



EMC TEST REPORT For CE

Test Report No. : KES-E1-18T0652-R1
Date of Issue : May. 16, 2019
Product name : DECODER
Model/Type No. : SPD-151
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. 12, 2018
Test date : Nov. 17, 2018 ~ Nov. 21, 2018
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dong Hyun, Won
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
Nov. 22, 2018	KES-E1-18T0652	Issued
May. 16, 2019	KES-E1-18T0652-R1	Re-issue due to application regulations update

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1.0 General Product Description

Main Specifications of EUT are:

항목			세부 설명
H/W	CPU		임베디드 CPU
	운영 체제		임베디드 리눅스
	출력	HDMI	1개 (최대 4K)
		VGA	1개 (최대 1080p)
		CVBS	1개
		비디오 출력 포맷	3840x2160@60HZ/30HZ(HDMI), 2560x1440@60HZ/30HZ(HDMI), 1920x1080@60HZ, 1280x1024@60H, 1280x720@60Hz
	외장장치	이더넷	1개 (10/100/1000BASE-T)
		USB	USB 2.0 2개 (Reserved)
		오디오 출력	1개
		LED	전원, 네트워크
	환경 사양	동작 온도	0°C ~ +40°C (+32°F ~ +104°F)
		동작 습도	20% ~ 85% RH
	전기적 사양	전원	12V DC, PoE (IEEE802.3af)
		소비 전력	최대 8.4W (12V DC), 최대 8.4W (PoE)
	외관	색상 / 재질	진회색 / 메탈
		외형 치수 (WxHxD)	178.0 x 34.0 x 187.8mm (7.01" x 1.34" x 7.39")
		무게	Approx. 0.68Kg (1.50 lb)

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항목			세부 설명
S/W	비디오	코덱	H.265/H.264/MJPEG
		디스플레이 성능	16x2M(1080P)@30fp, 8MP@30fps
		카메라 해상도	최대 12MP
		대역폭	200Mbps
		분할화면	(HDMI) 1/2x2/3x3/4x4/5x5/6x6(32Ch Only) (VGA) 1/2x2/3x3/4x4 (CVBS) 1
		레이아웃	최대 20개/모니터, 시퀀스 지원
	병합	모니터 병합	1x2, 2x1
		타일 병합	지원
	오디오	코덱	G.711/G.726/AAC
	관리 소프트웨어		Web-Viewer, SSM (Over 2.10.3)
	OS		Windows : 7, 8.1, 10 Mac OS X : 10.10, 10.11, 10.12, 10.13
	웹 브라우저		Google Chrome 63, Apple Safari 11 (Mac OS X only), MS Edge 41, MS Explorer 11
	시간 설정		NTP/수동
	내보내기 / 가져오기		Configuration Export/Import
	로그		최대 20000 (System log, Event log each)
	프로토콜		Over SUNAPI 2.3, SVNP support

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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
DECORDER	SPD-151	-	Hanwha Techwin (Tianjin) Co.,Ltd.	EUT

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Network Camera	QND-6070RCH	-	Hanwha Techwin (Tianjin) Co.,Ltd.	-
PoE Adaptor	PD-3001GC/AC	RD9356082016964200	Power Dsine	-
Notebook	LG15N54	410NZET022292	LG Electronics	-
Notebook Adaptor	PA-1900-08	9702591703	Dongguang Lite Power 2nd Plant	-
Monitor 1	A2514_DPN	CN07BN4400591BSK28F5NK904	11ssan Elecom(shen yang) Co., Ltd	-
Monitor 1 Adaptor	A4514_DSM	CN078N4400721ASE38GCOYOXS R · S	SAMSUNG ELECTRONIC JAPAN Co., Ltd.	-
Monitor 2	LT23C350	009MHYCH106388P	삼성전자(주)	-
Monitor 2 Adaptor	A4514_DDY	CN07BN44-00593BD07G690189	SAMSUNG ELECTRONIC JAPAN Co., Ltd.	-
Monitor 3	SMT-2233	ZC6U67VH500194D	Weihai Daewoo Electronics Co., Ltd.	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
USB 2.0 Memory	-	-	-	4 GB

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1.6 External I/O Cabling

■ DC 12 V MODE

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DECORDER (EUT)	RJ-45	PoE Adaptor	RJ-45	4.0	U
	D - SUB	Monitor 1	D - SUB	1.7	S
	HDMI	Monitor 2	HDMI	1.8	S
	BNC	Monitor 3	BNC	4.0	S
	3.5 mm	Speaker	3.5 mm	1.4	U
	USB	USB 2.0 Memory	USB	-	-
PoE Adaptor	RJ-45	Notebook	RJ-45	3.0	U
	RJ-45	Network Camera	RJ-45	3.0	U

* Unshielded=U, Shielded=S

■ PoE MODE

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DECORDER (EUT)	RJ-45	PoE Adaptor	RJ-45	4.0	U
	D - SUB	Monitor 1	D - SUB	1.7	S
	HDMI	Monitor 2	HDMI	1.8	S
	BNC	Monitor 3	BNC	4.0	S
	3.5 mm	Speaker	3.5 mm	1.4	U
	USB	USB 2.0 Memory	USB	-	-
PoE Adaptor	RJ-45	Notebook	RJ-45	3.0	U
	RJ-45	Network Camera	RJ-45	3.0	U

* Unshielded=U, Shielded=S

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1.7 EUT Operating Mode(s)

Test Mode	operating
DC 12 V	EUT Monitoring, Ping Test
PoE	EUT Monitoring, Ping Test

