



EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0803-R2
Date of Issue : Jun. 10, 2019
Product name : Decoder Board
Model/Type No. : SPD-260B
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 KS Q ISO/IEC 17025 and KOLAS.

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Dec. 07, 2017	KES-E1-17T0803	Issued
May. 16, 2019	KES-E1-17T0803-R1	Changed customer's address and factory addition due to customer request.
Jun. 10, 2019	KES-E1-17T0803-R2	Changed model name 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	2ea (1ea : up-to 4K, 1ea : up-to 1080p)
		VGA	2ea (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	1ea
		Format	1920*1080@60Hz, 1280*720@60Hz
	LED		Decoding Operation
	Electrical	Power	12V/5V/3.3V
		Power Consumption	Max, 9W
	Environmental	Operating Temperature	+0°C ~ +40°C
		Humidity	20% ~ 85% RH
	Mechanical	Dimension (WxHxD)	173.6 X 40.4 X 158.9 (mm)
		Weight	284g
S/W	Video	Codec	H.265/H.264/MJPEG
		Support Resolution	5M(2592x1944), 3M(2048x1536), 2M(1920x1080, 1600x1200), 1.3M and below (1280x1024, 1280x960, 1280x720, 800x600, 720x576, 704x576, 640x480, 640x360, 352x288, 320x240, 320x180, 176x144), Halfway mode (1080x1920, 720x1280)
		Max. Channel	4CH 4K@30fps, 16CH 2M(1080P)@30fps
		Max. Decoding Performance	30fps@8MP, up-to 12MP
		Division (/monitor)	(HDMI) 1/4/6/8/9/13/16/2V/3V
		Layout	Up-to 20ea/monitor, Sequence support
		Enhanced Mode	Support (All decoding capability move to one video output port)
	Audio	Codec	G.711/G.726/AAC

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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
Decoder Board	SPD-260B	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Network Video Decoder Rack	SPD-1660R	-	Hanwha Techwin (Tianjin) Co.,Ltd	-
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.	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Decoder Board (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
	PCI Express 1X	Network Video Decoder Rack	PCI Express 1X	-	-
PoE Adaptor	RJ-45 (Data)	Notebook	RJ-45 (Data)	3.0	U
	RJ-45 (PoE)	Camera	RJ-45 (PoE)	3.0	U
	RJ-45	Network Video Decoder Rack	RJ-45	3.0	U

* Unshielded=U, Shielded=S

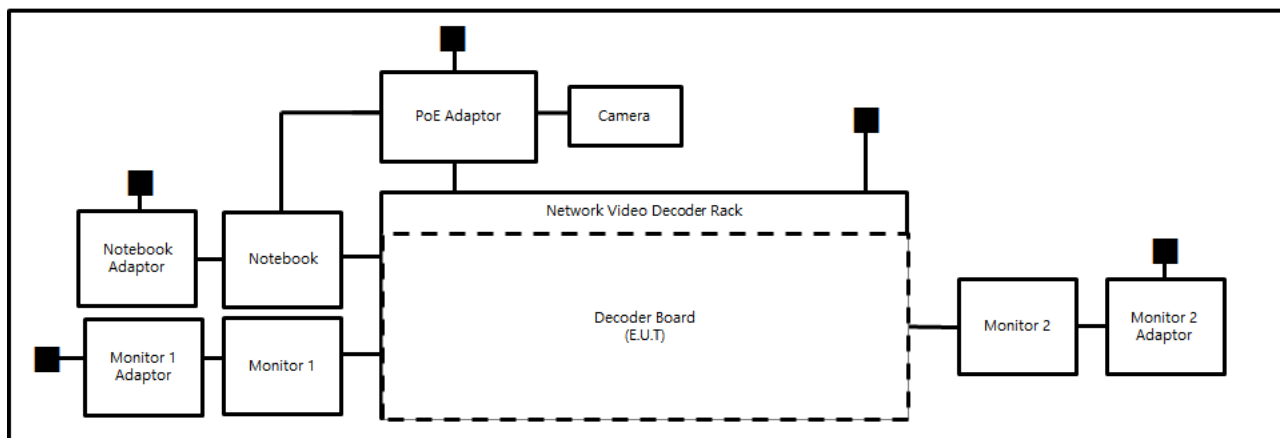
1.7 E.U.T Operating Mode(s)

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.

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 2 output HDMI ports was used.
2. Only one of the 2 output D-SUB 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-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547:2009

☒ EN 55032:2012/AC:2013

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☐ EN 61326-1:2013



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

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2.1 Conducted Emissions at Mains Power Ports

Test Date

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

RemarksSee Appendix A for test data.

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2.2 Conducted Emissions at Telecommunication Ports

Test Date

N/A

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	101781	04, 27, 2018
☐	LISN	ENV216	R & S	101787	01, 11, 2018
☐	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☐	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
☐	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 11, 2018
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 11, 2018

Test Conditions

Temperature: °C

Relative Humidity: %

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

N/A

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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

RemarksSee Appendix A for test data.

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2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Nov. 30, 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.

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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

RemarksSee Appendix A for test data.

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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

RemarksSee Appendix A for test data.

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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.

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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

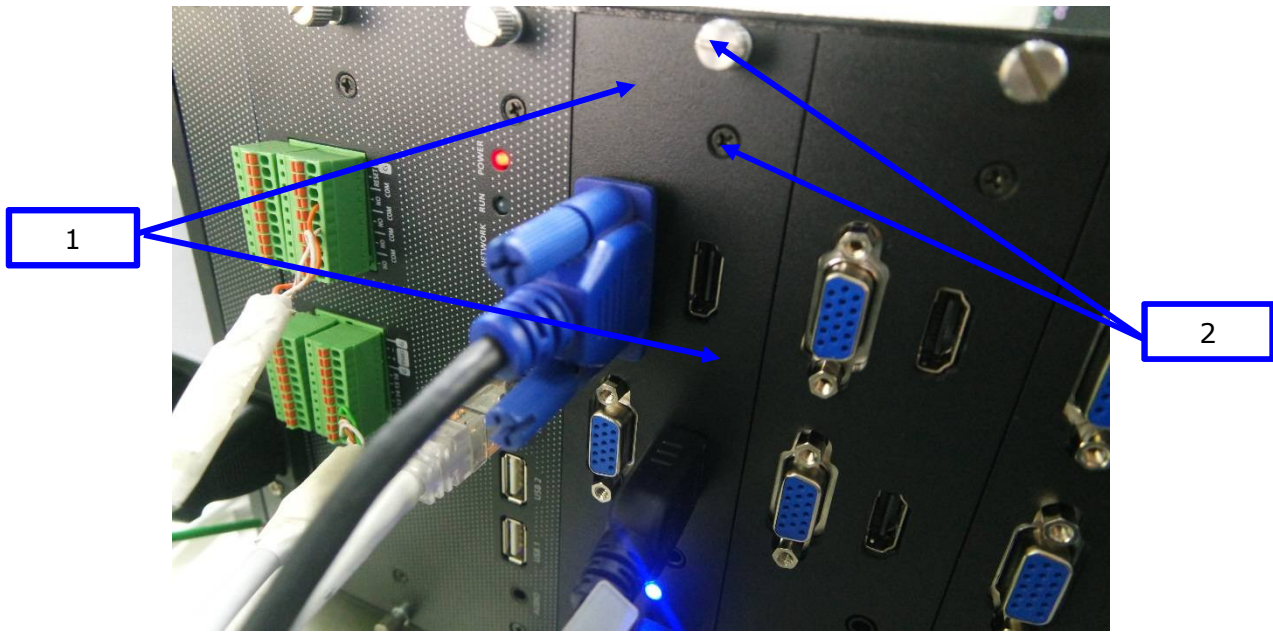
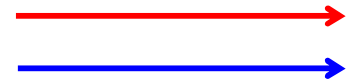
Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

