EMC TEST REPORT For CE

Test Report No.	:	KES-E1-19T0015
Date of Issue	:	Feb. 15, 2019
Product name	:	NVR
Model/Type No.	:	TRM-810S
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

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Feb. 15, 2019	KES-E1-19T0015	Issued

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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	

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	

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-810S	-	D-TECH CO.,LTD.	EUT
GPS Antenna	-	-	-	EUT
Control Box	-	-	-	EUT

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.	-

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

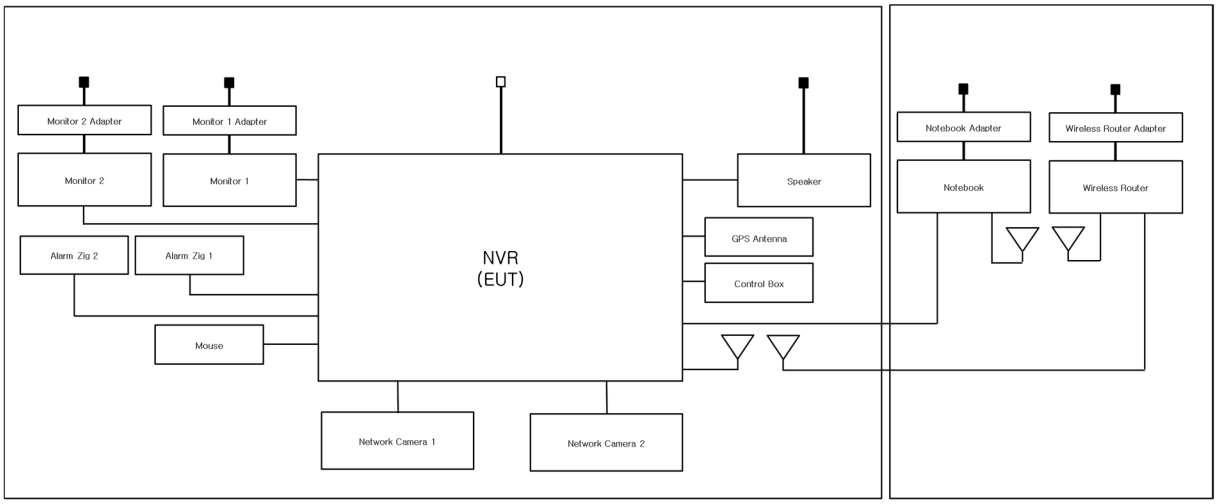
1.7 EUT Operating Mode(s)

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**
Web Viewer	-	Hanwha Techwin Co., Ltd.

1.8 Configuration

■ AC Main
□ DC Main



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, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 32.

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
JAPAN	**VCCI**	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	R-4308, C-4798, T-2311, G-914
KOREA	**MSIP**	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KR0100
Canada	**IC**	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1
Europe	**CE**	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	**KOLAS**	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KOREA LABORATORY ACCREDITATION SCHEME KOLAS TESTING NO. 489

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 55011:2009/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

☒ EN 50121-3-2:2016

☐ **VCCI V-3 / 2015.04** ☐ Class A ☐ Class B

☐ **AS/NZS CISPR22:2009 +A1:2010** ☐ Class A ☐ Class B

☐ **47 CFR Part 15, Subpart B**

- ☐ CISPR 22:2009 +A1:2010 ☐ Class A ☐ Class B
- ☐ ANSI C63.4-2009

☐ **IC Regulation ICES-003 : 2016**

- ☐ CAN/CSA CISPR 22-10 ☐ Class A ☐ Class B
- ☐ ANSI C63.4-2014

☐ **RE– Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

- ☐ Equipment for fixed use
- ☐ Equipment for vehicular use
- ☐ Equipment for portable use

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

2.1 Conducted Emissions at Mains Power Ports

Test Date
Jan. 20, 2019

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	101781	04, 25, 2019
☒	LISN	ENV216	R & S	101787	01, 04, 2020
☒	LISN	ESH2-Z5	R & S	100450	04, 25, 2019
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 26, 2019

Test Conditions
Temperature: 24.2 ℃
Relative Humidity: 55.3 % R.H.
.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

2.2 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Jan. 21, 2019

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

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, 26, 2019
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
☒	ATTENUATOR	8491A	HP	32173	03, 21, 2019

Test Conditions
Temperature: 24.1 ℃
Relative Humidity: 51.8 % R.H.

Frequency Range of Measurement
30 ㎒ to 1 ㎓

Instrument Settings
IF Band Width: 120 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

2.3 Radiated Electric Field Emissions(Above 1 ㎓)

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	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: ℃
Relative Humidity: % R.H.

Frequency Range of Measurement
1 ㎓ to 6 ㎓

Instrument Settings
IF Band Width: 1 ㎒

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks
N/A

2.4 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

℃

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

2.5 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

℃

Relative Humidity: %

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

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

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

General performance criteria

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

Performance criterion A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

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
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 11, 2019
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 23.2 ℃
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