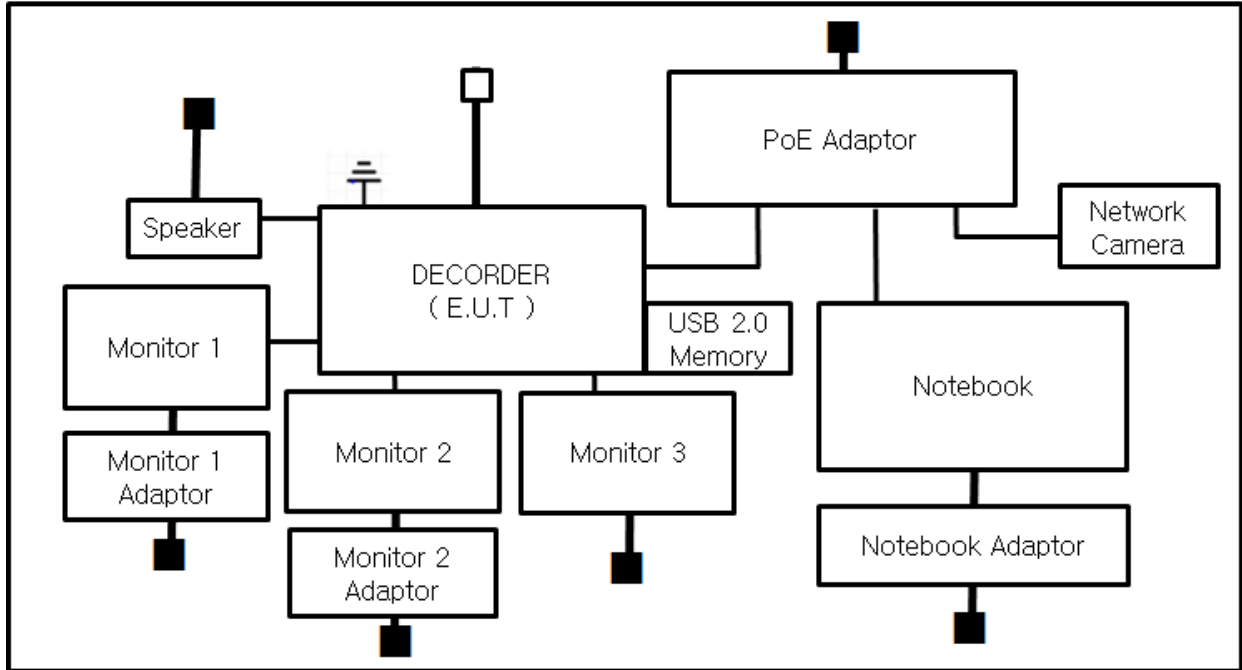
EUT Test operating S/W		
Name	Version	Manufacture Company
WebViewer	-	Hanwha Techwin Co., Ltd.

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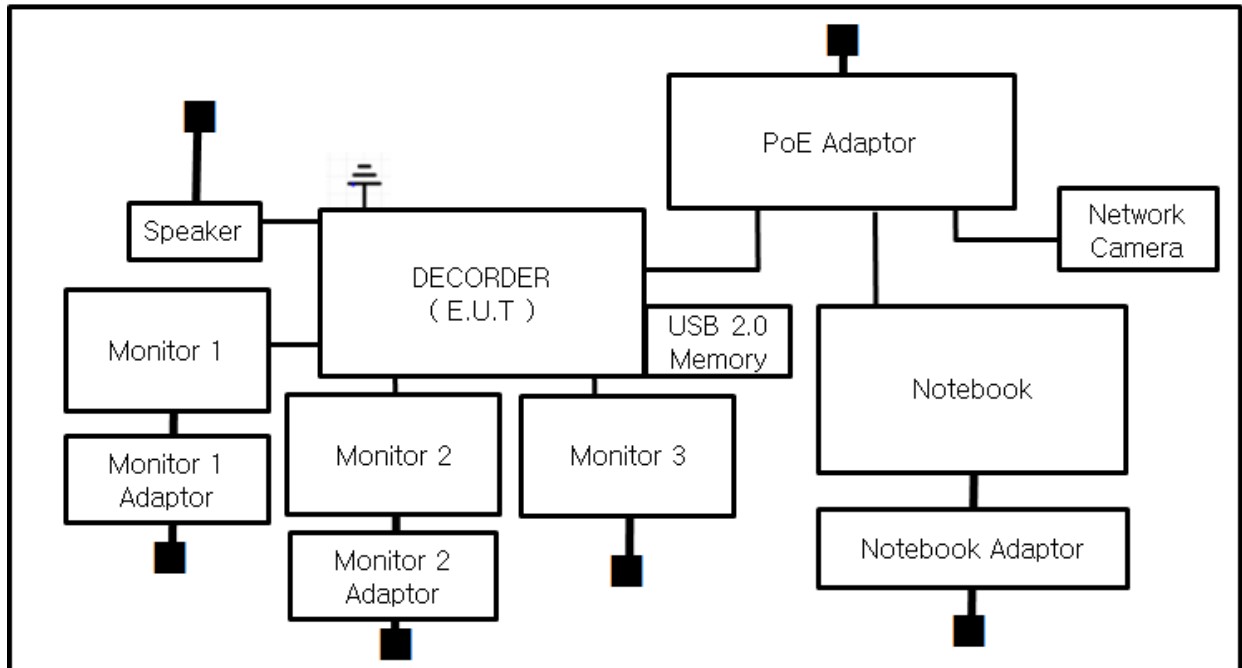
1.8 Configuration

■ AC Main
 □ DC Main

■ DC 12 V MODE



■ PoE MODE



1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	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

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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+A1:2014

☐ 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

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test S/W	EMC32	R & S	9.12.00	-
☐	EMI TEST RECEIVER	ESR3	R & S	101781	04, 25, 2019
☐	LISN	ENV216	R & S	101787	01, 05, 2019
☐	LISN	ESH2-Z5	R & S	100450	04, 25, 2019
☐	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018

Test Conditions

Temperature:

°C

Relative Humidity:

% 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

N/A : It is not tested apply because it is powered by DC and PoE.



2.2 Conducted Emissions at Telecommunication Ports

Test Date

Nov. 18, 2018

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	04, 25, 2019
☒	LISN	ENV216	R & S	101137	01, 31, 2019
☒	LISN	ENV216	R & S	101786	04, 25, 2019
☒	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 22, 2018
☐	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 22, 2019
☒	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 10, 2019

Test Conditions

Temperature: 23,1 °C
Relative Humidity: 53,0 % 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.

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2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Nov. 17, 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: 22,6 °C

Relative Humidity: 53,4 % 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. 18, 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, 06, 2019
☒	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 Conditions

Temperature: 22,8 °C
Relative Humidity: 53,0 % 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

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
☐	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2019
☐	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature:

°C

Relative Humidity:

% 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

N/A : It is not tested apply because it is powered by DC and PoE.