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.

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Nov. 30, 2017

Test LocationEMS-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	-
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	09, 04, 2019

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 % R.H., 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % R.H. 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

Dec. 01, 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 ☒ ± 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 klz ☒ 100 klz

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)
-	-	-

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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3.4 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

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Test Specifications

AC Power Lines

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

Surge Amplitude :

Common Mode

☒ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

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

Polarity:

☒ Positive & Negative

Repetition Rate:

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

Required Performance Criteria: ☒ Complied

Other supply / Signal Lines

Source Impedance:

42 ohm for common mode

Surge Amplitude:

Common Mode

☐ (0,5 / 1,0) kV

Number of Surges:

☐ 5 Surges

Polarity:

☐ Positive & Negative

Repetition Rate:

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

Required Performance Criteria: ☐ Complied

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Test Data☒ Line to 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)
-	-	-

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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3.5 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 % R.H., 1 kHz sine wave

☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step:

☒ 1 % R.H. 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
-	-	-

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.

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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

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Test Specifications & Observations/Remarks

(Test Voltage : 230 V)

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

- Voltage variations

☒ Unom + 10 % R.H. ☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 % R.H. ☒ 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.

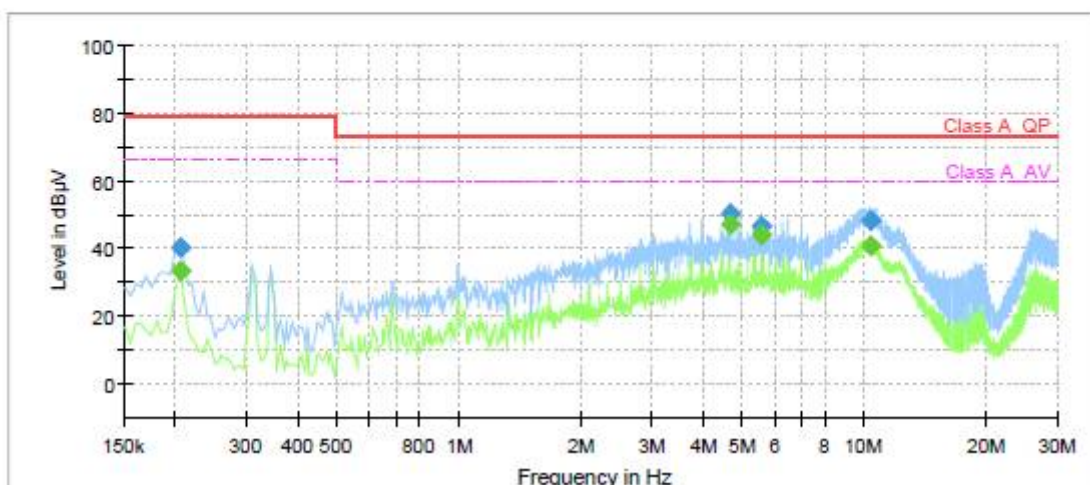
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SPD-260BP
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	---	33.44	66.00	32.56	1000.0	9.000	L1	19.4
0.205000	40.08	---	79.00	38.92	1000.0	9.000	L1	19.4
4.665000	---	47.09	60.00	12.91	1000.0	9.000	L1	19.9
4.665000	50.07	---	73.00	22.93	1000.0	9.000	L1	19.9
5.595000	---	43.89	60.00	16.11	1000.0	9.000	L1	19.8
5.595000	46.65	---	73.00	26.35	1000.0	9.000	L1	19.8
10.375000	---	40.52	60.00	19.48	1000.0	9.000	L1	19.7
10.375000	48.17	---	73.00	24.83	1000.0	9.000	L1	19.7

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[NEUTRAL]

Common Information

Test Description:

Model No.:

Mode

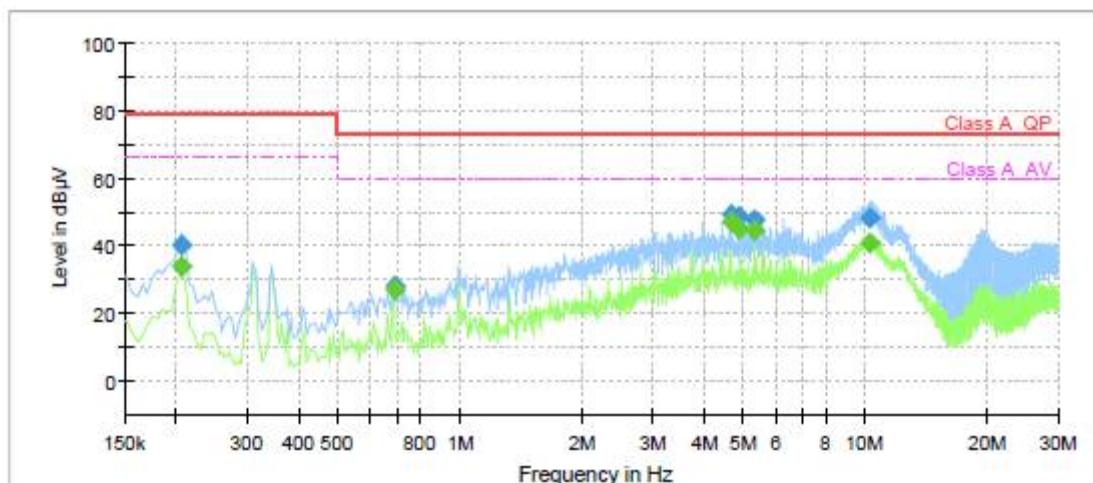
Operator Name:

Conducted Emission

SPD-260BP

N

KES



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	33.74	66.00	32.26	1000.0	9.000	N	19.4
0.205000	40.30	---	79.00	38.70	1000.0	9.000	N	19.4
0.690000	---	26.79	60.00	33.21	1000.0	9.000	N	19.7
0.690000	27.91	---	73.00	45.09	1000.0	9.000	N	19.7
4.660000	---	47.07	60.00	12.93	1000.0	9.000	N	19.9
4.660000	49.20	---	73.00	23.80	1000.0	9.000	N	19.9
4.895000	---	44.76	60.00	15.24	1000.0	9.000	N	19.9
4.895000	48.51	---	73.00	24.49	1000.0	9.000	N	19.9
5.360000	---	44.56	60.00	15.44	1000.0	9.000	N	19.8
5.360000	47.59	---	73.00	25.41	1000.0	9.000	N	19.8
10.275000	---	40.80	60.00	19.20	1000.0	9.000	N	19.7
10.275000	48.00	---	73.00	25.00	1000.0	9.000	N	19.7

◆ Calculation

$$\text{QuasiPeak [dBuV]} / \text{CAverage [dBuV]} = \text{Reading Value [dBuV]} + \text{Corr. [dB]}$$

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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Conducted Emissions at Telecommunication Ports

[10 Mbps]

N/A

◆ 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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[100 Mbps]

N/A

◆ 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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[1 000 Mbps]

N/A

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

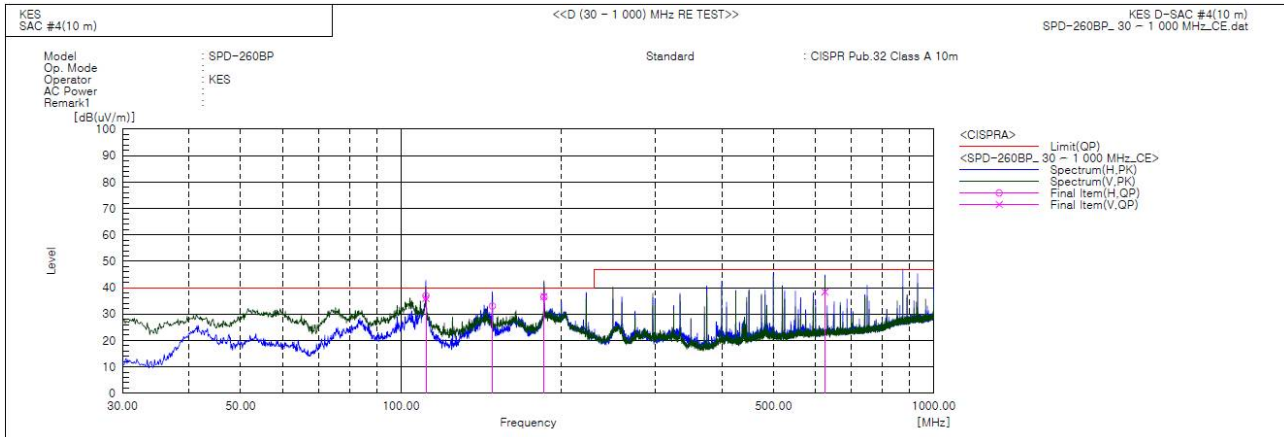
Reading Value : Not shown in the table.

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

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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	111.359	H	66.4	-29.5	36.9	40.0	3.1	485.0	278.0	
2	111.359	V	65.4	-29.5	35.9	40.0	4.1	112.0	314.0	
3	148.461	H	64.5	-31.5	33.0	40.0	7.0	381.0	297.0	
4	185.564	H	65.2	-28.7	36.5	40.0	3.5	394.0	210.0	
5	185.564	V	65.4	-28.7	36.7	40.0	3.3	131.0	214.0	
6	624.974	V	52.7	-14.3	38.4	47.0	8.6	147.0	341.0	

◆ Calculation – SAC #4(10 m)

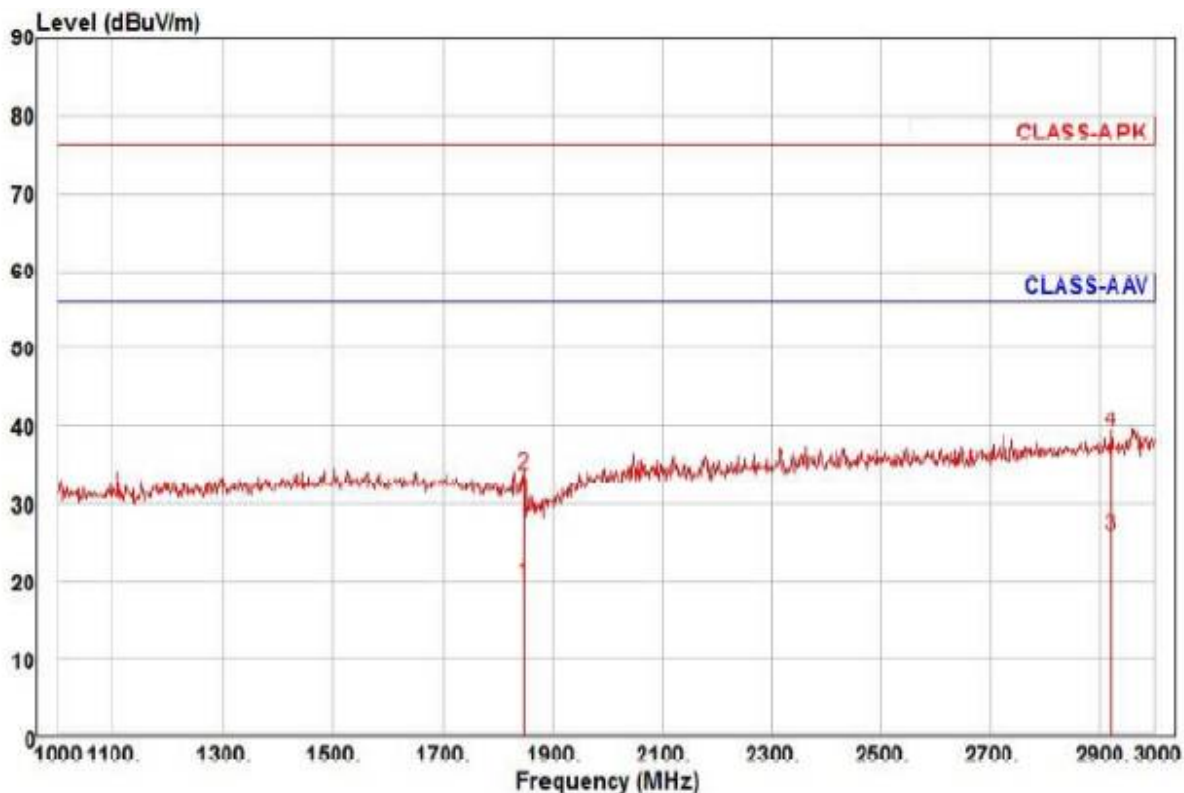
Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

