



KES Co., Ltd.

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Report No.:

KES-E2-19T0013

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EMC TEST REPORT For CE

Test Report No. : KES-E2-19T0013

Date of Issue : Feb. 15, 2019

Product name : NVR

Model/Type No. : TRM-410S

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. D-TECH CO.,LTD.
2. HANWHA TECHWIN(TIANJIN) CO., LTD
3. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.

Manufacturer Address : 1. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
2. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
3. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam

Date of Receipt : Dec. 18, 2018

Test date : Jan. 19, 2019 ~ Jan. 24, 2019

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Feb. 15, 2019	KES-E2-19T0013	Issued

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E.U.T Internal Photographs		오류! 책갈피가 정의되어 있지 않습니다.

1.0 General Product Description

Main Specifications of EUT are:

Item		Details	
		TRM-410S	TRM-810S/810M
Display			
Network Camera	Inputs	Max. 4CH (4 PoE, RJ-45)	Max. 8CH (8 PoE) TRM-810S: Max. 8CH (8 PoE, RJ-45) TRM-810M: Max. 8CH (8 PoE, M12 D-Code)
	Resolution	CIF ~ 8MP	
	Protocols	Wisenet(SUNAPI), ONVIF	
Live	Local Display	HDMI / VGA	
	Multi-Channel Display	[Local Monitor] 1 / 2H / 2V / 3V / 4 / Auto sequence [Web] 4 / Auto sequence	[Local Monitor] 1 / 2H / 2V / 3V / 4 / 6 / 8 / 9 / Auto sequence [Web] 1 / 4 / 9 / 1+5 / 1+7 / 2H / 2V / 3V / 6 / 12 / Auto sequence
	Performance	[Local Monitor] 8MP(60fps), 5MP(90fps), 3MP(120fps), 2MP(120fps), 720p(120fps), D1(120fps)	
Performance			
Operating System	Embedded	Linux	
Record	Compression	H.265, H.264, MJPEG, WiseStream(H.265, H.264)	
	Recording Bandwidth	Max. 50Mbps	Max. 80Mbps
	Resolution	CIF ~ 8MP	
	Type	Normal, Schedule(Continuous/Event), Event (Pre/Post), Emergency	
	Retention	Retention per channel (1 ~ 400 days)	
	Event Trigger	Alarm Input (6), Video Loss, Camera Event(Sensor, MD, Video Analytics, Defocus Camera), G-Sensor(3 Axis)	
	Event Action	e-Mail, Alarm Out, Buzzer, Monitor Out	



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Item		Details	
		TRM-410S	TRM-810S/810M
Search & Play	Playback Bandwidth	32Mbps(4ch simultaneously)	32Mbps(8ch simultaneously)
	User	Max. 4 Users (Local 1, Remote 3)	
	Mode	Date & Time(Calendar)/Event Log list, Smart Search(Virtual Line w/ direction, Enter/Exit)	
	Simultaneous playback	Max. 4 channels(Local Monitor, CMS)	Max. 8 channels(Local Monitor, CMS)
Search & Play	Resolution	CIF ~ 8MP	
	Fisheye Dewarping	Web / CMS	
	Playback Control	Fast/Slow Forward/Backward, Move one step up/down	
Storage	Built-In	No HDD (supporting the installation of 2 HDDs per tray)	
	Internal HDD	2 SATA(Front-Swap) - Max. 2TB(HDD, Non-RAID Mode) - Max. 4TB(SSD, Non-RAID Mode)	
	RAID	-	RAID-1
Backup	File backup	Exe(GUI), JPG/AVI(excluding GPS information)(Network)	
	Function	Multi channel(Upto 4CH) Play, Date-Time/Title/GPS display	Multi channel(Upto 8CH) Play, Date-Time/Title/GPS display
	Type	Auto(Wi-Fi), Manual(HDD/SSD)	
	Wifi Backup Performance	MAX. 50Mbps	MAX. 80Mbps
Sensor	I/O	6/4	
Audio	Input	4 channels (network)	8 channels (network)
	Compression	G.711, G.726, AAC(16/48KHz)	
	Audio Communication	2-Way	

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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
NVR	TRM-410S	-	D-TECH CO.,LTD.	EUT
GPS Antenna	-	-	-	EUT
Control Box	-	-	-	EUT

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1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Monitor 1	LS23C340	ZXPCHTMF A02346H	Samsung Electronics Co., Ltd.	-
Monitor 1 Adapter	A2514_DPN	CN07BN4400591BS K28F5NK904	11ssan Elecom(shen yang) Co., Ltd	-
Monitor 2	27UK850	805NTGYCH455	LG Electronics Inc.,	-
Monitor 2 Adapter	A16-140P1A	ZJ5CS64929301C30 4	LG Electronics Inc.,	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
Alarm Zig 1	-	-	-	-
Alarm Zig 2	-	-	-	-
Network Camera 1	SNV-L6013	-	Hanwha Techwin(TIANJIN) Co., Ltd	-
Network Camera 2	SNV-L6013	-	Hanwha Techwin(TIANJIN) Co., Ltd	-
Mouse	1113	-	Microsoft	-
Notebook	LG15N54	410NZXE015458	LG Electronics Inc.,	-
Notebook Adapter	ADP-90WH B	84ZW19F1747	DELTA ELECTRONICS(JIANGSU) LTD.	-
Wireless Router	A2004plus	-	IpTIME	-
Wireless Router Adapter	TY-2007	-	Zioncoin Electronics (Shenzhen) Ltd.	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NVR (EUT)	D-SUB	Monitor 1	D-SUB	1.3	U
	HDMI	Monitor 1	HDMI	1.4	U
	RJ-45 (RS-232)	Control Box	RJ-45	3.1	U
	RJ-45 (Alarm In)	Alarm Zig 1	4 Pin	3.0	U
	RJ-45 (Alarm Out)	Alarm Zig 2	4 Pin	3.2	U
	RJ-45 (PoE)	Network Camera 1	RJ-45 (PoE)	3.0	U
	RJ-45 (PoE)	Network Camera 2	RJ-45 (PoE)	3.2	U
	USB	Mouse	USB	1.8	U
	3.5 mm (Audio)	Speaker	3.5 mm	1.4	U
	4 Pin	GPS Antenna	4 Pin	4.0	U
	RJ-45 (Viewer)	Notebook	RJ-45	5.0	U
	Wireless	Wireless Router	Wireless	-	-
Wireless Router	Wireless	Notebook	Wireless	-	-