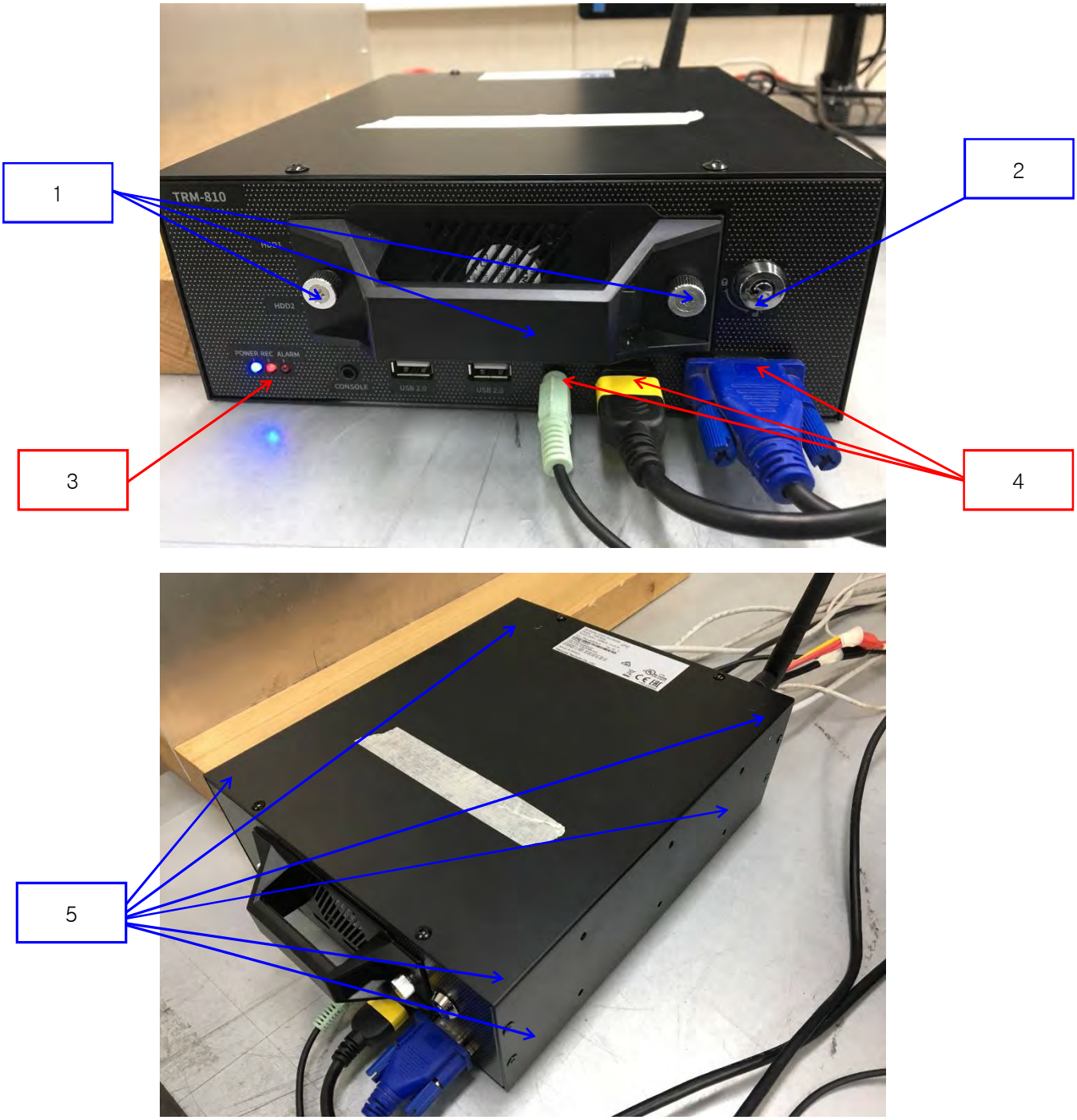
Discharge Voltage:	Contact	Air	HCP	VCP
	☒ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☒ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

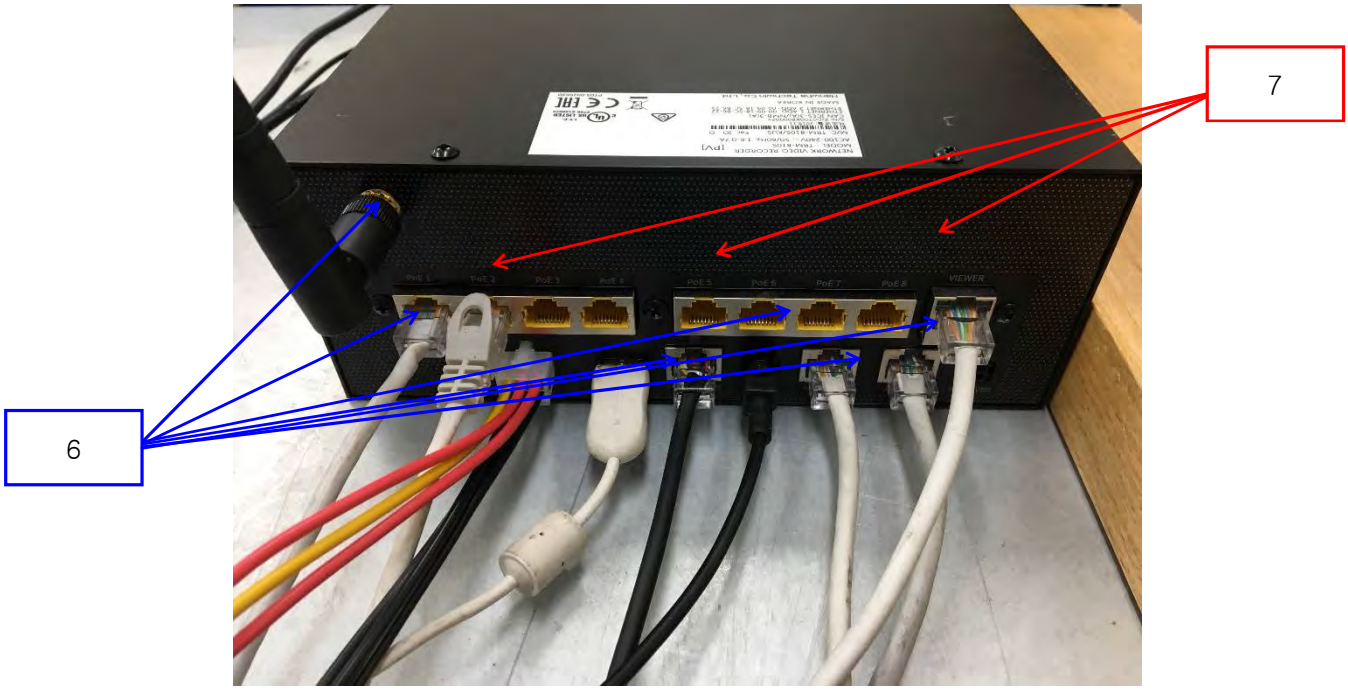
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ B

Location of Discharge:

Air
Contact





Test Data

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HCP Contact	Contact Discharge	B	A	-
2	VCP Contact	Contact Discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HDD Case	Contact Discharge	B	A	-
2	Key Slot	Contact Discharge	B	A	-
3	LED	Air Discharge	B	A	-
4	Front Ports	Air Discharge	B	A	-
5	Enclosure	Contact Discharge	B	A	-
6	Rear Ports	Contact Discharge	B	A	-
7	Rear Enclosure	Air Discharge	B	A	-

Direct Discharge

Note: "Blank" = Not performed

Results:
A – No degradation of function
B – Distortion/Error of function (self-recoverable)
C – Loss of function