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-260BP

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	1848.00	19.79	25.98	9.23	35.31	203	56.00	-36.31	horizontal	Average
2	1848.00	33.82	25.98	9.23	35.31	203	76.00	-42.28	horizontal	Peak
3 pp	2920.00	21.23	28.30	11.93	35.53	120	56.00	-30.07	horizontal	Average
4 pk	2920.00	34.46	28.30	11.93	35.53	120	76.00	-36.84	horizontal	Peak

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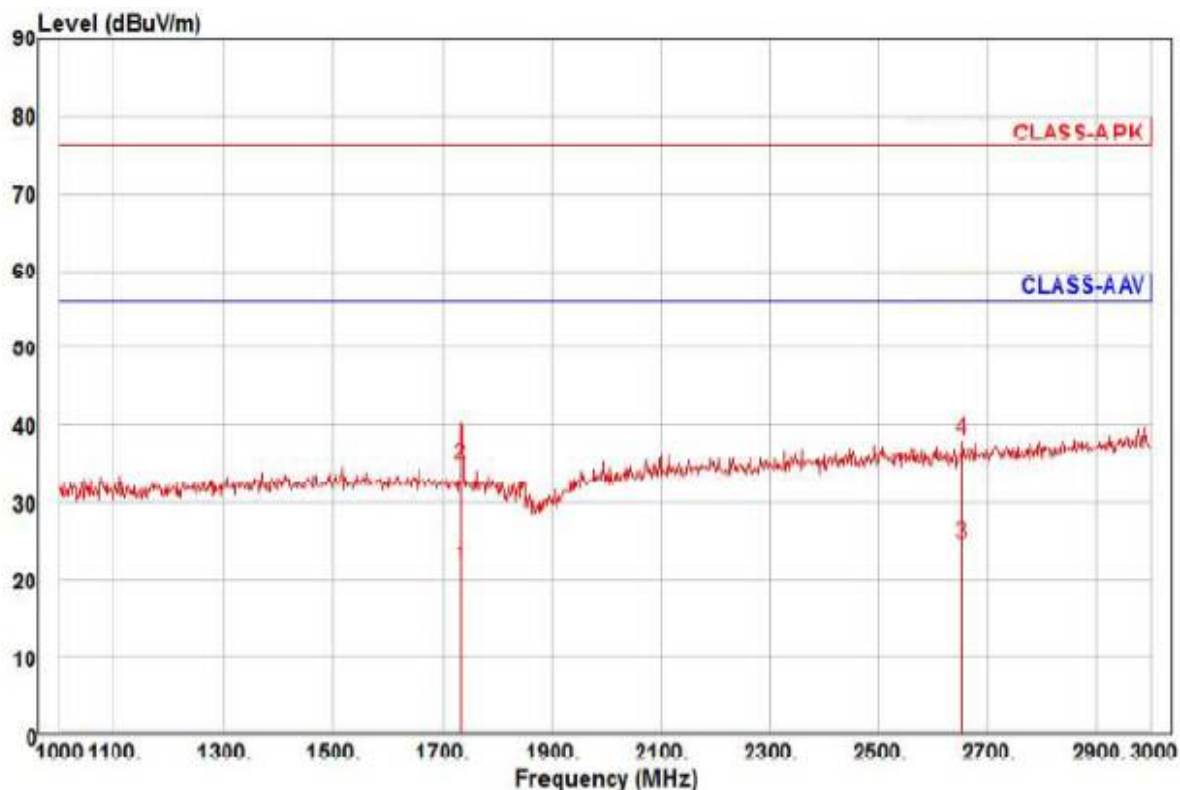
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m BBHA 9120D(RRA 2019-09-04) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPD-260BP
Mode :
Memo : 1 ~ 3 GHz

	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	1736.00	22.35	25.85	8.90	35.40	211	56.00	-34.30	vertical	Average
2	1736.00	35.62	25.85	8.90	35.40	211	76.00	-41.03	vertical	Peak
3 pp	2654.00	21.31	27.61	11.21	35.43	274	56.00	-31.30	vertical	Average
4 pk	2654.00	34.63	27.61	11.21	35.43	274	76.00	-37.98	vertical	Peak