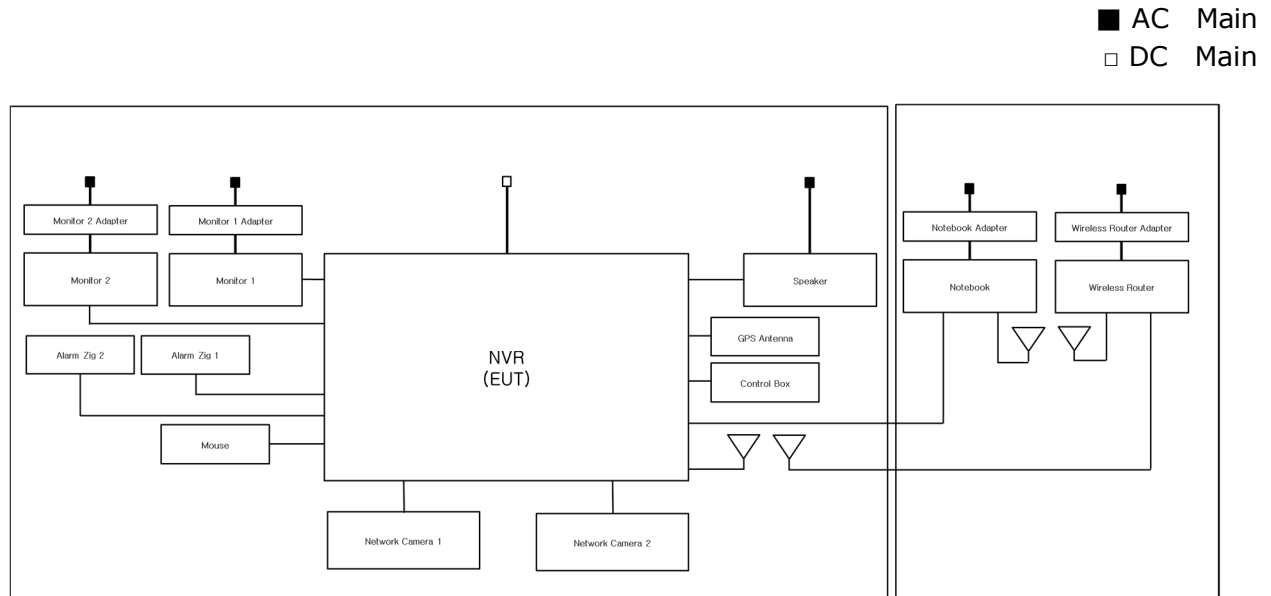
* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

Test Mode	operating
OP	Confirmed the operation of the camera through WebViewer and network Ping Test.

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

1.8 Configuration



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 55032:2015

☒ 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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-
- | | | |
|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> VCCI V-3 / 2015.04 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> 47 CFR Part 15, Subpart B | | |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2009 | | |
| <input type="checkbox"/> IC Regulation ICES-003 : 2016 | | |
| <input type="checkbox"/> CAN/CSA CISPR 22-10 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014 | | |
|
<input type="checkbox"/> RE- Directive 2014/53/EU | | |
|
<input type="checkbox"/> EN 301 489-1 V1.9.2 | | |
| <input type="checkbox"/> Equipment for fixed use | | |
| <input type="checkbox"/> Equipment for vehicular use | | |
| <input type="checkbox"/> Equipment for portable use | | |
|
<input type="checkbox"/> EN 301 489-3 V1.6.1 | | |
|
<input type="checkbox"/> EN 301 489-17 V2.2.1 | | |
|
<input type="checkbox"/> 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
<input type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101781	04, 25, 2019
<input type="checkbox"/>	LISN	ENV216	R & S	101787	01, 04, 2020
<input type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 25, 2019
<input type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 26, 2019

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

It is not tested apply because it is powered by DC.

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2.2 Conducted Emissions at Telecommunication Ports

Test Date

Jan. 20, 2019

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101781	04, 25, 2019
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	01, 04, 2020
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 25, 2019
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 26, 2019
<input checked="" type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 07, 2020
<input checked="" type="checkbox"/>	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 07, 2020
<input type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 09, 2019
<input type="checkbox"/>	CDN	CDNS502A	TESEQ	40431	01, 08, 2020

Test Conditions

Temperature: 24.2 °C

Relative Humidity: 55.3 % 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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2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jan. 21, 2019

Test Location

☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 11, 2019
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 26, 2019
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 21, 2019

Test Conditions

Temperature: 24.1 °C
Relative Humidity: 51.8 % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jan. 24, 2019

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR7	R & S	101190	08, 06, 2019
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2019
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 21, 2019
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 24.3 °C
Relative Humidity: 51.0 % 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.