2.6 Voltage Fluctuations and Flicker

Test Date

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☐	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
☐	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2019
☐	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Test Results

The requirements are:

- ☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks

N/A : It is not tested apply because it is powered by DC and PoE.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

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

The variety and the diversity of the apparatus within the scope of this document makes it

difficult to define precise criteria for the evaluation of the immunity test results.

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

A functional description and a definition of performance by the manufacture and noted in the test

report, based on the following criteria:

Electrostatic discharge

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

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

Radiated electromagnetic fields

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

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

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

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

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

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

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

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



Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or
any
change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or
any
change in outputs, which could be interpreted by associated equipment as a change,
and no such flickering of indicators oeuvres at $U = 130 \text{ dB}\mu\text{V}$.
For component of CCTV systems, where the status is monitored by observing the TV picture,
then deterioration of the picture is allowed at $U = 140 \text{ dB}\mu\text{V}$, providing:
(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
(b) at $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could
still be used; and
(c) there in no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

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



3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Nov. 19, 2018

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 11, 2019
☒	HCP	-	KES	-	-
☒	VCP	-	KES	-	-

Test Conditions

Temperature: 23,1 °C
Relative Humidity: 53,0 % R.H.
Atmospheric Pressure: 101,0 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

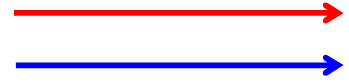
Discharge Voltage:	Contact	Air	HCP	VCP
	☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

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

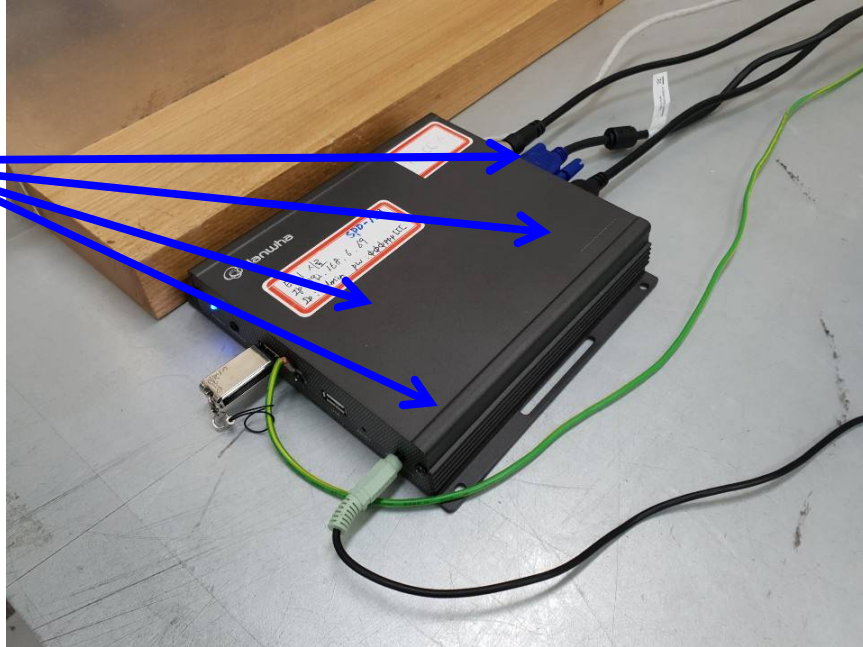
Required Performance Criteria: ☒ Complied

Location of Discharge:

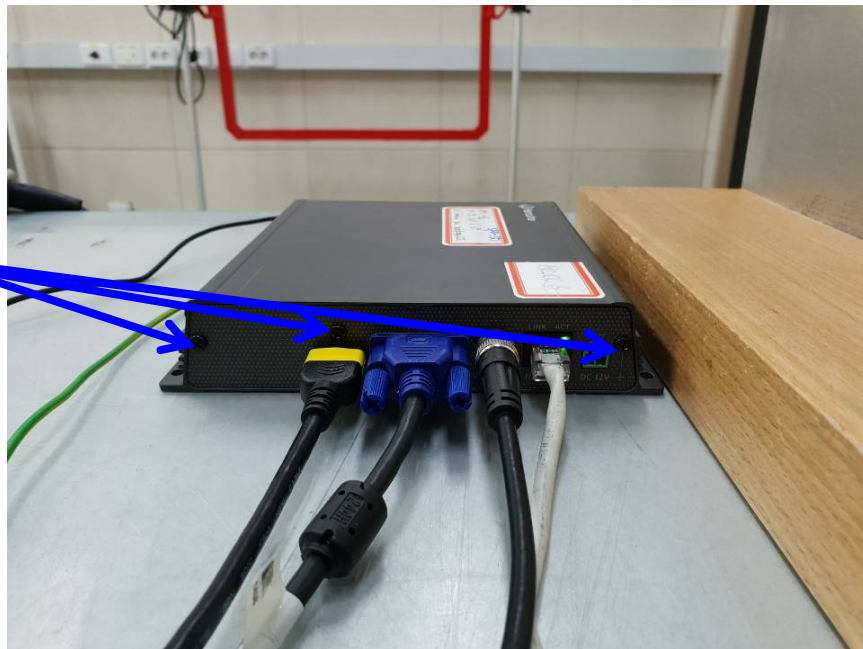
Air
Contact



1



2



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Test Data

■ DC 12 V MODE

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

■ PoE MODE

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. 20, 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, 06, 2019
☒	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 06, 2019
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 06, 2019
☒	POWER METER	NRP2	R & S	103475	08, 06, 2019
☒	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 06, 2019
☒	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 06, 2019
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 06, 2019
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions

Temperature: 22,7 °C
Relative Humidity: 52,9 % R.H.
Atmospheric Pressure: 101,4 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**■ DC 12 V MODE**

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

■ PoE MODE

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

RemarksPASS Required Performance Criteria

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Nov. 19, 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, 2019
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2019
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2019

Test Conditions

Temperature: 22,8 °C
Relative Humidity: 52,1 % R.H.
Atmospheric Pressure: 101,2 kPa

Test Specifications

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

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

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 klz ☒ 100 klz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ Complied

Test Data

■ DC 12 V MODE

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

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

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

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L1	Complied	Complied
L2	Complied	Complied
L1 – L2	Complied	Complied