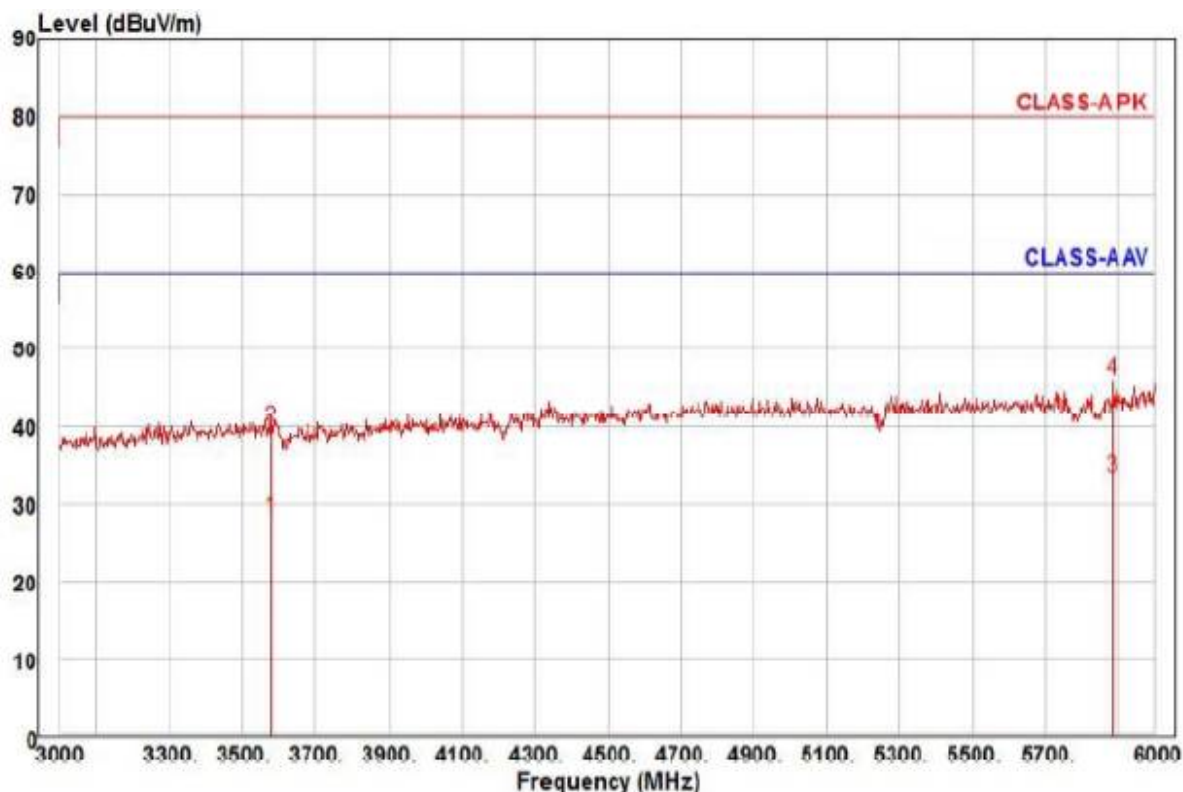
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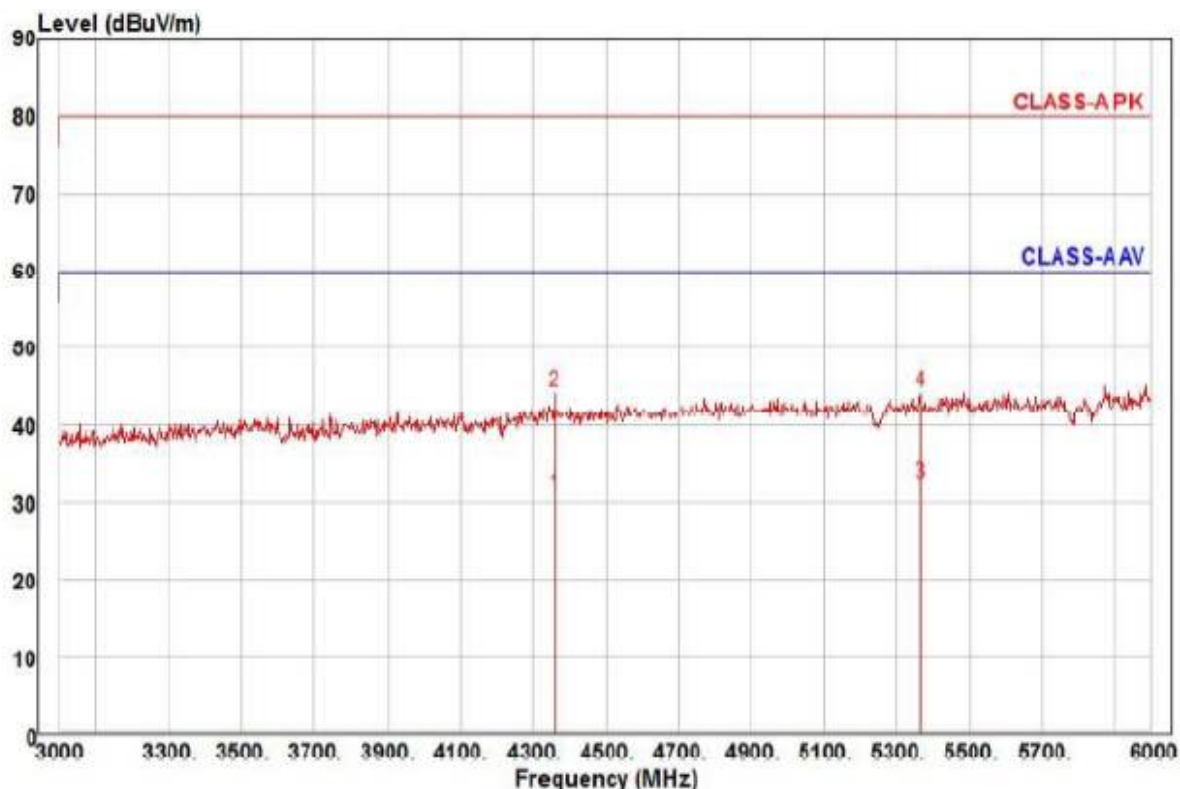
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m BBHA 9120D(RRA 2019-09-04) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SPD-260BP
Mode :
Memo : 3 ~ 6 GHz

	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	3576.00	21.29	29.02	13.24	35.40	311	60.00	-31.85	horizontal	Average
2	3576.00	33.13	29.02	13.24	35.40	311	80.00	-40.01	horizontal	Peak
3 pp	5886.00	19.54	32.41	17.30	35.68	82	60.00	-26.43	horizontal	Average
4 pk	5886.00	32.14	32.41	17.30	35.68	82	80.00	-33.83	horizontal	Peak

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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-260BP
Mode :
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	4359.00	21.35	30.60	14.72	35.41	176	60.00	-28.74	vertical	Average
2	4359.00	34.42	30.60	14.72	35.41	176	80.00	-35.67	vertical	Peak
3 pp	5367.00	20.22	31.69	16.39	35.65	140	60.00	-27.35	vertical	Average
4 pk	5367.00	31.98	31.69	16.39	35.65	140	80.00	-35.59	vertical	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

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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	298.742E-3			
2	656.790E-6			PASS
3	198.816E-3	9.605	2.07	PASS
4	926.938E-6			PASS
5	36.021E-3	3.511	1.03	PASS
6	899.301E-6			PASS
7	18.484E-3	2.667	693.00E-3	PASS
8	853.696E-6			PASS
9	26.057E-3	7.238	360.00E-3	PASS
10	895.713E-6			PASS
11	13.424E-3	4.520	297.00E-3	PASS
12	786.754E-6			PASS
13	7.172E-3	3.795	189.00E-3	PASS
14	735.030E-6			PASS
15	7.806E-3	5.782	135.00E-3	PASS
16	743.563E-6			PASS
17	7.611E-3	6.390	119.11E-3	PASS
18	705.426E-6			PASS
19	5.323E-3	4.994	106.58E-3	PASS
20	703.026E-6			PASS
21	3.774E-3			PASS
22	715.059E-6			PASS
23	4.271E-3			PASS
24	847.712E-6			PASS
25	2.942E-3			PASS
26	690.288E-6			PASS
27	2.202E-3			PASS
28	663.477E-6			PASS
29	1.712E-3			PASS
30	686.601E-6			PASS
31	1.048E-3			PASS
32	642.919E-6			PASS
33	1.010E-3			PASS
34	683.039E-6			PASS
35	1.164E-3			PASS
36	667.732E-6			PASS
37	1.416E-3			PASS
38	783.268E-6			PASS
39	1.122E-3			PASS
40	711.567E-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 - Harmonics (continued)**Maximum harmonic current results**

