



EMC TEST REPORT For CE

Test Report No. : KES- E1-18T0176-R1

Date of Issue : May. 01, 2018

Product name : NVR

Model/Type No. : TRM-1610S

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 : Feb. 01, 2018

Test date : Feb. 13, 2018 ~ Feb. 20, 2018

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

Tested by

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EMC Test Engineer

Reviewed by

Dong-Hun, Jang
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This test report is not related to KOLAS.



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Test report No.:
KES-E1-18T0176-R1
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Feb. 23, 2018	KES-E1-18T0176	Issued
May. 01, 2018	KES-E1-18T0176-R1	Re-issue due to manufacturer change

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1.0 General Product Description

Main Specifications of E.U.T are:

Display		
Network Camera	Inputs	Max. 16CH (4 PoE)
	Resolution	CIF ~ 12MP
	Protocols	SUNAPI, ONVIF
Live	Local Display	HDMI / VGA
	Multi-Channel Display	[Local monitor] 1 / 2V / 3V / 4 / 6 / 8 / 9 / 13 / 16 / Auto sequence, [Web] 1 / 4 / 9 / 16 / Auto sequence
	Performance	[Local Monitor] - 12M (30fps). - 8.3M(120fps) - 1080p(480fps)
Performance		
Operating System	Embedded	Linux
Record	Compression	H.265, H.264, MJPEG, WiseStream(H.265, H.264)
	Recording Bandwidth	Max. 128Mbps(80Mbps)
	Resolution	CIF ~ 12MP
	Type	Manual, Schedule (Continuous / Event), Event (Pre / Post), Emergency
	Retention	Retention per channel (1~400 days)
	Event Trigger	Alarm Input (16), Video Loss, Camera Event(Sensor, MD, Video Analytics, Defocus)
	Event Action	e-Mail, Alarm Out, Buzzer, Monitor Out, vms
Search & Play	Playback Bandwidth	32Mbps (16CH 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. 16CH(Local Monitor, CMS)



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-1610S	-	Hanwha Techwin (Tianjin) Co.,Ltd	EUT



1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook1	LG15N54	410NZXE015458	LG	-
Adapter1	ADP-90WH B	84ZW19F1747	DELTA ELECTRONICS(JIANGSU) LTD.	-
Notebook2	RV518	HTK991NC600187 E	SAMSUNG	-
Adapter2	ADP-60ZH	AD-6019R	DELTA ELECTRONICS, INC.	-
Monitor1	LS23C340	ZXPCHTMF A02346H	SAMSUNG	-
Monitor1 Adapter	A4514_DSM	CN07BN4400721A SE38GCOY0XS	SAMSUNG	-
Monitor2	LS23A300	ZS2XHVNB902349 2Z	SAMSUNG	-
Monitor2 Adapter	PN3014	-	SAMSUNG	-
Camera	LVN-6030R	ZHH070GJC00005 B	Hanwha Techwin (Tianjin) Co.,Ltd	-
Mouse	-	-	-	-
USB 3.0 Memory	-	-	SanDisk	-
Speaker 5	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
Alarm1	-	-	-	-
Alarm2	-	-	-	-
Router	N604R	-	IPTIME	-
Adapter	SSA021F0900S 0KODM	-	SHENZHEN KUANTEN LIMITED	-

1.6 External I/O Cabling

■ 12 V (dc) Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NVR (EUT)	HDMI	Monitor1	HDMI	1.7	S
	VGA	Monitor2	VGA	1.6	U
	USB	Mouse	-	1.7	U
	USB3.0	USB3.0 Memory	-	-	-
	Control Box	Control Box	Main Connector	3.0	S
	POE1	Cmaera	POE	3.2	U
	Viewer	Notebook1	RJ-45	3.1	U
	GPS ANT	GPS Antenna	-	3.0	U
	AUDIO	Speaker	-	1.6	U
	Alarm Block	Alarm1	-	3.0	U
	Alarm Block	Alarm2	-	3.0	U