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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
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST	5.4.8.0	-
<input type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2019
<input type="checkbox"/>	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

RemarksIt is not tested apply because it is powered by DC.

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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
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST	5.4.8.0	-
<input type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2019
<input type="checkbox"/>	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

RemarksIt is not tested apply because it is powered by DC.

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

Jan. 19, 2019

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 11, 2019
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	KES	-	-

Test Conditions

Temperature: 23.2 °C
Relative Humidity: 51.6 % R.H.
Atmospheric Pressure: 101.2 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 <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	Air <input checked="" type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input checked="" type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	HCP <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	VCP <input type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input checked="" type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV
--------------------	---	---	---	---

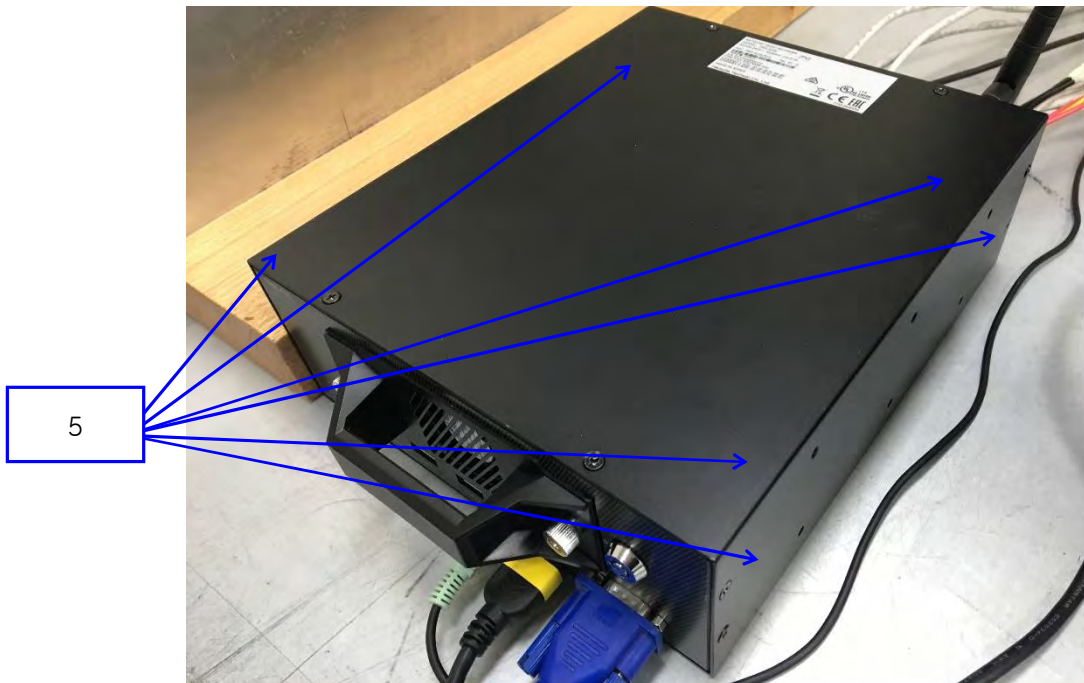
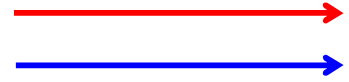
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

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	HDD Case	Contact Discharge	Complied	-
2	Key Slot	Contact Discharge	Complied	-
3	LED	Air Discharge	Complied	-
4	Front Ports	Air Discharge	Complied	-
5	Enclosure	Contact Discharge	Complied	-
6	Rear Ports	Contact Discharge	Complied	-
7	Rear Enclosure	Air Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

RemarksN/A

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Jan. 24, 2019

Test Location

EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 06, 2019
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 06, 2019
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 06, 2019
<input checked="" type="checkbox"/>	POWER METER	NRP2	R & S	103475	08, 06, 2019
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 06, 2019
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 06, 2019
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 06, 2019
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions

Temperature: 24.3 °C
Relative Humidity: 51.0 % R.H.
Atmospheric Pressure: 101.7 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

N/A

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Jan. 23, 2019

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2019
<input type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2019
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 26, 2019

Test Conditions

Temperature: 24.3 °C
Relative Humidity: 53.9 % R.H.
Atmospheric Pressure: 100.4 kPa

Test Specifications

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

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

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 kHz ☒ 100 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ Complied

Test Data

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

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

☒ 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 (Control Box)	Complied	Complied
RJ-45 (Alarm In)	Complied	Complied
RJ-45 (Alarm Out)	Complied	Complied
RJ-45 (PoE)	Complied	Complied
4 Pin (GPS)	Complied	Complied
RJ-45 (Viewer)	Complied	Complied

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

N/A

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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

N/A

Test Location

EMS-Surge: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
<input type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2019
<input type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2019
<input type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1551168979	04, 25, 2019
<input type="checkbox"/>	CDN	CNV 508T5	EM TEST	P1549168422	04, 25, 2019

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

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)
-	-	-

☐ 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)
-	-	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

RemarksIt is not tested apply because it is powered by DC.