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	299.298E-3			
2	824.055E-6			PASS
3	199.204E-3	4.331	4.60	PASS
4	1.289E-3			PASS
5	36.211E-3	1.588	2.28	PASS
6	1.057E-3			PASS
7	18.825E-3	1.222	1.54	PASS
8	1.082E-3			PASS
9	26.442E-3	3.305	800.00E-3	PASS
10	1.041E-3			PASS
11	13.625E-3	2.064	660.00E-3	PASS
12	1.075E-3			PASS
13	7.395E-3	1.761	420.00E-3	PASS
14	921.591E-6			PASS
15	8.001E-3	2.667	300.00E-3	PASS
16	960.162E-6			PASS
17	7.795E-3	2.945	264.70E-3	PASS
18	842.927E-6			PASS
19	5.473E-3	2.311	236.84E-3	PASS
20	792.223E-6			PASS
21	3.921E-3			PASS
22	815.800E-6			PASS
23	4.567E-3			PASS
24	1.268E-3			PASS
25	3.311E-3			PASS
26	825.524E-6			PASS
27	2.508E-3			PASS
28	765.594E-6			PASS
29	1.988E-3			PASS
30	845.634E-6			PASS
31	1.464E-3			PASS
32	745.068E-6			PASS
33	1.126E-3			PASS
34	789.381E-6			PASS
35	1.301E-3			PASS
36	933.006E-6			PASS
37	1.565E-3			PASS
38	1.104E-3			PASS
39	1.273E-3			PASS
40	960.712E-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

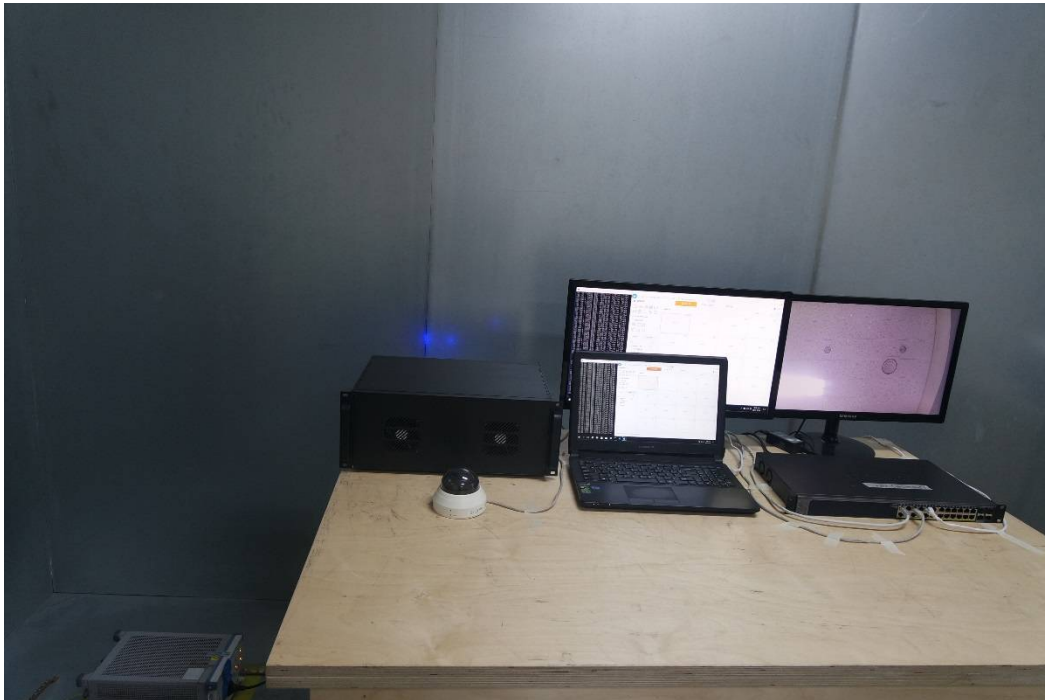
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.034	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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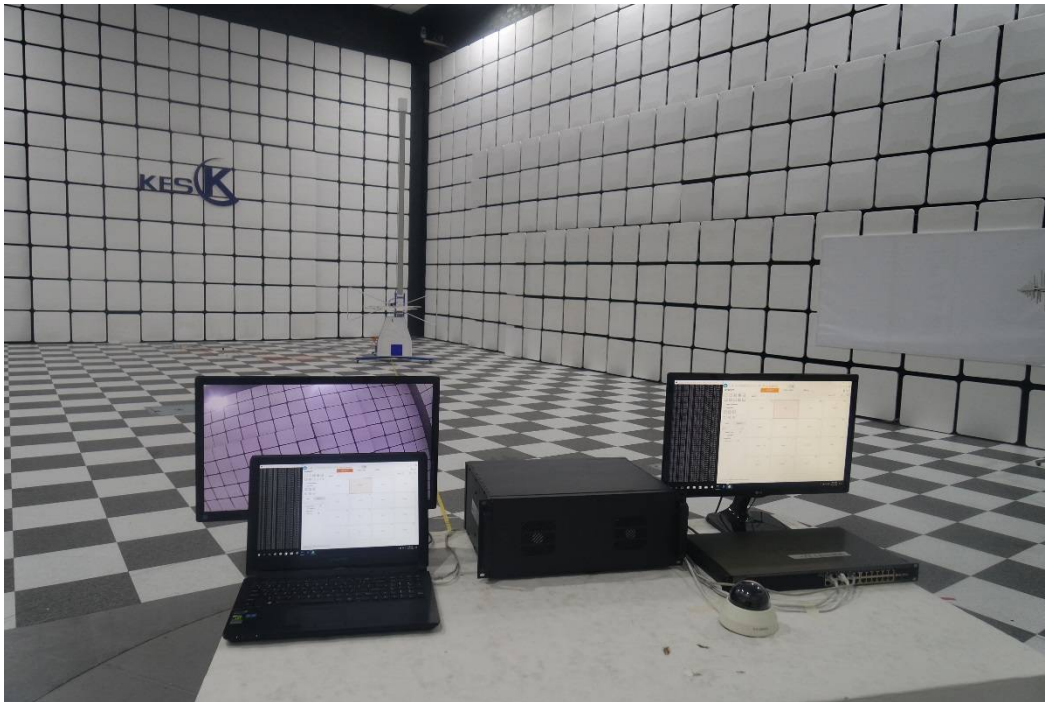
Conducted Telecommunication Emissions