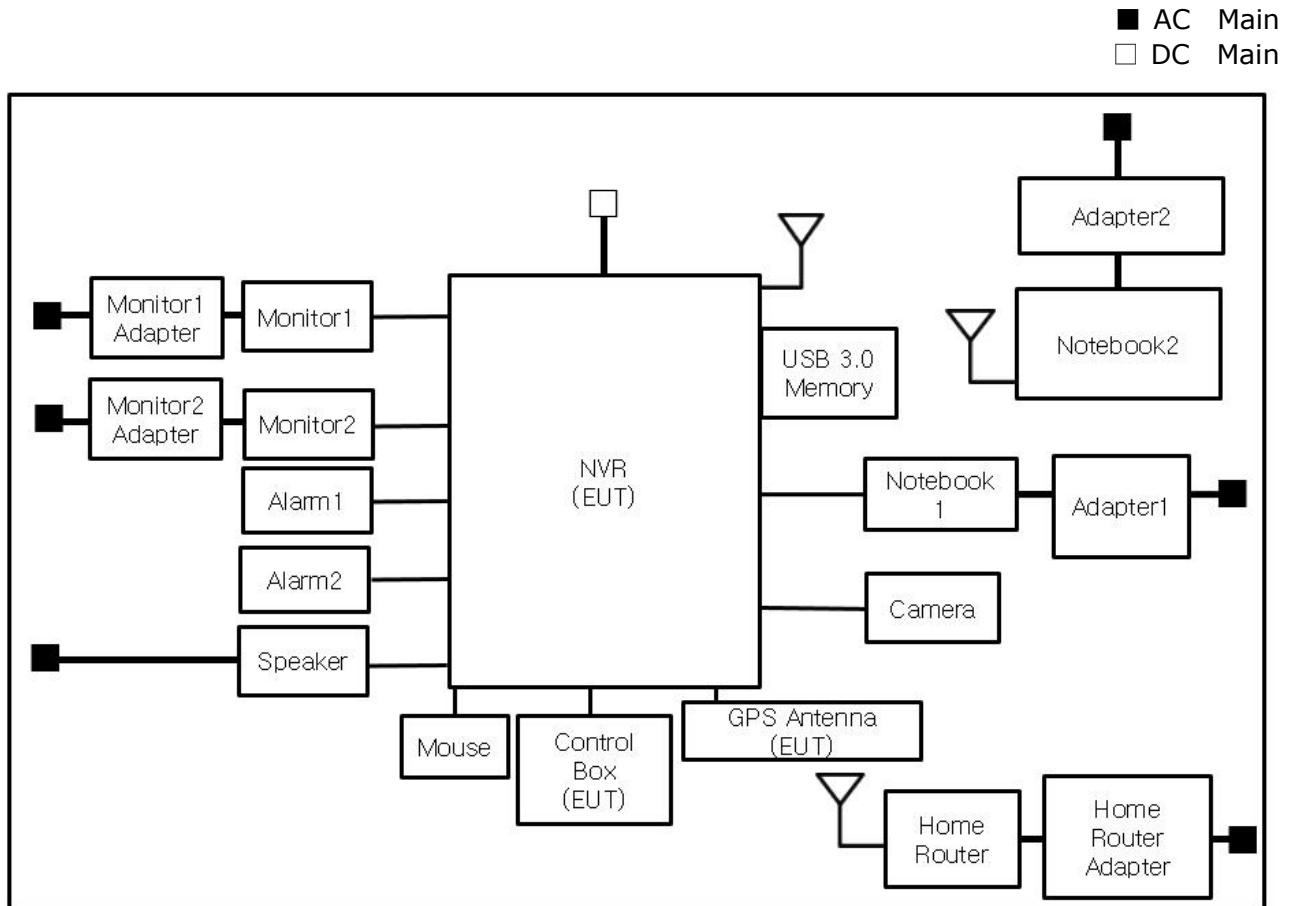
* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

Test Mode	operating
12 V (dc)	EUT Monitoring, 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

during Radiated Electric Field Emissions test, 2443MHZ, 4905MHZ is excluded the Wi-Fi fundamental frequency or harmonic frequency.