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Jan. 21, 2019

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.11	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 26, 2019
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 26, 2019
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 26, 2019
<input checked="" type="checkbox"/>	CDN	CDN T800	TESEQ	42800	11, 26, 2019
<input checked="" type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 27, 2019

Test Conditions

Temperature: 23.9 °C
Relative Humidity: 54.6 % R.H.
Atmospheric Pressure: 100.8 kPa

Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 150 kHz to 80 MHz

Voltage Level: ☐ 1 Vrms ☐ 3 Vrms
☒ 10 Vrms

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☒ 1 s ☐ 3 s

Required Performance Criteria: ☒ Complied

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Test Data☐ Input a.c. power ports

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

☒ 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 (Control Box)	Clamp	Complied
RJ-45 (Alarm In)	Clamp	Complied
RJ-45 (Alarm Out)	Clamp	Complied
RJ-45 (PoE)	CDN	Complied
4 Pin (GPS)	Clamp	Complied
RJ-45 (Viewer)	CDN	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**

N/A

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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
<input type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2019
<input type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2019

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa

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Test Specifications & Observations/Remarks

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input type="checkbox"/> 20 % dip	<input type="checkbox"/> 250 / 5 000	-
<input type="checkbox"/> 30 % dip	<input type="checkbox"/> 25 / 500	-
<input type="checkbox"/> 60 % dip	<input type="checkbox"/> 10 / 200	-
<input type="checkbox"/> 100 % dip	<input type="checkbox"/> 250 / 5 000	-

- Voltage variations

<input type="checkbox"/> Unom + 10 %	<input type="checkbox"/> 253.0 V (ac)	-
<input type="checkbox"/> Unom - 15 %	<input type="checkbox"/> 195.5 V (ac)	-

Observations:

Complied – No degradation of function

Test Results

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

RemarksIt is not tested apply because it is powered by DC.



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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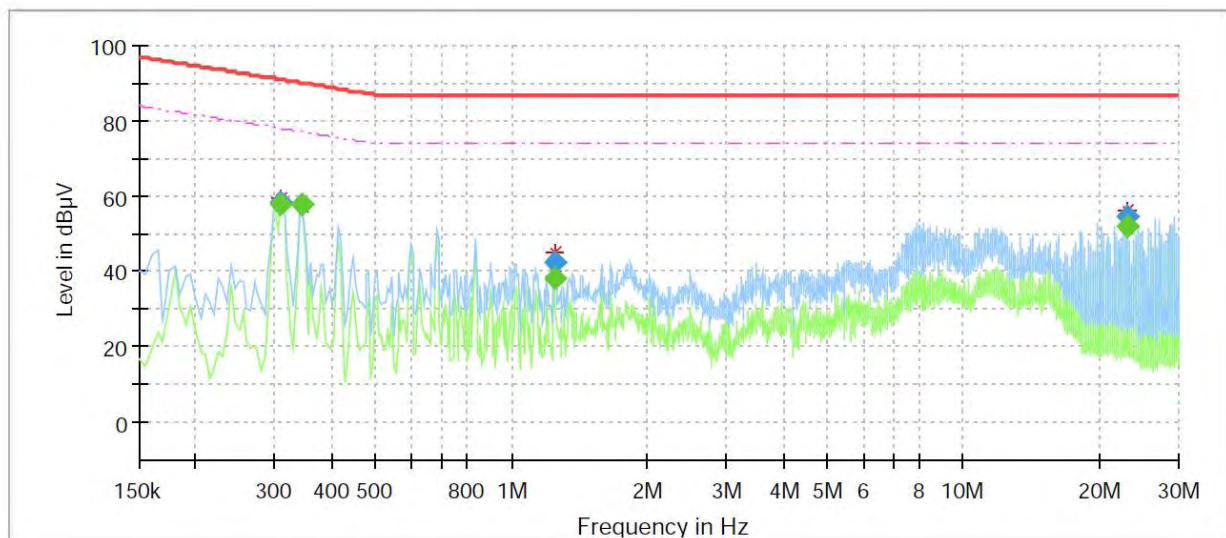
Conducted Emissions at Telecommunication Ports

■ LAN MODE

[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TRM-410S
Mode: LAN / 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)
0.310000	---	57.86	77.97	20.11	1000.0	9.000	Single Line	19.8
0.310000	58.33	---	90.97	32.64	1000.0	9.000	Single Line	19.8
0.345000	---	57.68	77.08	19.40	1000.0	9.000	Single Line	19.8
0.345000	57.80	---	90.08	32.28	1000.0	9.000	Single Line	19.8
1.250000	---	38.38	74.00	35.62	1000.0	9.000	Single Line	20.1
1.250000	42.28	---	87.00	44.72	1000.0	9.000	Single Line	20.1
23.130000	---	52.11	74.00	21.89	1000.0	9.000	Single Line	20.0
23.130000	54.72	---	87.00	32.28	1000.0	9.000	Single Line	20.0