N/A

N/A

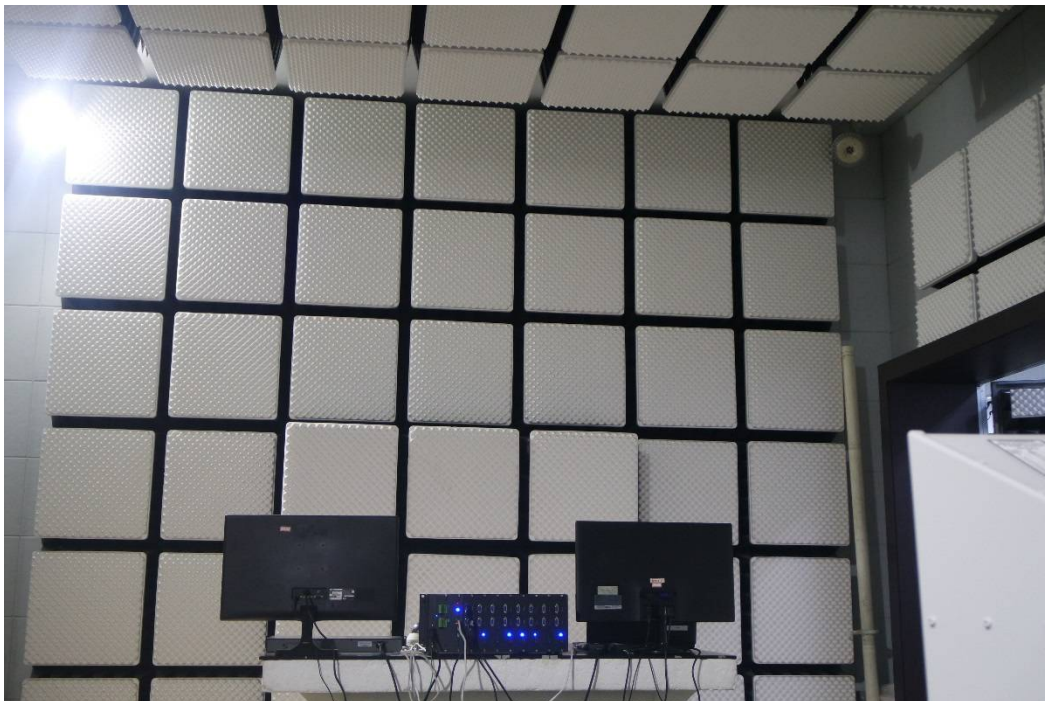
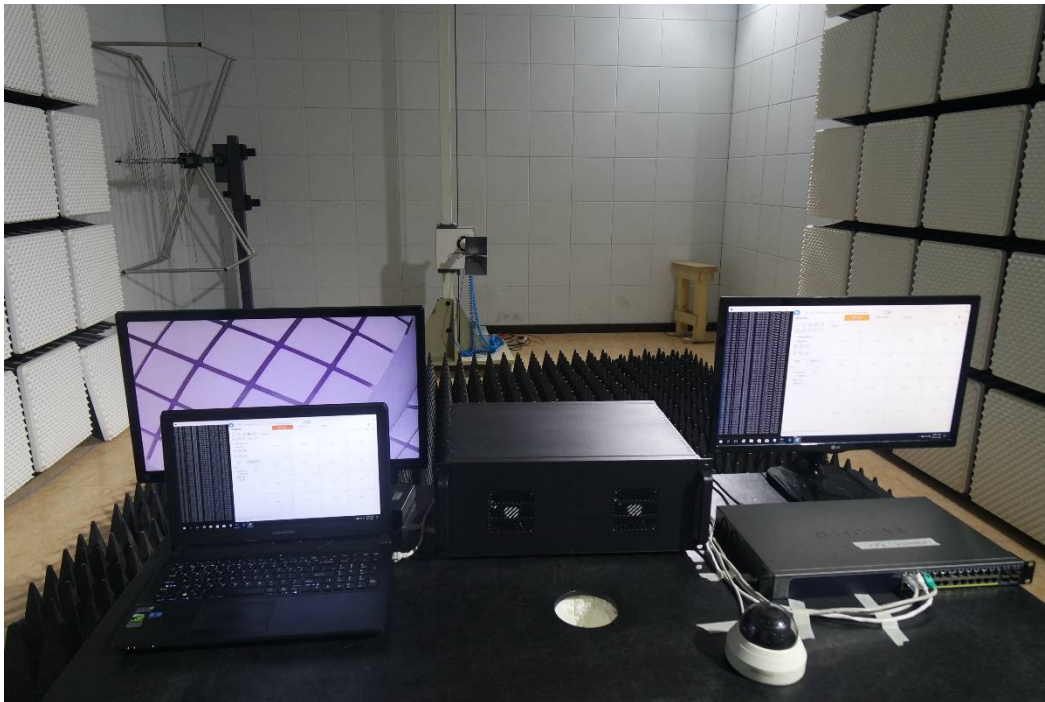
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