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	Accreditation No
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

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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



2.1 Conducted Emissions at Mains Power Ports

Test Date

N/A

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, 27, 2018
☐	LISN	ENV216	R & S	101787	01, 05, 2019
☐	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☐	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 07, 2018
☐	LISN	NNBM8124	SCHWARZBECK	8124-1003	08, 07, 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



2.2 Conducted Emissions at Telecommunication Ports

Test Date

Feb. 13, 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	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 05, 2019
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 07, 2019
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 07, 2019
☐	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 12, 2018
☐	CDN	CDNS502A	TESEQ	40431	01, 05, 2019

Test Conditions

Temperature: 21,5 °C

Relative Humidity: 42,3 % 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

Remarks

See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Feb. 13, 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, 18, 2018
☒	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

Test Conditions

Temperature: 21,2 °C
Relative Humidity: 41,0 % 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

Feb. 13, 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	04, 17, 2018
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2019
☒	ATTENUATOR	8491A	HP	32173	03, 24, 2018
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 22,7 °C
Relative Humidity: 44,0 % 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.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

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

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

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

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

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

report, based on the following criteria:

Electrostatic discharge

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

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

Radiated electromagnetic fields

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

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

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

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

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

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

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

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

Fast transient burst / slow high energy voltage surge

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

Conducted RF immunity

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

Voltage dip/interruption / Voltage variation

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

3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Feb. 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, 2018
☒	HCP	-	KES	-	-
☒	VCP	-	KES	-	-

Test Conditions

Temperature: 22,4 °C
Relative Humidity: 42,6 % R.H.
Atmospheric Pressure: 101,3 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

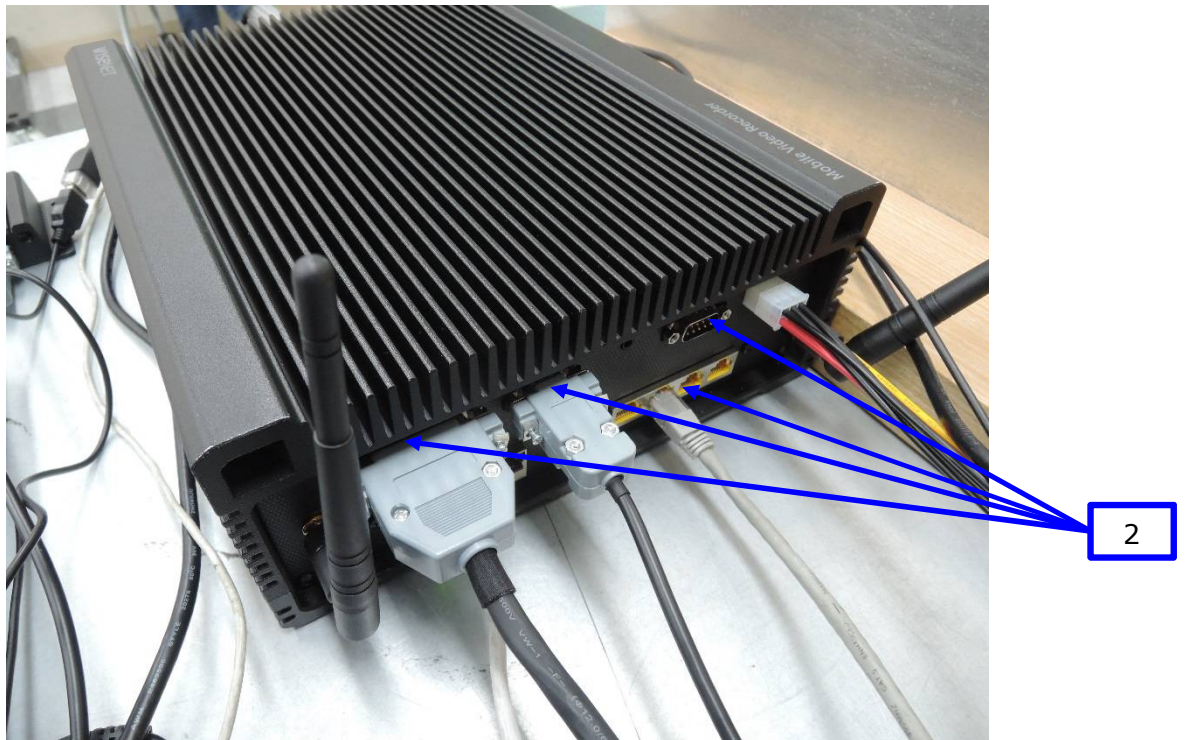
Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
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Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



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Test Data**Indirect Discharge**

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure, screw	Contact Discharge	Complied	-
2	Front port, Rear port	Contact Discharge	Complied	-
3	Control box	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

Feb. 14, 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, 07, 2018
☒	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 07, 2018
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 07, 2018
☒	POWER METER	NRP2	R & S	103475	08, 07, 2018
☒	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 07, 2018
☒	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 07, 2018
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 07, 2018
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 42,0 % R.H.
Atmospheric Pressure: 101,1 kPa



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

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
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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

RemarksPASS Required Performance Criteria.