☒ Signal ports and telecommunication ports – Coupling Clamp used

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

■ PoE MODE

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

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

☐ 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
BNC	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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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Nov. 19, 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	06, 26, 2019
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2019
☒	CDN	CNV 508N1	EM TEST	P1551168979	04, 25, 2019
☐	CDN	CNV 508T5	EM TEST	P1549168422	04, 25, 2019

Test Conditions

Temperature: 22,8 °C
Relative Humidity: 52,1 % R.H.
Atmospheric Pressure: 101,2 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

■ DC 12 V MODE

☐ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L1 – PE	Complied	Complied
L2 – PE	Complied	Complied

Signal Lines☒ Line to Earth – Common Mode

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

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■ PoE MODE☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines☒ Line to Earth – Common Mode

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

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Nov. 21, 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, 09, 2019
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 08, 2019
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 06, 2019
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 06, 2019
☒	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 02, 2019

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 53,1 % R.H.
Atmospheric Pressure: 101,3 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**■ DC 12 V MODE**☐ Input a.c. power ports

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

☒ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L1 – L2	CDN	Complied

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN	Complied
BNC	Clamp	Complied

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■ PoE MODE☐ Input a.c. power ports

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

☐ Input d.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN	Complied
BNC	Clamp	Complied

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

Observations:

Complied – No degradation of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**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

N/A

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, 2019
☐	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2019

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa

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Test Specifications & Observations/Remarks

(Test Voltage : 230 V)

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

- Voltage variations

☐ Unom + 10 %	☐ 253.0 V (ac)	<u>N/A</u>
☐ Unom - 15 %	☐ 195.5 V (ac)	<u>N/A</u>

Observations:

Complied – No degradation of function

Test Results

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

Remarks

N/A : It is not tested apply because it is powered by DC and PoE.



APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

N/A



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[NEUTRAL]

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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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Conducted Emissions at Telecommunication Ports

■ DC 12 V MODE

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

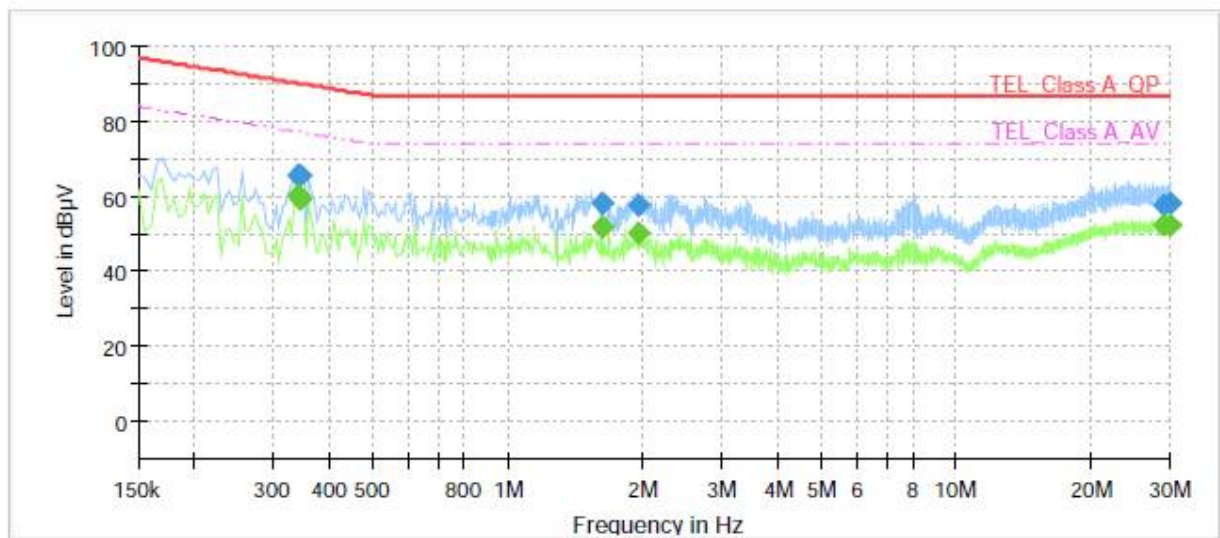
SPD-151

Mode

DC_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)
0.340000	---	60.27	77.20	16.93	1000.0	9.000	Single Line	19.5
0.340000	65.50	---	90.20	24.70	1000.0	9.000	Single Line	19.5
0.345000	---	59.46	77.08	17.62	1000.0	9.000	Single Line	19.5
0.345000	65.78	---	90.08	24.30	1000.0	9.000	Single Line	19.5
1.620000	---	52.12	74.00	21.88	1000.0	9.000	Single Line	20.0
1.620000	58.19	---	87.00	28.81	1000.0	9.000	Single Line	20.0
1.960000	---	50.21	74.00	23.79	1000.0	9.000	Single Line	20.0
1.960000	57.53	---	87.00	29.47	1000.0	9.000	Single Line	20.0
28.975000	---	52.28	74.00	21.72	1000.0	9.000	Single Line	20.7
28.975000	57.94	---	87.00	29.06	1000.0	9.000	Single Line	20.7
29.980000	---	52.47	74.00	21.53	1000.0	9.000	Single Line	20.8
29.980000	58.19	---	87.00	28.81	1000.0	9.000	Single Line	20.8