Test Results

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

Remarks

N/A

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 #3 ☐ SEMI ANECHOIC CHAMBER #4(10m)

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
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 06, 2019
☒	HIGH POWER DUAL AMP	SSA532	성산전자	SSA532-001	05, 18, 2019
☒	POWER METER	E4419B	Agilent	GB40203000	05, 18, 2019
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	05, 18, 2019
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	05, 18, 2019

Test Conditions

Temperature:	24.3 ℃
Relative Humidity:	51.0 % R.H.
Atmospheric Pressure:	101,7 kPa

Test Specifications

Antenna Polarization:	Horizontal & vertical unless indicated otherwise
Antenna Distance:	☒ 3 m
Frequency Range:	☒ 80 MHz to 1 GHz [20V/m]
[Field Strength]	☒ 1,4 GHz to 2,1 GHz [10 V/m]
	☒ 2,1 GHz to 2,5 GHz [5 V/m]
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:	☒ A

Test Data

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

Note: "Blank" = Not performed

Results:
A – No degradation of function
B – Distortion/Error of function (self-recoverable)
C – Loss of function

Test Results

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

Remarks

N/A

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
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2019
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2019
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 26, 2019

Test Conditions

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

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 0.5 ㎸	☐ ± 1.0 ㎸
	☒ ± 2.0 ㎸	☐ ± 4.0 ㎸
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 ㎸	☐ ± 1.0 ㎸
	☒ ± 2.0 ㎸	
Burst Period:	☒ 300 ㎳	☐ 2 s
Repetition Rate:	☒ 5 ㎑	☐ 100 ㎑
Duration of Test Voltage:	☒ ≥ 1 min	
Required Performance Criteria:	☒ A	

Test Data

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

Mode of Application	Performance Criteria	Results	
		(+) Burst (㎸)	(-) Burst (㎸)
-	B	-	-

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

Mode of Application	Performance Criteria	Results	
		(+) Burst (㎸)	(-) Burst (㎸)
L1	B	A	A
L2	B	A	A
L1 – L2	B	A	A

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (㎸)	(-) Burst (㎸)
RJ-45 (Control Box)	B	A	A
RJ-45 (Alarm In)	B	A	A
RJ-45 (Alarm Out)	B	A	A
RJ-45 (PoE)	B	A	A
4 Pin (GPS)	B	A	A
RJ-45 (Viewer)	B	A	A

Note: "Blank" = Not performed

Results:
A – No degradation of function
B – Distortion/Error of function (self-recoverable)
C – Loss of function

Test Results

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

Remarks

N/A

3.4 Surge Transients

Reference Standard
EN 61000-4-5:2014

Test Date
Jan. 23, 2019

Test Location
EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 26, 2019
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2019
☐	CDN	CNV 508N1	EM TEST	P1610176296	11, 28, 2019
☒	CDN	CNV 504N7.3	EM TEST	P1744207079	11, 28, 2019

Test Conditions

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

Test Specifications

AC Power Lines

Source Impedance: 42 ohm for common mode

Surge Amplitude : Common Mode
☐ 2 kV
Differential Mode
☐ 1 kV

Number of Surges: ☐ 5 surges per angle

Angle: ☐ 0°, 90°, 180°, 270° (input a.c. DC power port)

Polarity: ☐ Positive & Negative

Repetition Rate: ☐ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☐ B

Other supply

Source Impedance: 42 ohm for common mode

Surge Amplitude: Common Mode
☐ 2 kV
Differential Mode
☒ 1 kV

Number of Surges: ☒ 5 Surges

Polarity: ☒ Positive & Negative

Repetition Rate: ☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ B

Test Data

☒ Line to Line – Differential Mode

Mode of Application	Performance Criteria	Observations	
		(+) Surge (㎸)	(-) Surge (㎸)
L1 – L2	B	A	A

☐ Line to Ground – Common Mode

Mode of Application	Performance Criteria	Observations	
		(+) Surge (㎸)	(-) Surge (㎸)
-	B	-	-

Note: "Blank" = Not performed

Results:
A – No degradation of function
B – Distortion/Error of function (self-recoverable)
C – Loss of function

Test Results

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

Remarks

N/A

3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6:2014

Test Date
Jan. 22, 2019

Test Location
EMS-CS: Electro wave Shieldroom #6

Test Equipment

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

Test Conditions

Temperature:	23.9 ℃
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 ☒ 10 Vrms	☐ 3 Vrms
Modulation:	☒ AM, 80 %, 1 kHz sine wave	
Frequency step:	☒ 1 % step	
Dwell Time:	☒ 1 s	☐ 3 s
Required Performance Criteria:	☒ A	

Test Data

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

☒ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
L1 – L2	CDN	A	A

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
RJ-45 (Control Box)	Clamp	A	A
RJ-45 (Alarm In)	Clamp	A	A
RJ-45 (Alarm Out)	Clamp	A	A
RJ-45 (PoE)	CDN	A	A
4 Pin (GPS)	Clamp	A	A
RJ-45 (Viewer)	CDN	A	A

Notes: CDN = Coupling Decoupling Network
EMC = Electro Magnetic Clamp
"blank" = Not performed

Results:
A – No degradation of function
B – Distortion/Error of function (self-recoverable)
C – Loss of function