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Feb. 20, 2018

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, 2018
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 27, 2018

Test Conditions

Temperature: 22,5 °C
Relative Humidity: 42,4 % R.H.
Atmospheric Pressure: 101,0 kPa

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 kV ☐ ± 4.0 kV	☐ ± 2.0 kV
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 kV ☐ ± 2.0 kV	☒ ± 1.0 kV
Burst Period:	☒ 300 ms	☐ 2 s
Repetition Rate:	☐ 5 klz	☒ 100 klz
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 – L2	Complied	Complied

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
Control box	Complied	Complied
PoE1	Complied	Complied
Viewer	Complied	Complied
GPS ANT	Complied	Complied
Alarm Block	Complied	Complied

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

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



3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

N/A

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, 27, 2018
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
☐	CDN	CNV 508N1	EM TEST	P1610176296	11, 28, 2018
☐	CDN	CNV 504N7.3	EM TEST	P1744207079	12, 18, 2018

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa



Test Specifications

AC Power Lines

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

Surge Amplitude : Common Mode
☐ (0,5 / 1,0 / 2,0) kV
Differential Mode
☐ (0,5 / 1,0) kV

Number of Surges: ☐ 5 surges per angle

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

Polarity: ☐ Positive & Negative

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

Required Performance Criteria: ☐ Complied

Other supply / Signal Lines

Source Impedance: 42 ohm for common Mode

Surge Amplitude: Common Mode
☐ (0,5 / 1,0) kV

Number of Surges: ☐ 5 Surges

Polarity: ☐ Positive & Negative

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

Required Performance Criteria: ☐ Complied

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Test Data☐ Line to Earth – Common Mode

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

Signal Lines☐ Line to Earth – Common Mode

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

Note: "Blank" = Not performed

Observations: N/A

Test Results

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

RemarksN/A : Because the EUT power is DC, limits are not specified.

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Feb. 19, 2018

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, 27, 2018
☒	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 27, 2018
☒	CDN	CDN M016	TESEQ	43694	11, 27, 2018
☐	CDN	CDN M016	TESEQ	43697	11, 27, 2018
☒	CDN	CDN T800	TESEQ	42800	11, 27, 2018
☒	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 28, 2018

Test Conditions

Temperature: 21,4 °C
Relative Humidity: 42,1 % R.H.
Atmospheric Pressure: 100,9 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
-	CDN	-

☒ 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
Control box, GPS ANT, Alarm Block	EM Injection Clamp	Complied
PoE1, 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

PASS Required Performance Criteria.



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 #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, 2018
☐	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Atmospheric Pressure:

kPa



Test Specifications & Observations/Remarks

(Test Voltage : -)

<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: N/A

Test Results

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

Remarks

N/A : Because the EUT power is DC, limits are not specified.



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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))