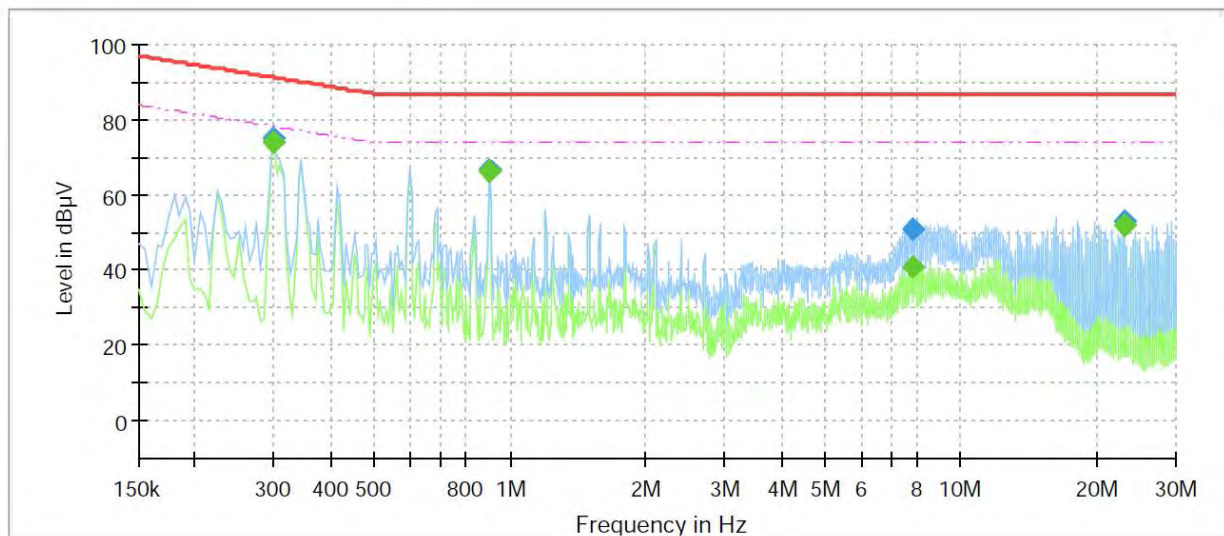
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■ PoE MODE

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
 Model No.: TRM-410S
 Mode: PoE / 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)
0.300000	---	74.11	78.24	4.13	1000.0	9.000	Single Line	19.8
0.300000	75.04	---	91.24	16.20	1000.0	9.000	Single Line	19.8
0.900000	---	66.20	74.00	7.80	1000.0	9.000	Single Line	20.0
0.900000	66.43	---	87.00	20.57	1000.0	9.000	Single Line	20.0
7.830000	---	40.66	74.00	33.34	1000.0	9.000	Single Line	19.5
7.830000	50.79	---	87.00	36.21	1000.0	9.000	Single Line	19.5
23.130000	---	52.05	74.00	21.95	1000.0	9.000	Single Line	20.2
23.130000	52.78	---	87.00	34.22	1000.0	9.000	Single Line	20.2

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

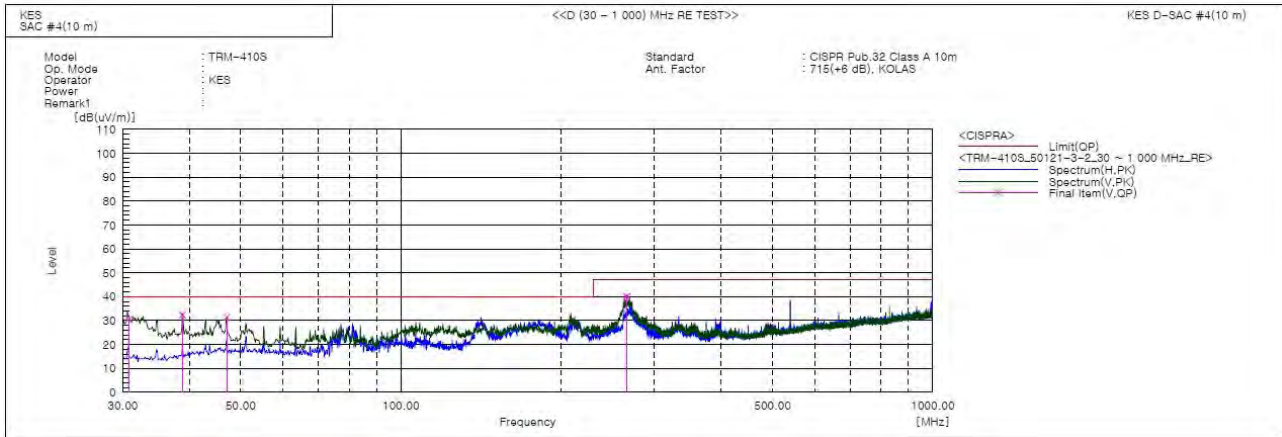
Reading Value : Not shown in the table.

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

* LAN MODE Communication maximum Speed : 1 000 Mbps

PoE MODE Communication maximum Speed : 100 Mbps

Radiated Electric Field Emissions(Below 1 GHz)



Final Result

No.	Frequency [MHz]	(P) V	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	30.844	V	56.1	-25.3	30.8	40.0	9.2	116.0	43.0	
2	38.865	V	56.1	-23.7	32.4	40.0	7.6	100.0	91.0	
3	47.096	V	53.2	-21.8	31.4	40.0	8.6	128.0	115.0	
4	266.074	V	59.9	-19.9	40.0	47.0	7.0	120.0	329.0	

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

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

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

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

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



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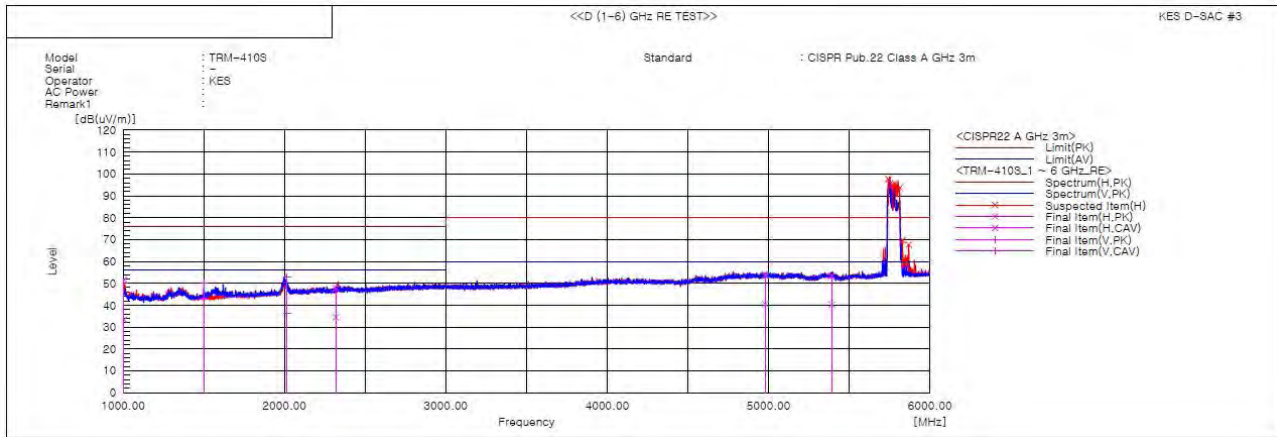
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Report No.:

KES-E2-19T0013

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Radiated Electric Field Emissions(Above 1 GHz)



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1005.031	H	53.5	35.3	-1.9	51.6	33.4	76.0	56.0	24.4	22.6	100.0	212.3	
2	1500.130	V	50.0	42.3	0.3	50.3	42.6	76.0	56.0	25.7	13.4	100.0	0.4	
3	2016.316	V	49.0	32.2	4.0	53.0	36.2	76.0	56.0	23.0	19.8	100.0	219.7	
4	2317.323	H	42.5	29.2	5.3	47.8	34.5	76.0	56.0	28.2	21.5	100.0	238.1	
5	4978.779	H	39.2	26.1	14.5	53.7	40.6	80.0	60.0	26.3	19.4	100.0	316.7	
6	5390.647	H	39.3	26.2	14.0	53.3	40.2	80.0	60.0	26.7	19.8	100.0	238.9	
7	5741.000	H			14.8			80.0	60.0			100.0	4.6	
8	5768.000	H			14.9			80.0	60.0			100.0	8.8	
9	5785.000	H			15.0			80.0	60.0			100.0	356.3	
10	5812.000	H			15.1			80.0	60.0			100.0	356.3	
11	5830.000	H			15.1			80.0	60.0			100.0	56.2	
12	5869.000	H			15.2			80.0	60.0			100.0	357.6	

◆ 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

* Operating Frequency : 5.7 GHz, 5.8 GHz

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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

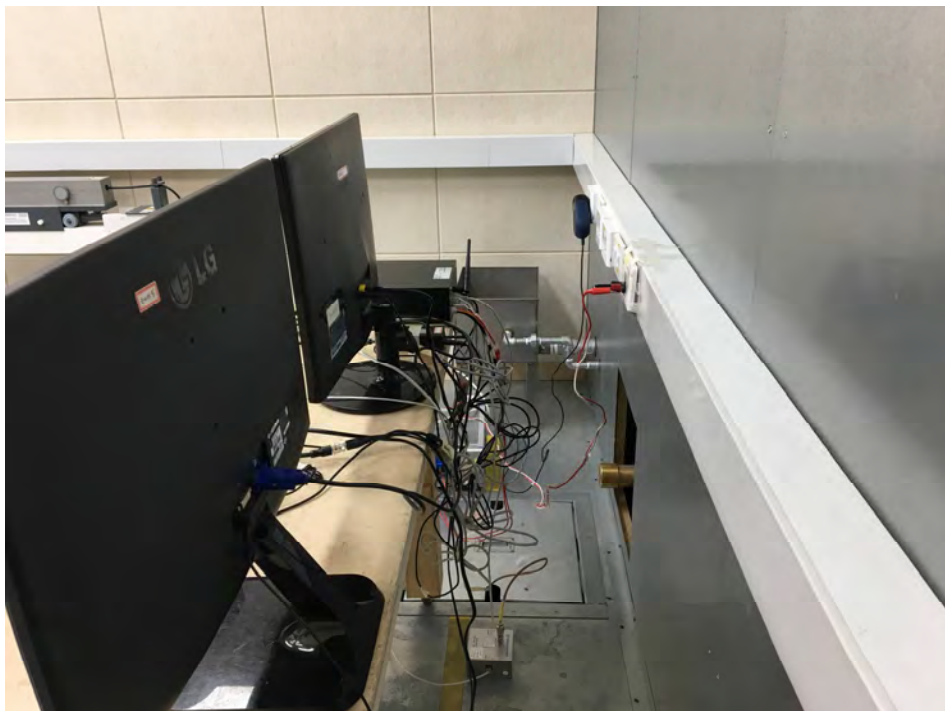
Conducted Voltage Emissions

N/A

N/A

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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

N/A

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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients

N/A

Conducted Disturbance



Voltage Dips and Short Interruptions

N/A

EUT External Photographs

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(Top)



(Bottom)