Test Results

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

Remarks

N/A

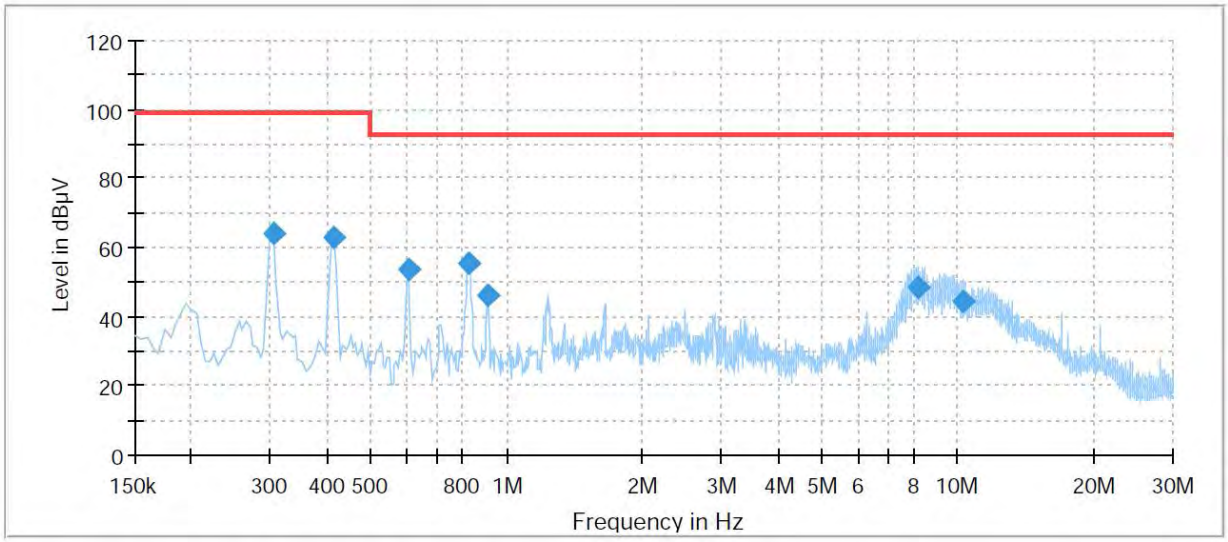
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TRM-810S
Mode	50121-3-2 / (+)
Operator Name:	KES



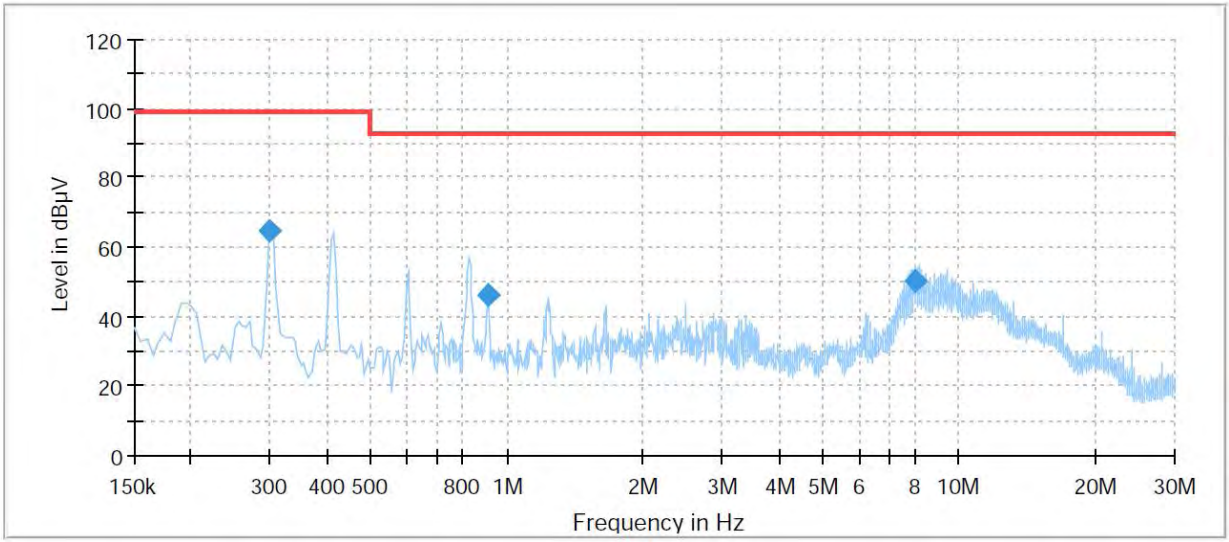
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.305000	63.95	---	99.00	35.05	1000.0	9.000	L1	19.6
0.415000	62.96	---	99.00	36.04	1000.0	9.000	L1	19.7
0.605000	53.78	---	93.00	39.22	1000.0	9.000	L1	19.9
0.825000	55.64	---	93.00	37.36	1000.0	9.000	L1	20.0
0.905000	46.01	---	93.00	46.99	1000.0	9.000	L1	20.1
8.155000	48.30	---	93.00	44.70	1000.0	9.000	L1	19.8
10.285000	44.16	---	93.00	48.84	1000.0	9.000	L1	20.0

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TRM-810S
Mode	50121-3-2 / (-)
Operator Name:	KES

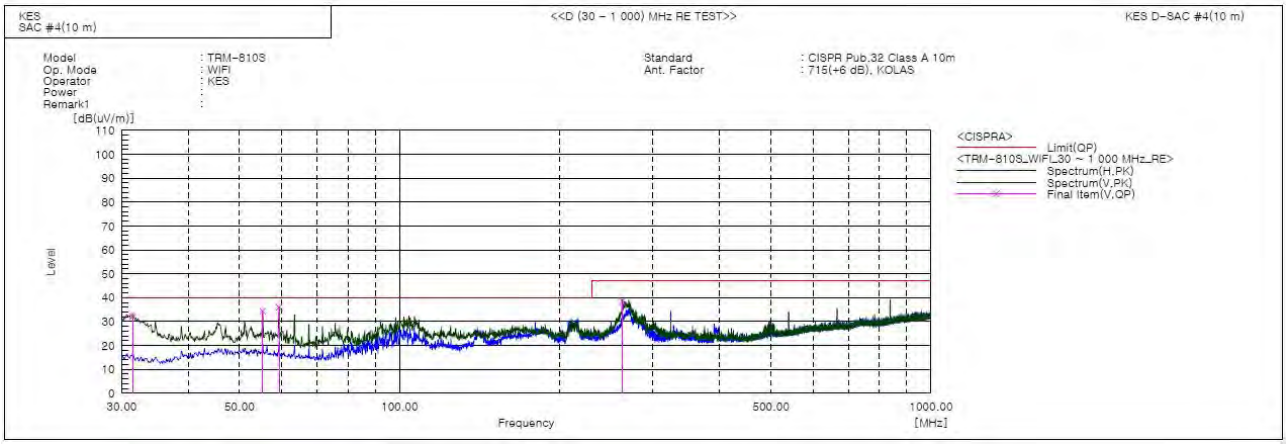


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.300000	64.56	---	99.00	34.44	1000.0	9.000	N	19.6
0.905000	46.34	---	93.00	46.66	1000.0	9.000	N	20.1
7.985000	49.92	---	93.00	43.08	1000.0	9.000	N	19.8

♦ 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))

Radiated Electric Field Emissions(Below 1 ㎓)