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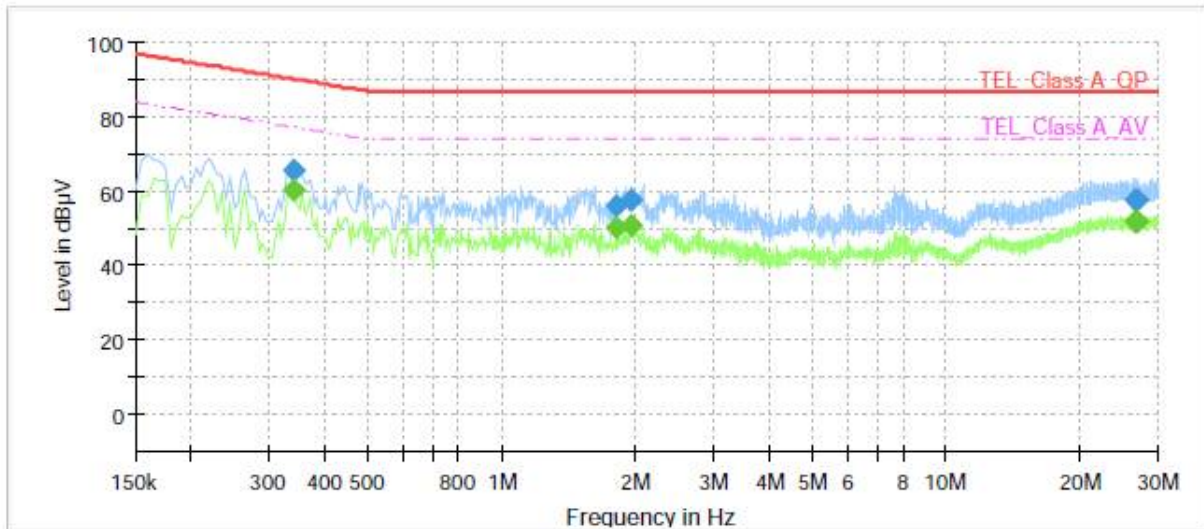
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[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: SPD-151
Mode: DC 1 000 Mbps
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.340000	---	60.37	77.20	16.83	1000.0	9.000	Single Line	19.7
0.340000	65.60	---	90.20	24.60	1000.0	9.000	Single Line	19.7
1.820000	---	50.23	74.00	23.77	1000.0	9.000	Single Line	20.1
1.820000	56.12	---	87.00	30.88	1000.0	9.000	Single Line	20.1
1.955000	---	50.62	74.00	23.38	1000.0	9.000	Single Line	20.1
1.955000	57.53	---	87.00	29.47	1000.0	9.000	Single Line	20.1
26.570000	---	51.71	74.00	22.29	1000.0	9.000	Single Line	20.2
26.570000	57.50	---	87.00	29.50	1000.0	9.000	Single Line	20.2
26.845000	---	51.74	74.00	22.26	1000.0	9.000	Single Line	20.2
26.845000	57.54	---	87.00	29.46	1000.0	9.000	Single Line	20.2

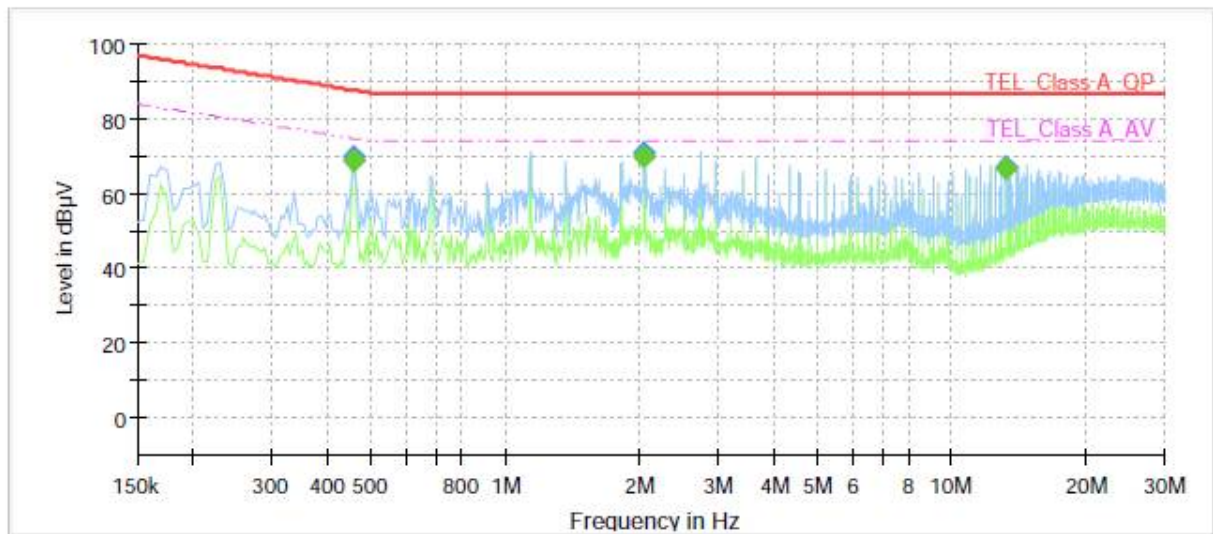
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■ PoE MODE

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-151
Mode	PoE_ 10 Mbps
Operator Name:	KES



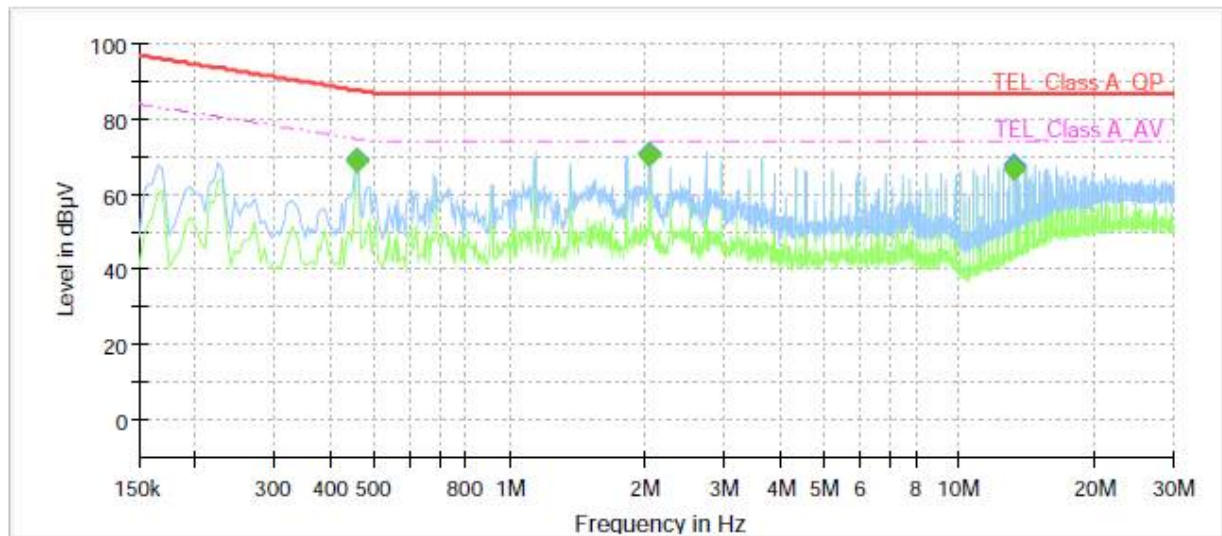
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.455000	---	68.58	74.78	6.20	1000.0	9.000	Single Line	19.6
0.455000	69.69	---	87.78	18.09	1000.0	9.000	Single Line	19.6
2.050000	---	70.07	74.00	3.93	1000.0	9.000	Single Line	20.0
2.050000	70.90	---	87.00	16.10	1000.0	9.000	Single Line	20.0
13.215000	---	66.68	74.00	7.32	1000.0	9.000	Single Line	19.9
13.215000	67.39	---	87.00	19.61	1000.0	9.000	Single Line	19.9