E.U.T Internal Photographs

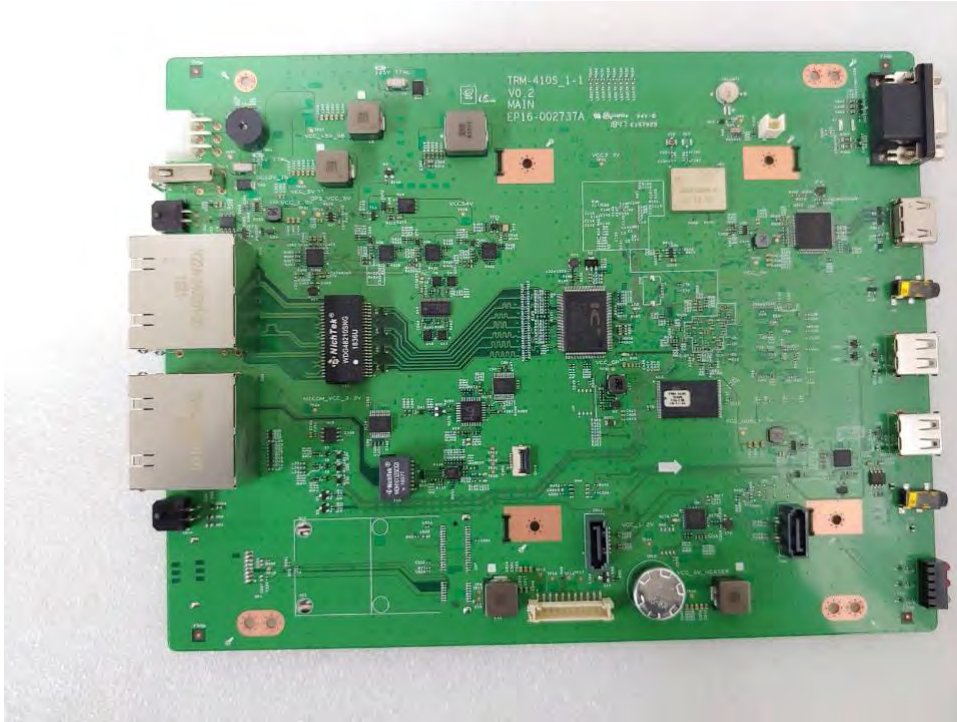
(Internal View)



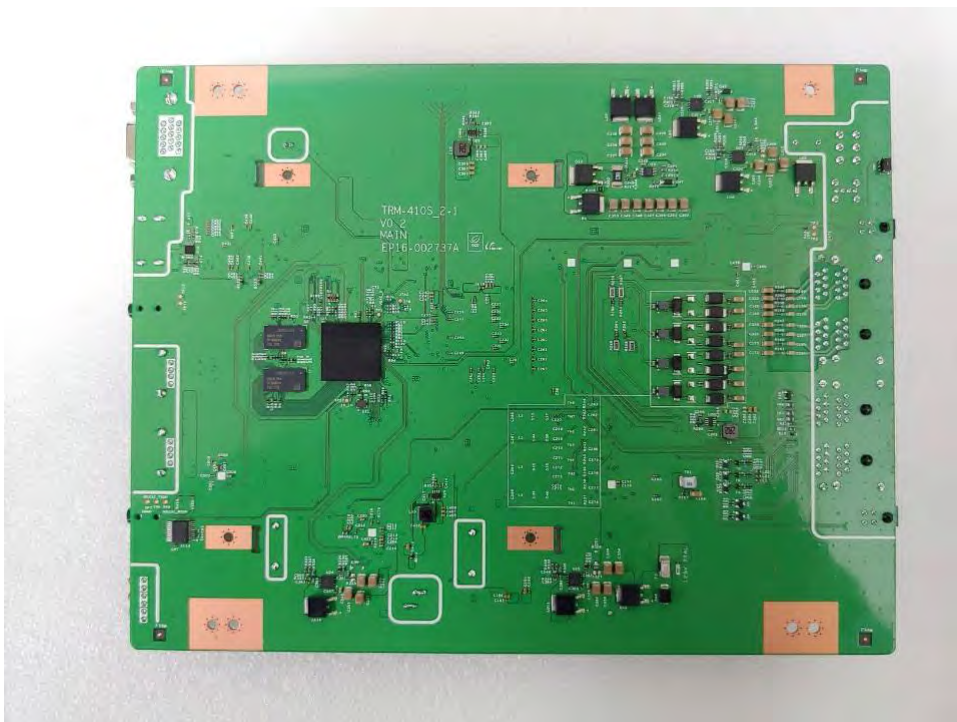
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EUT Internal View – Board 1

(Top)



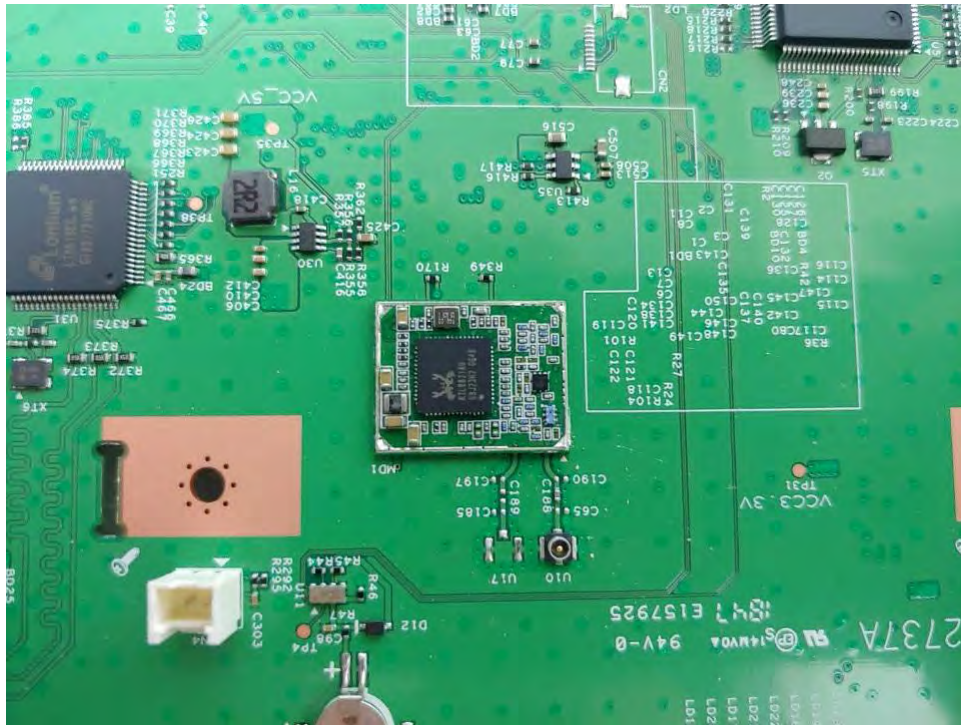
(Bottom)