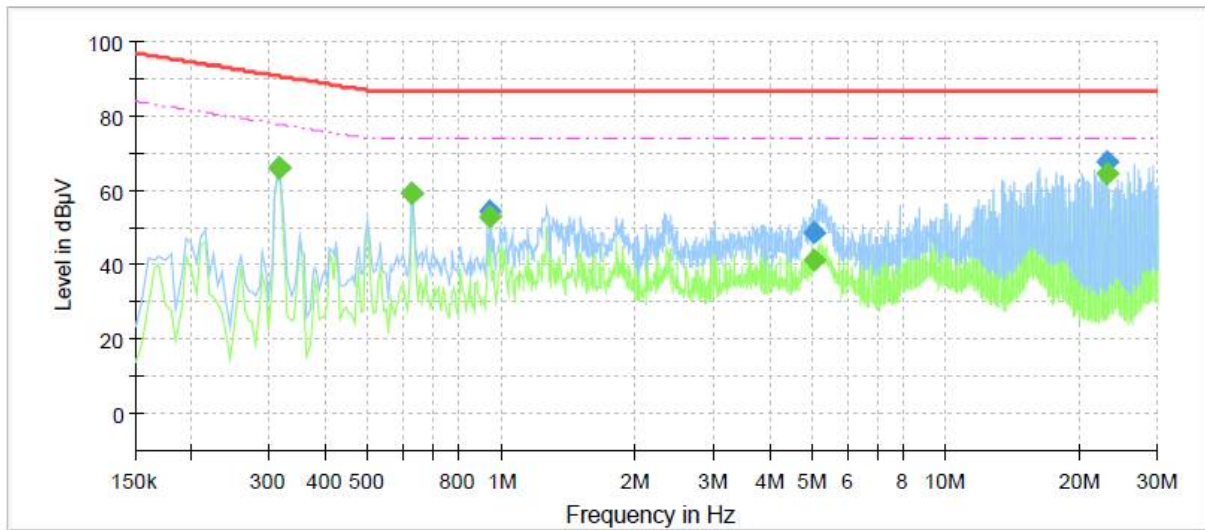
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Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TRM-1610S
Mode	LAN_10M
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.315000	66.28	---	90.84	24.56	1000.0	9.000	Single Line	19.4
0.315000	---	65.95	77.84	11.89	1000.0	9.000	Single Line	19.4
0.630000	---	59.14	74.00	14.86	1000.0	9.000	Single Line	19.5
0.630000	59.48	---	87.00	27.52	1000.0	9.000	Single Line	19.5
0.945000	---	52.73	74.00	21.27	1000.0	9.000	Single Line	19.7
0.945000	54.49	---	87.00	32.51	1000.0	9.000	Single Line	19.7
5.040000	48.75	---	87.00	38.25	1000.0	9.000	Single Line	19.4
5.040000	---	41.05	74.00	32.95	1000.0	9.000	Single Line	19.4
23.130000	---	64.42	74.00	9.58	1000.0	9.000	Single Line	20.2
23.130000	67.94	---	87.00	19.06	1000.0	9.000	Single Line	20.2

[100 Mbps]

Common Information

Test Description:

Model No.:

Mode

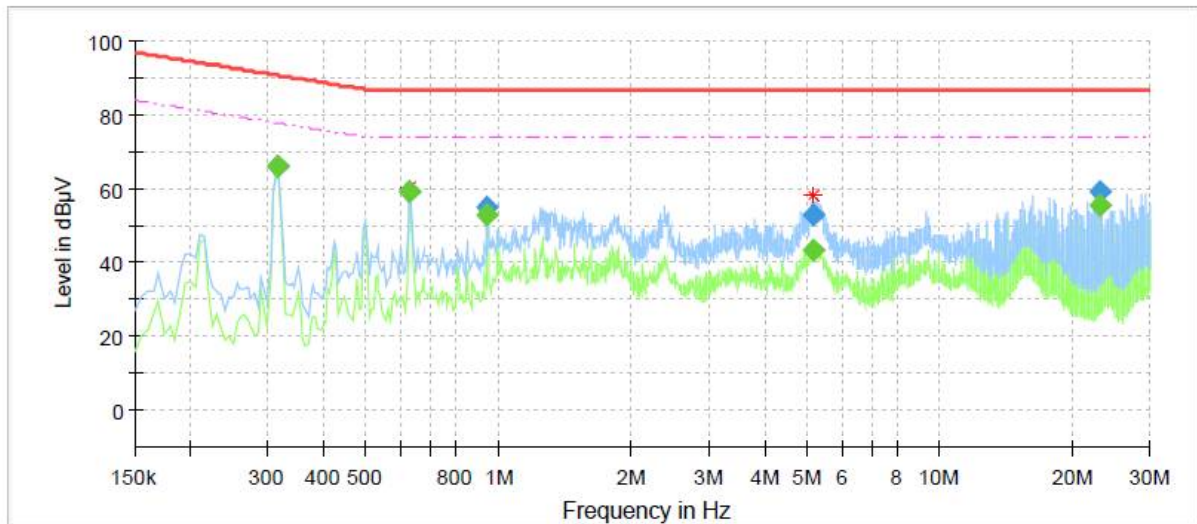
Operator Name:

Telecommunication Emission

TRM-1610S

LAN_100M

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.315000	66.39	---	90.84	24.45	1000.0	9.000	Single Line	19.3
0.315000	---	66.08	77.84	11.76	1000.0	9.000	Single Line	19.3
0.630000	59.54	---	87.00	27.46	1000.0	9.000	Single Line	19.5
0.630000	---	59.34	74.00	14.66	1000.0	9.000	Single Line	19.5
0.945000	54.98	---	87.00	32.02	1000.0	9.000	Single Line	19.6
0.945000	---	53.19	74.00	20.81	1000.0	9.000	Single Line	19.6
5.190000	---	43.37	74.00	30.63	1000.0	9.000	Single Line	19.2
5.190000	52.79	---	87.00	34.21	1000.0	9.000	Single Line	19.2
23.130000	---	55.40	74.00	18.60	1000.0	9.000	Single Line	20.1
23.130000	59.06	---	87.00	27.94	1000.0	9.000	Single Line	20.1

◆ Calculation

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

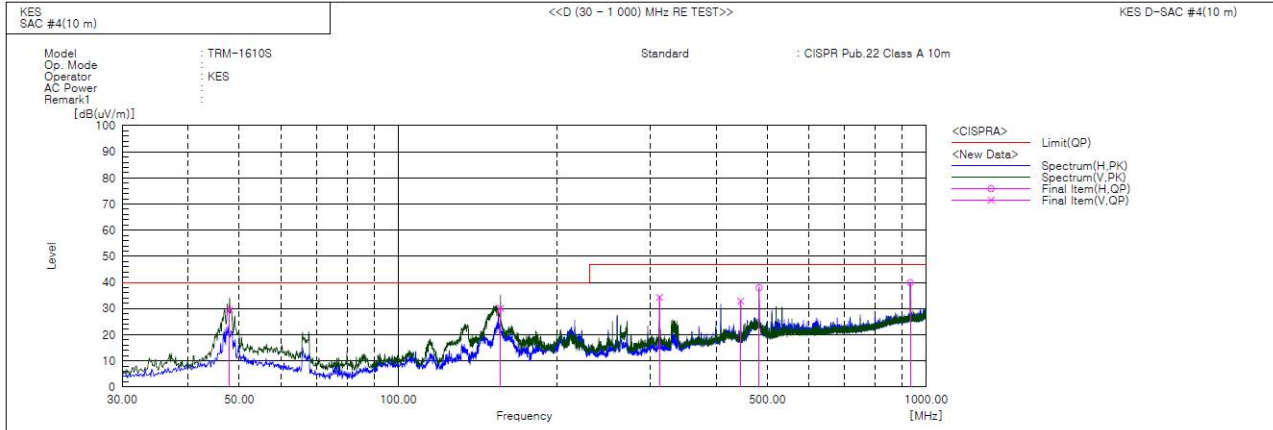
QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



Radiated Electric Field Emissions(Below 1 GHz)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	47.945	V	57.9	-28.3	29.6	40.0	10.4	400.0	297.0	
2	156.221	V	61.8	-31.7	30.1	40.0	9.9	150.0	101.0	
3	312.513	V	58.7	-24.4	34.3	47.0	12.7	100.0	281.0	
4	445.524	V	53.2	-20.4	32.8	47.0	14.2	100.0	64.0	
5	482.626	H	57.3	-19.4	37.9	47.0	9.1	200.0	144.0	
6	933.070	H	51.2	-11.3	39.9	47.0	7.1	100.0	39.0	

◆ 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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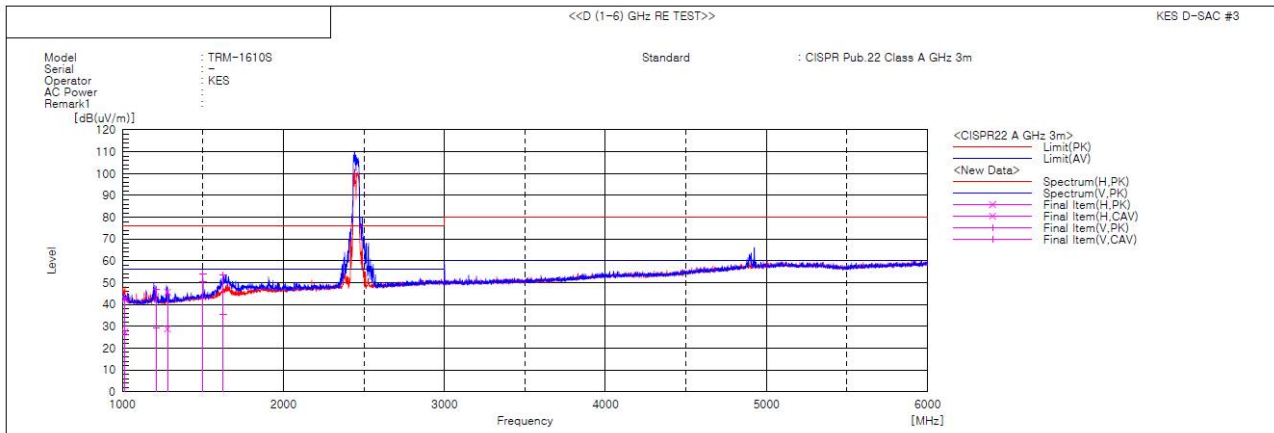
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Radiated Electric Field Emissions(Above 1 GHz)