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	31.474	V	57.5	-25.3	32.2	40.0	7.8	119.0	47.0	
2	55.241	V	56.3	-22.0	34.3	40.0	5.7	102.0	158.0	
3	59.343	V	58.6	-22.6	36.0	40.0	4.0	130.0	134.0	
4	262.440	V	58.4	-20.0	38.4	47.0	8.6	165.0	358.0	

♦ Calculation – SAC #4(10 m)
Result(QP) [㏈(㎶/m)] = (Reading(QP)[㏈(㎶)] + c.f[㏈(1/m)]
Margin(QP)[㏈] = Limit[㏈(㎶/m)] - Result(QP) [㏈(㎶/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 ㎓)

N/A

♦ Calculation
Over Limit [㏈] = (Read Level[㏈㎶] + Ant Factor[㏈/m] + Cable Loss [㏈] – Preamp Factor [㏈]) – Limit Line[㏈㎶]
Over Limit : Marjin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
		N/A		

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
N/A				

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

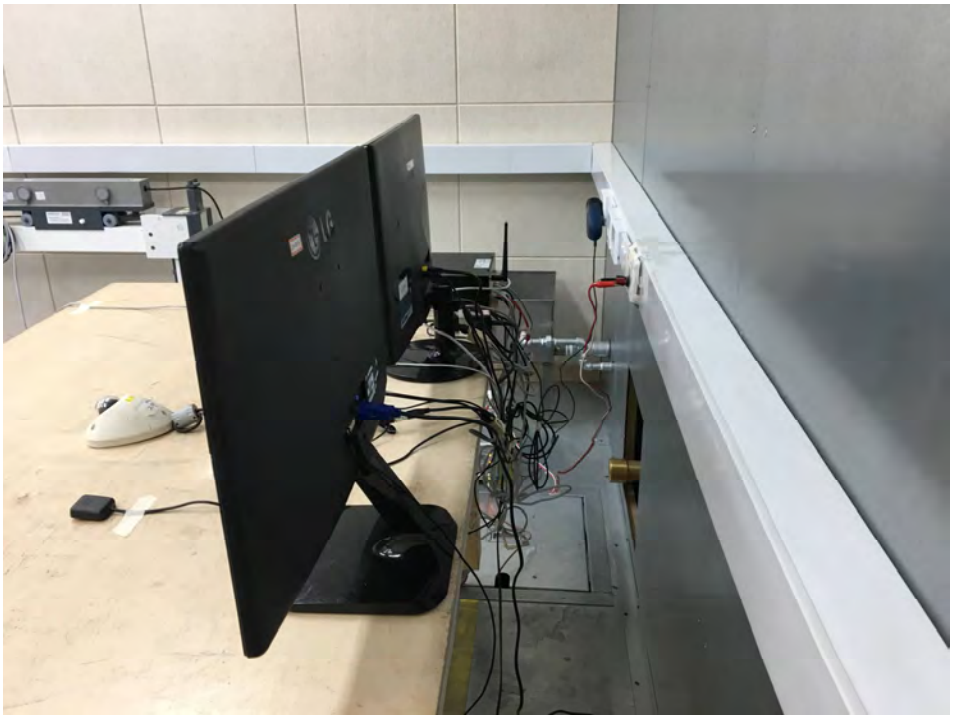
Test Data - Voltage Fluctuations

Maximum Flicker results

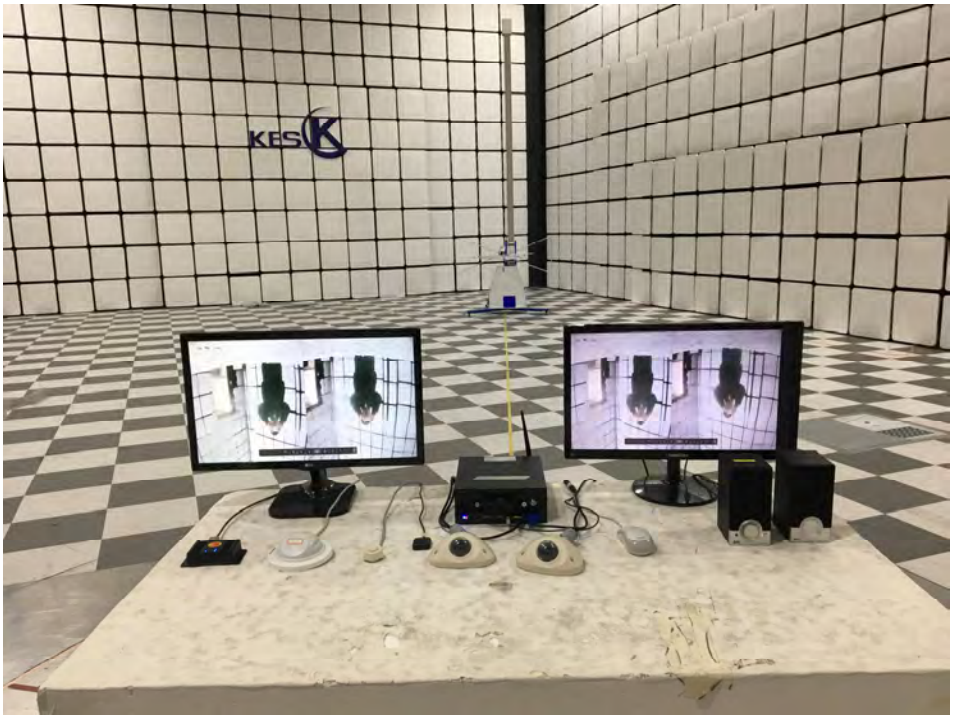
	EUT values	Limit	Result
Pst	N/A		
Plt			
dc [%]			
dmax [%]			
Tmax [s]			

Test Setup Photos and Configuration

Conducted Voltage Emissions



Radiated Electric Field Emissions(Below 1 ㎓)



Radiated Electric Field Emissions(Above 1 ㎓)