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
 Model No.: SPD-151
 Mode: PoE_ 1 000 Mbps
 Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.455000	---	68.73	74.78	6.05	1000.0	9.000	Single Line	19.7
0.455000	69.34	---	87.78	18.44	1000.0	9.000	Single Line	19.7
2.050000	---	70.16	74.00	3.84	1000.0	9.000	Single Line	20.1
2.050000	70.84	---	87.00	16.16	1000.0	9.000	Single Line	20.1
13.215000	---	66.79	74.00	7.21	1000.0	9.000	Single Line	20.0
13.215000	67.55	---	87.00	19.45	1000.0	9.000	Single Line	20.0

◆ 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))



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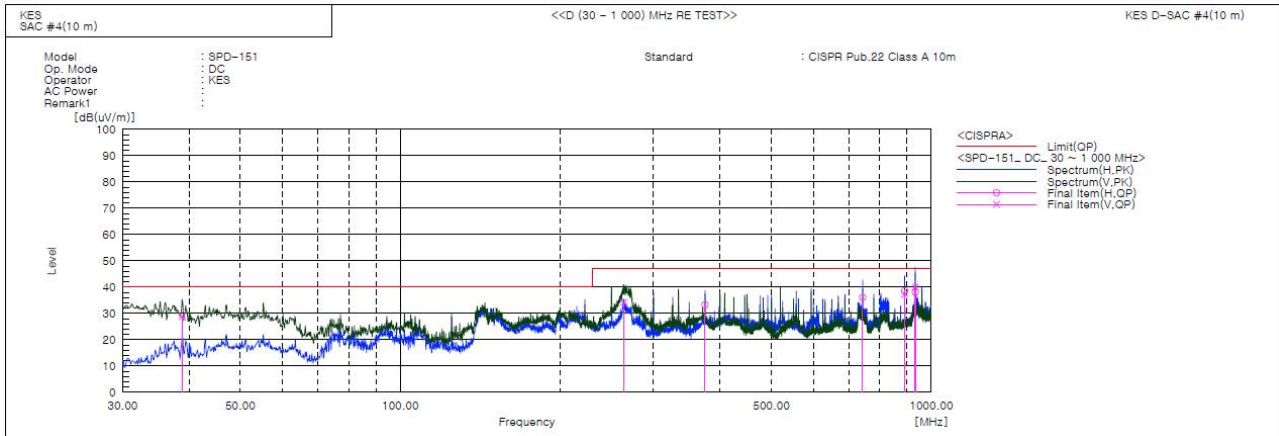
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC 12 V MODE



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	38.851	V	59.3	-30.5	28.8	40.0	11.2	110.0	258.0	
2	263.528	V	60.1	-25.9	34.2	47.0	12.8	131.0	8.0	
3	374.956	H	55.6	-22.3	33.3	47.0	13.7	318.0	195.0	
4	742.586	H	50.6	-14.5	36.1	47.0	10.9	364.0	290.0	
5	890.568	V	48.9	-11.6	37.3	47.0	9.7	165.0	339.0	
6	891.118	H	50.2	-11.6	38.6	47.0	8.4	368.0	287.0	
7	932.658	V	51.3	-11.2	40.1	47.0	6.9	150.0	331.0	
8	933.325	H	49.3	-11.2	38.1	47.0	8.9	347.0	159.0	

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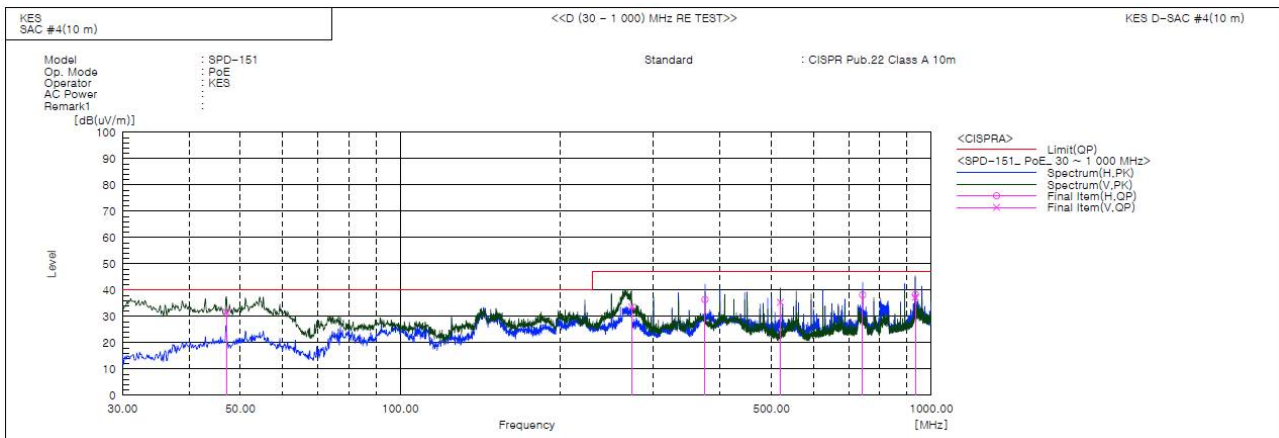
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■ PoE MODE