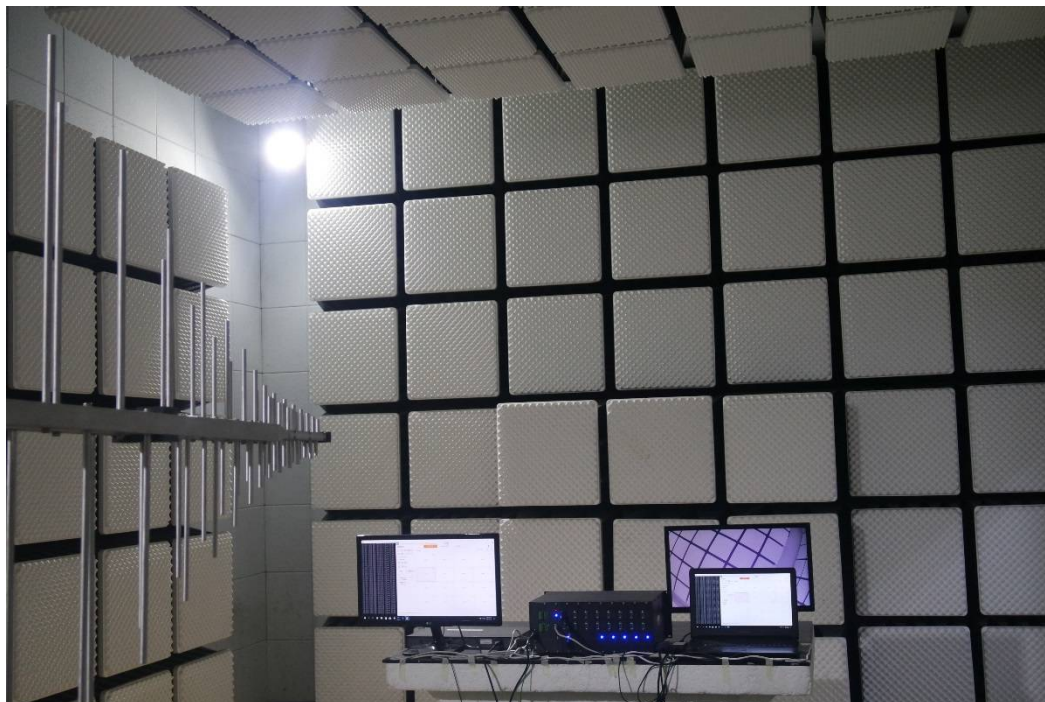


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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients

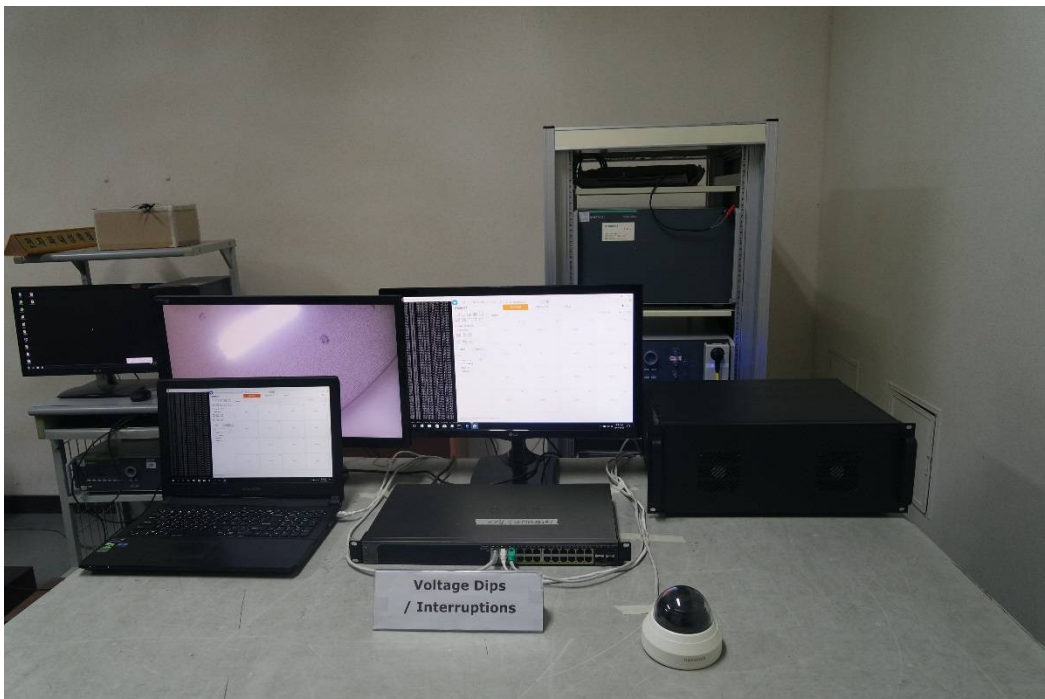


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Conducted Disturbance



Voltage Dips and Short Interruptions



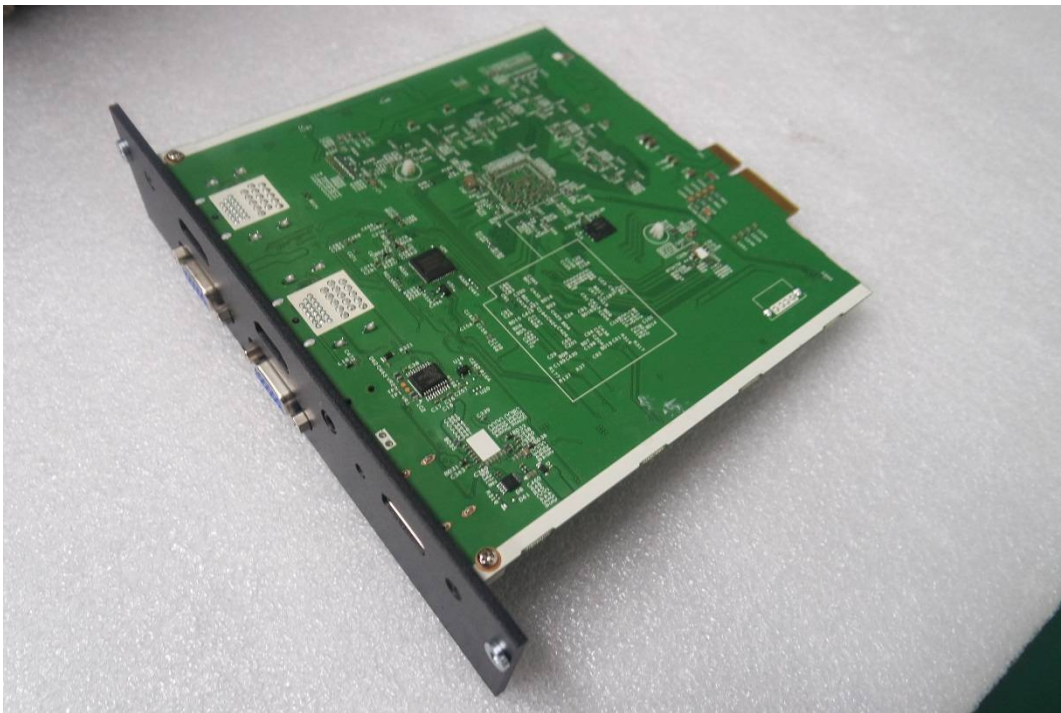
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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View 1)



(Internal View 2)



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Label and Location



Decoder Board

Model No : SPD-260B

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

Made in China