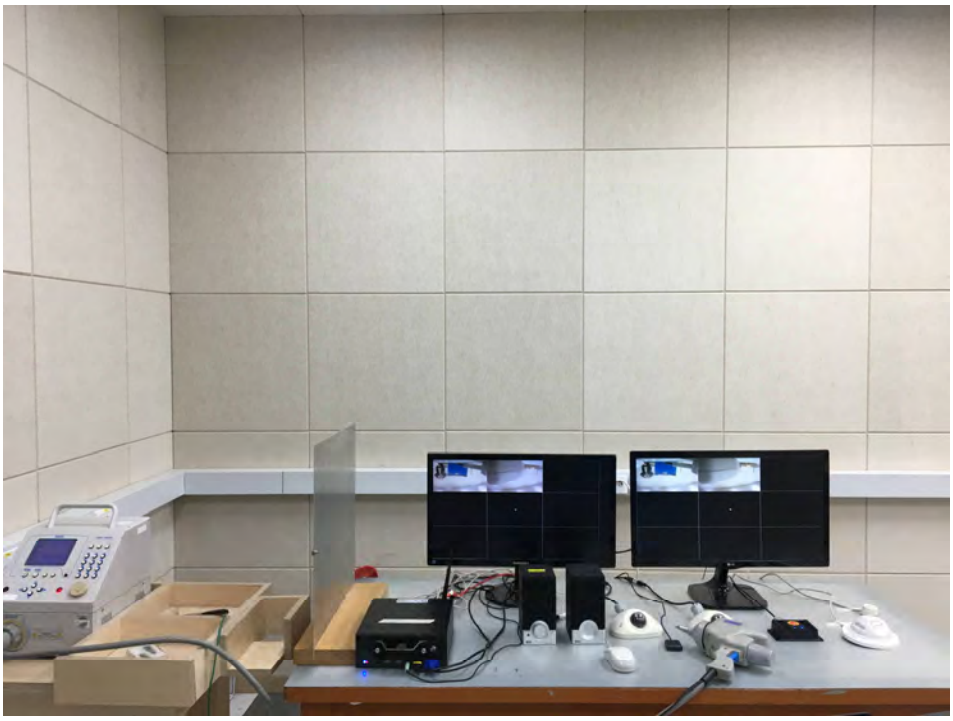
N/A

N/A

Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

Electrostatic Discharge



Radiated Electric Field Immunity

Electrical Fast Transients/Bursts

Surge Transients

Conducted Disturbance

EUT External Photographs

(Top)

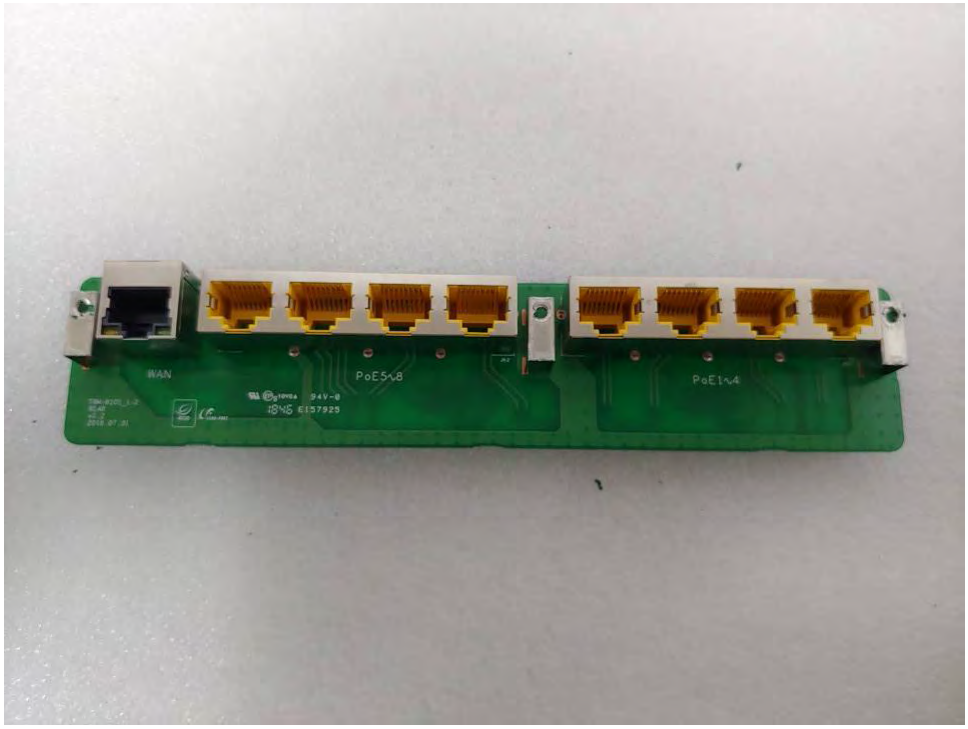
(Bottom)

EUT Internal Photographs

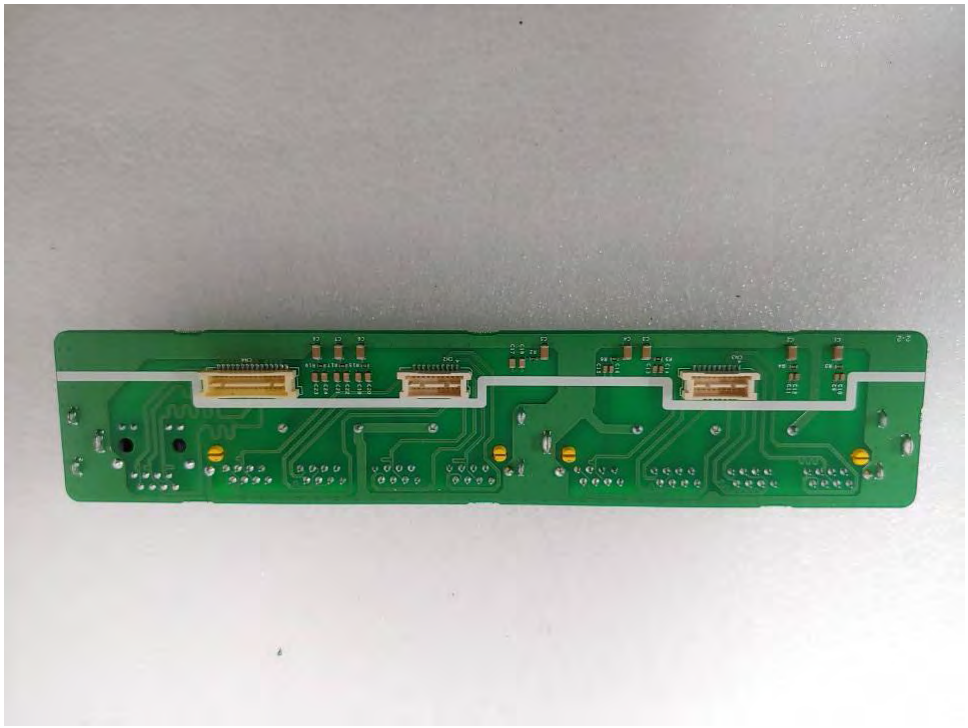
(Internal View)