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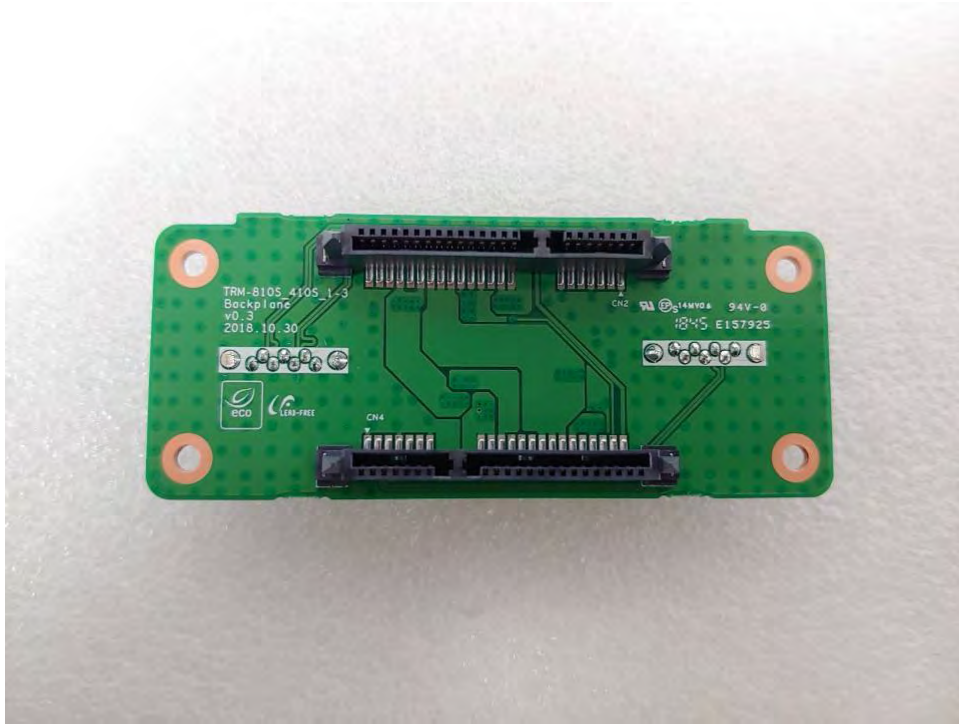
EUT Internal View – Board 2

(Top)

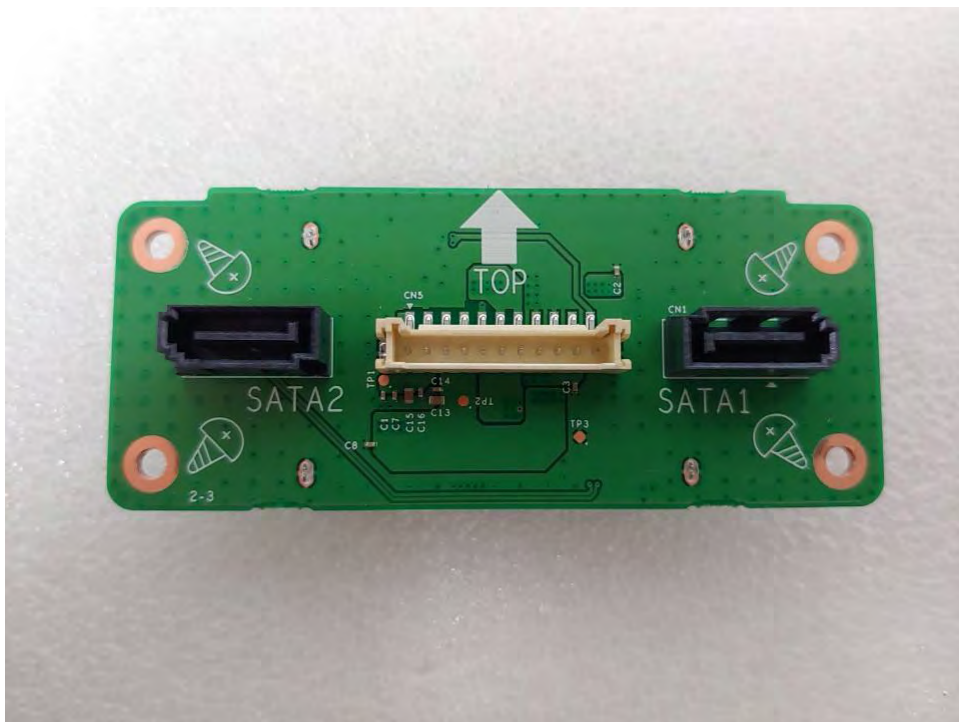


EUT Internal View – Board 3

(Top)



(Bottom)



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Label and Location



NVR

Model No : TRM-410S

Manufacturer : HANWHA TECHWIN(TIANJIN) CO., LTD

Made in China