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	47.096	V	60.1	-28.5	31.6	40.0	8.4	128.0	286.0	
2	272.621	V	59.2	-25.6	33.6	47.0	13.4	132.0	341.0	
3	374.956	H	58.7	-22.3	36.4	47.0	10.6	342.0	207.0	
4	519.729	V	53.6	-18.2	35.4	47.0	11.6	211.0	169.0	
5	742.586	H	52.7	-14.5	38.2	47.0	8.8	345.0	223.0	
6	933.070	V	48.5	-11.2	37.3	47.0	9.7	154.0	170.0	
7	933.318	H	49.6	-11.2	38.4	47.0	8.6	356.0	330.0	

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

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

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

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

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

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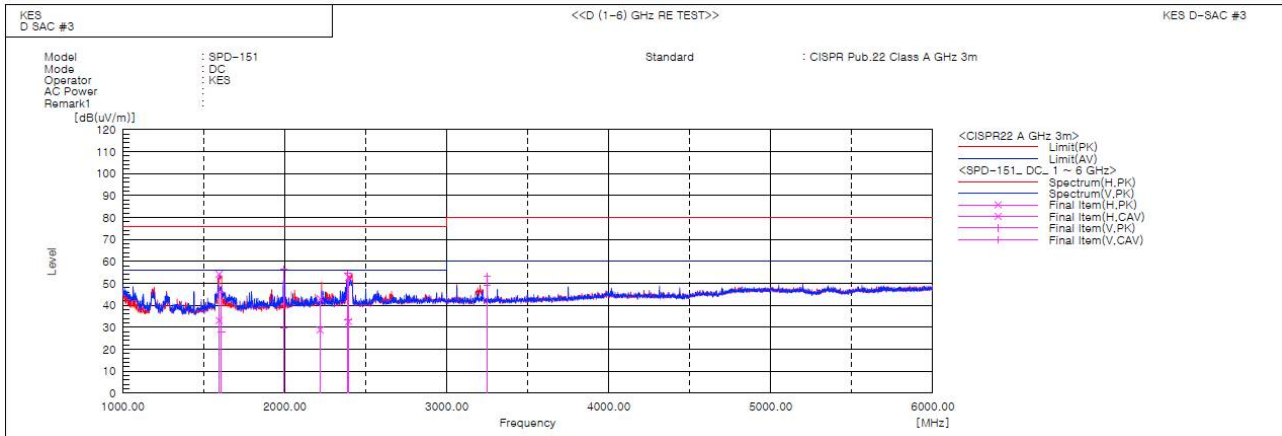
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Radiated Electric Field Emissions(Above 1 GHz)

■ DC 12 V MODE



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	1595.560	H	59.2	38.1	-5.0	54.2	33.1	76.0	56.0	21.8	22.9	100.0	333.5	
2	1610.127	V	50.6	32.9	-4.9	45.7	28.0	76.0	56.0	30.3	28.0	100.0	305.8	
3	1994.440	V	58.4	31.9	-2.1	56.3	29.8	76.0	56.0	19.7	26.2	100.0	4.2	
4	2218.672	H	44.1	29.8	-1.0	43.1	28.8	76.0	56.0	32.9	27.2	100.0	348.3	
5	2389.541	V	54.8	33.6	-0.4	54.4	33.2	76.0	56.0	21.6	22.8	100.0	304.0	
6	2394.375	H	53.2	33.1	-0.4	52.8	32.7	76.0	56.0	23.2	23.3	100.0	327.0	
7	3250.230	V	51.6	47.5	1.7	53.3	49.2	80.0	60.0	26.7	10.8	100.0	191.4	

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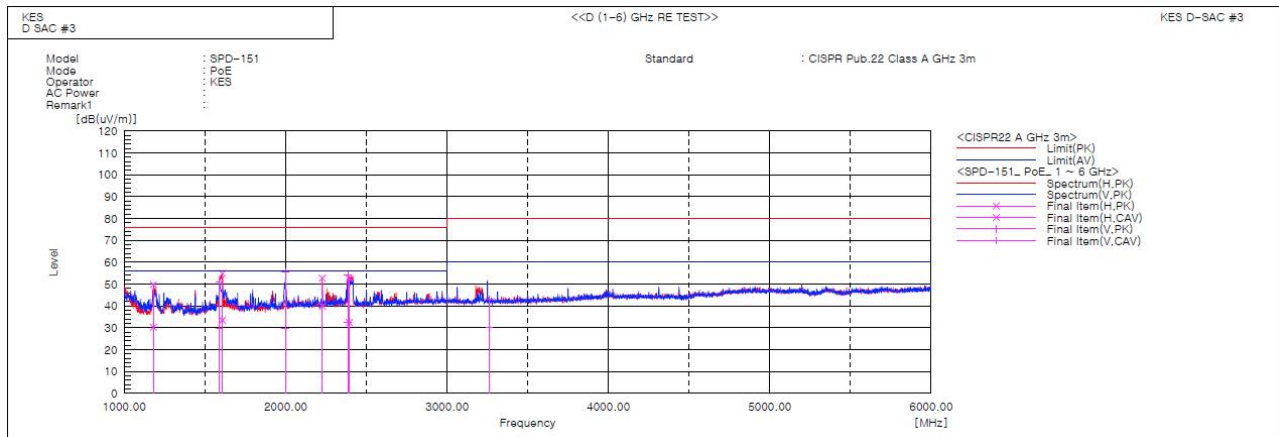
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■ PoE MODE



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result CAV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1180.562	H	56.9	37.5	-7.2	49.7	30.3	76.0	56.0	26.3	25.7	100.0	316.2	
2	1588.870	V	55.7	34.9	-5.0	50.7	29.9	76.0	56.0	25.3	26.1	100.0	309.7	
3	1607.819	H	59.8	38.4	-4.9	54.9	33.5	76.0	56.0	21.1	22.5	100.0	330.4	
4	1997.650	V	57.7	31.9	-2.1	55.6	29.8	76.0	56.0	20.4	26.2	100.0	0.6	
5	2227.350	H	53.7	40.8	-1.0	52.7	39.8	76.0	56.0	23.3	16.2	100.0	347.4	
6	2384.500	V	54.7	32.8	-0.4	54.3	32.4	76.0	56.0	21.7	23.6	100.0	301.9	
7	2394.445	H	53.1	32.9	-0.4	52.7	32.5	76.0	56.0	23.3	23.5	100.0	318.5	
8	3260.428	V	41.6	28.3	1.7	43.3	30.0	80.0	60.0	36.7	30.0	100.0	194.9	