EUT Internal View – Board 1

(Top)

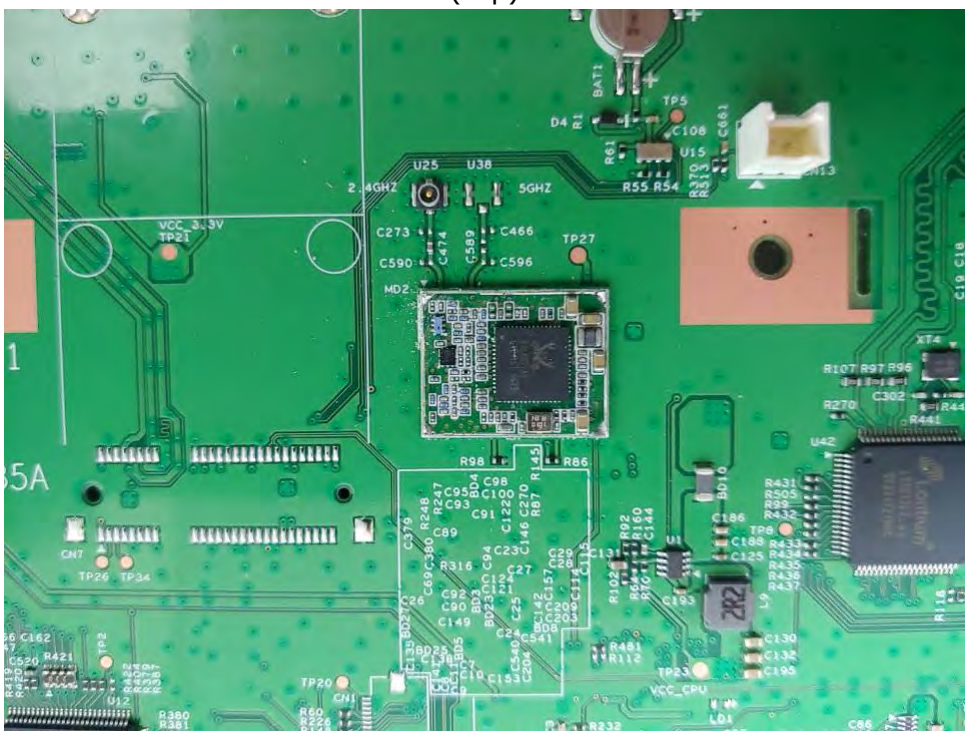


(Bottom)



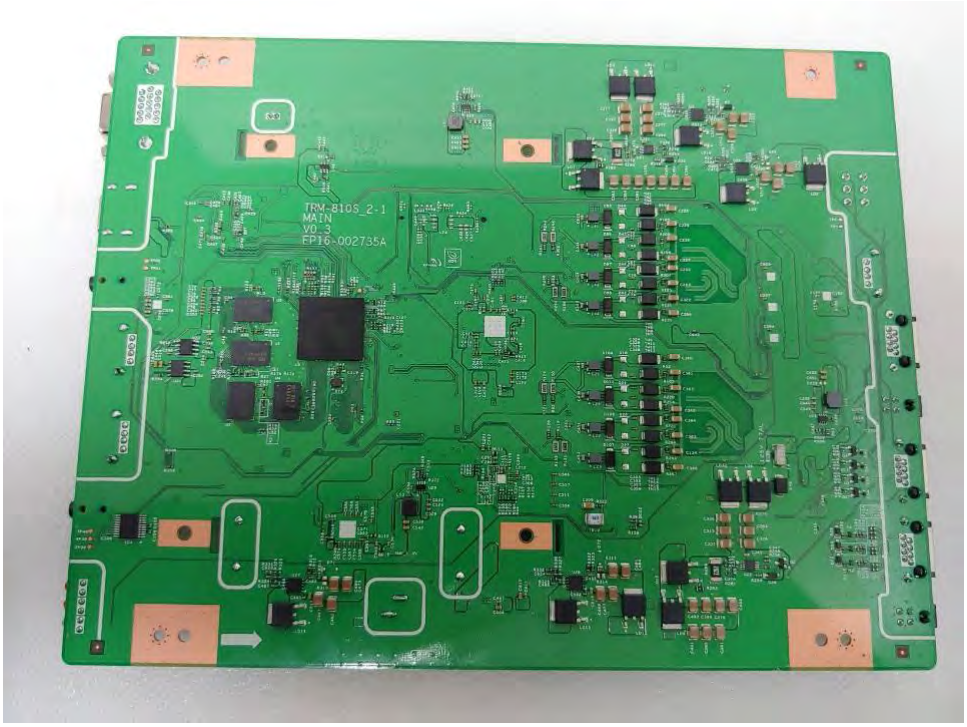
EUT Internal View – Board 2

(Top)