◆ Calculation

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

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

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

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

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Test Data - Voltage Fluctuations**Maximum Flicker results**

	EUT values	Limit	Result
Pst	N/A		
Plt			
dc [%]			
dmax [%]			
Tmax [s]			

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Test Setup Photos and Configuration

Conducted Voltage Emissions

N/A

N/A

Conducted Telecommunication Emissions



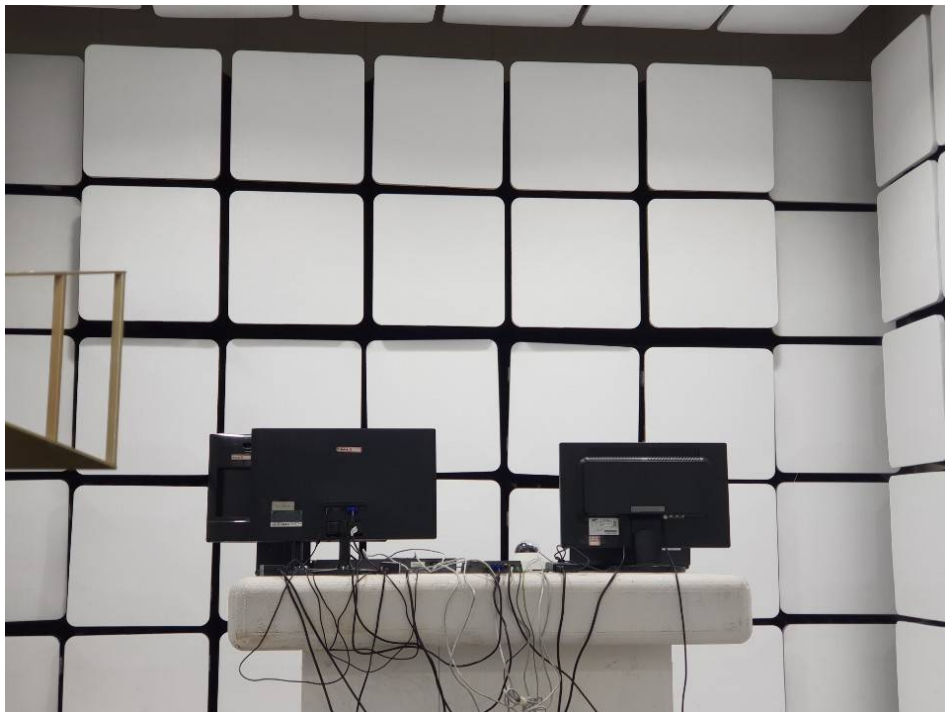
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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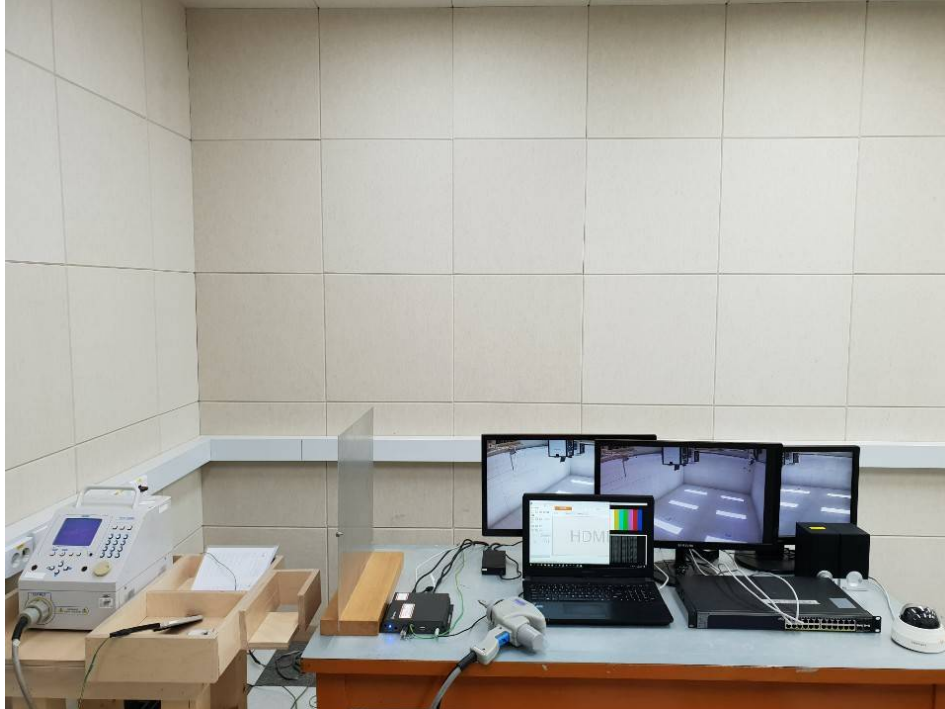
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Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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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

N/A

EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)

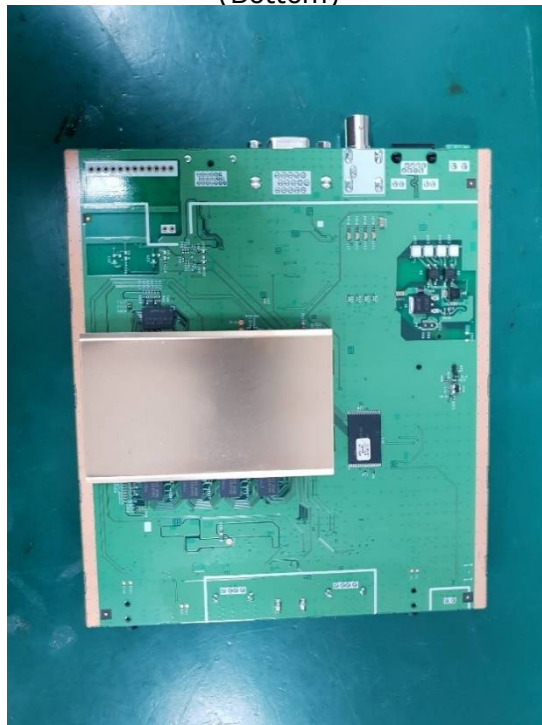


EUT Internal View – Main Board

(Top)



(Bottom)



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Label and Location



DECORDER

Model No : SPD-151

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

Made in China