EUT Internal View – Board 3

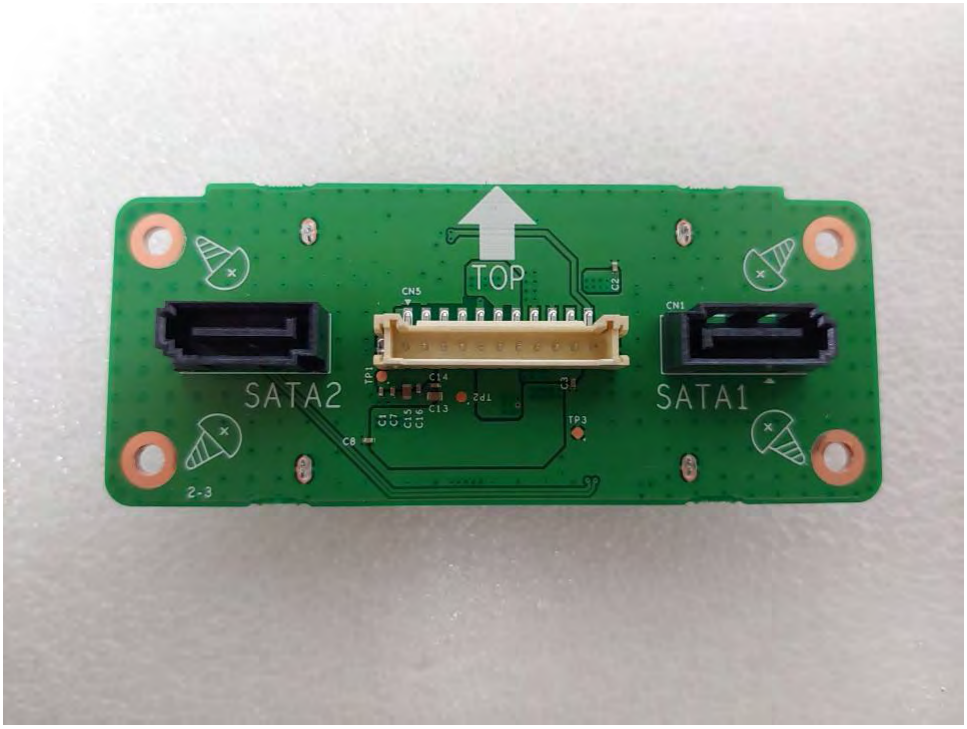
(Top)



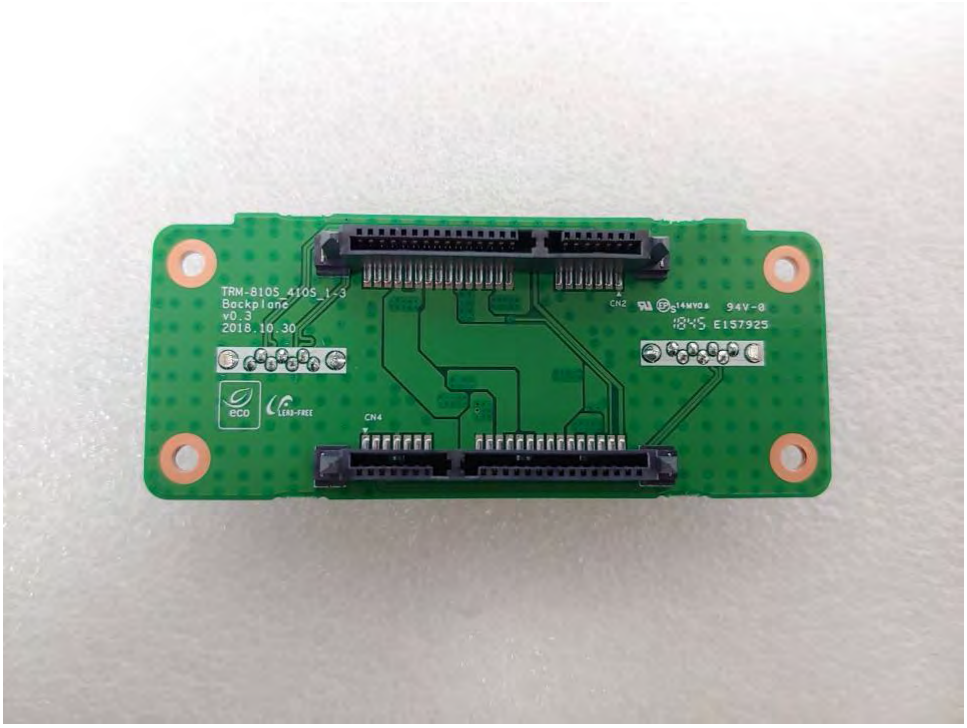
(Bottom)

EUT Internal View – Board 4

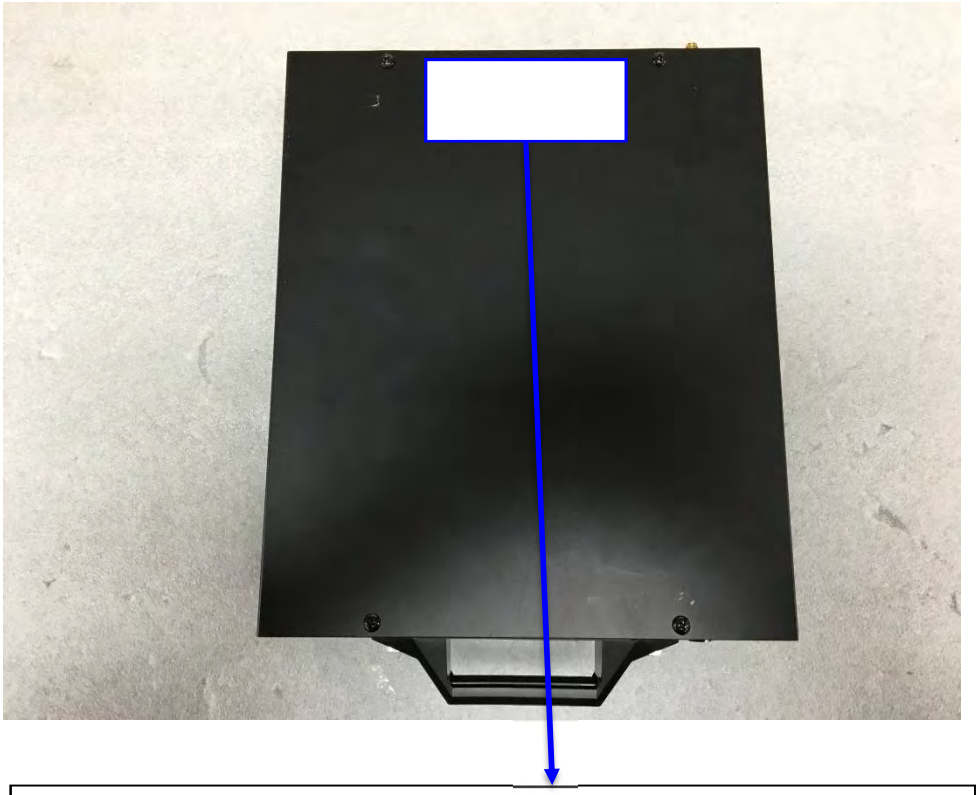
(Top)



(Bottom)



Label and Location



NVR

Model No : TRM-810S

Manufacturer : HANWHA TECHWIN(TIANJIN) CO., LTD

Made in China

CE