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	1016.084	H	46.1	30.9	-3.5	42.6	27.4	76.0	56.0	33.4	28.6	101.0	41.7	
2	1210.777	V	49.1	31.5	-2.3	46.8	29.2	76.0	56.0	29.2	26.8	101.0	170.5	
3	1280.359	H	47.4	30.5	-1.7	45.7	28.8	76.0	56.0	30.3	27.2	101.0	216.7	
4	1499.960	V	53.9	50.3	0.2	54.1	50.5	76.0	56.0	21.9	5.5	101.0	188.3	
5	1625.623	V	52.3	34.2	1.3	53.6	35.5	76.0	56.0	22.4	20.5	101.0	179.6	
6	2443.000	V			6.7			76.0	56.0			101.0	358.3	
7	4905.000	V			16.6			80.0	60.0			101.0	348.3	

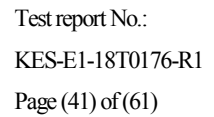
◆ Calculation

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

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





Test Data - Voltage Fluctuations

Maximum Flicker results

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



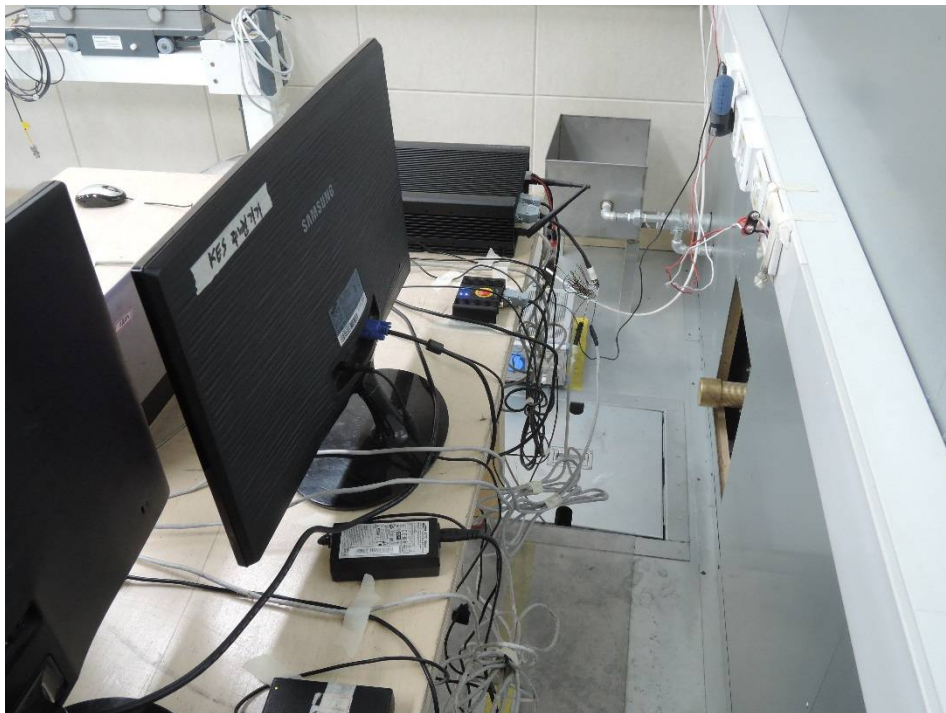
Test Setup Photos and Configuration

Conducted Voltage Emissions

N/A

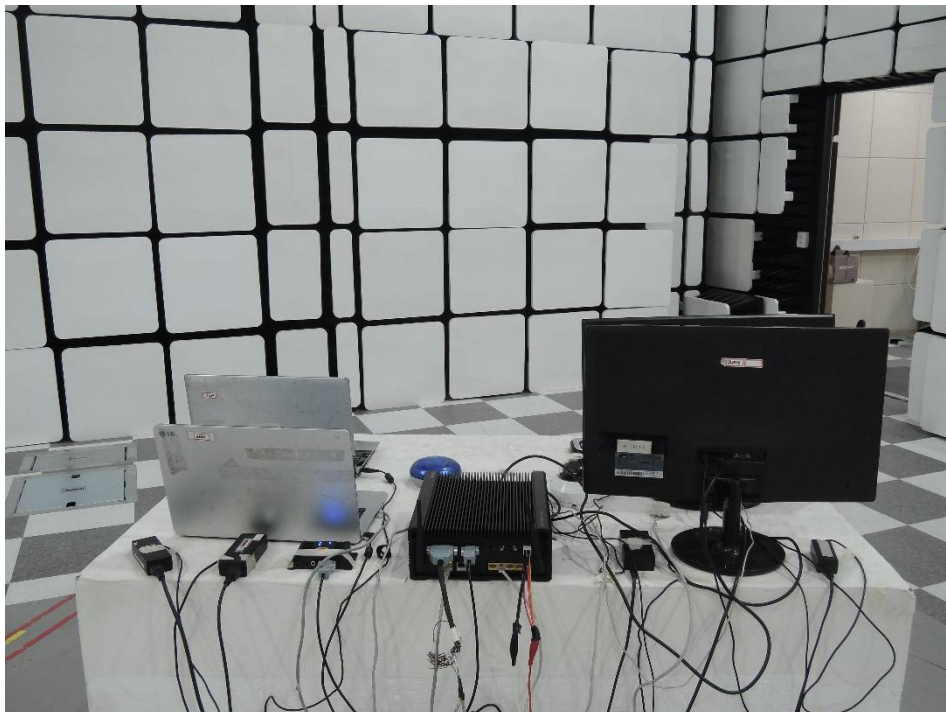
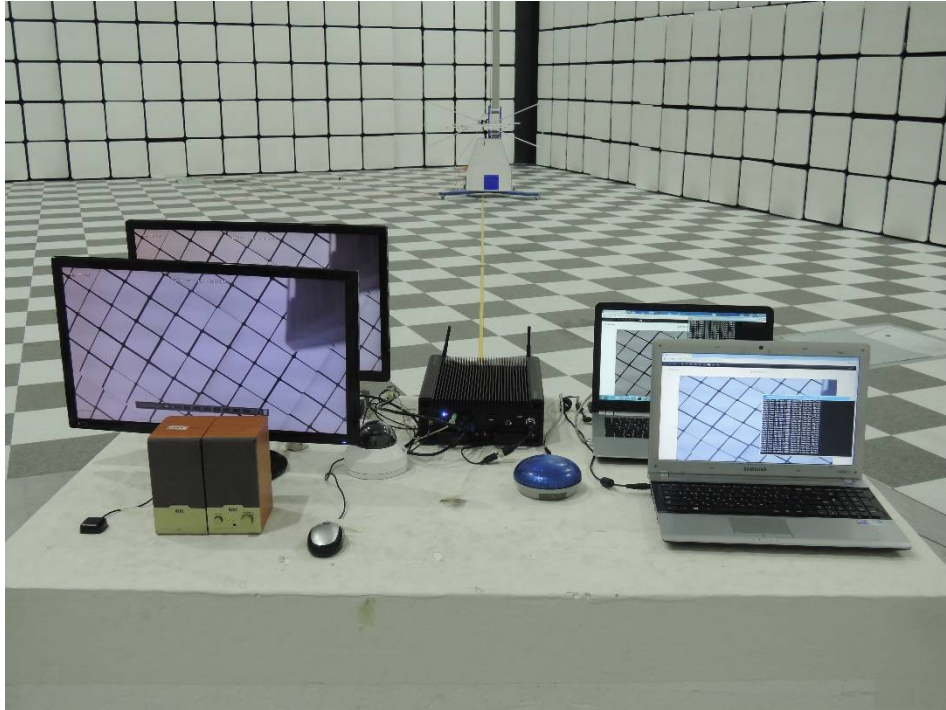
N/A

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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Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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Electrostatic Discharge

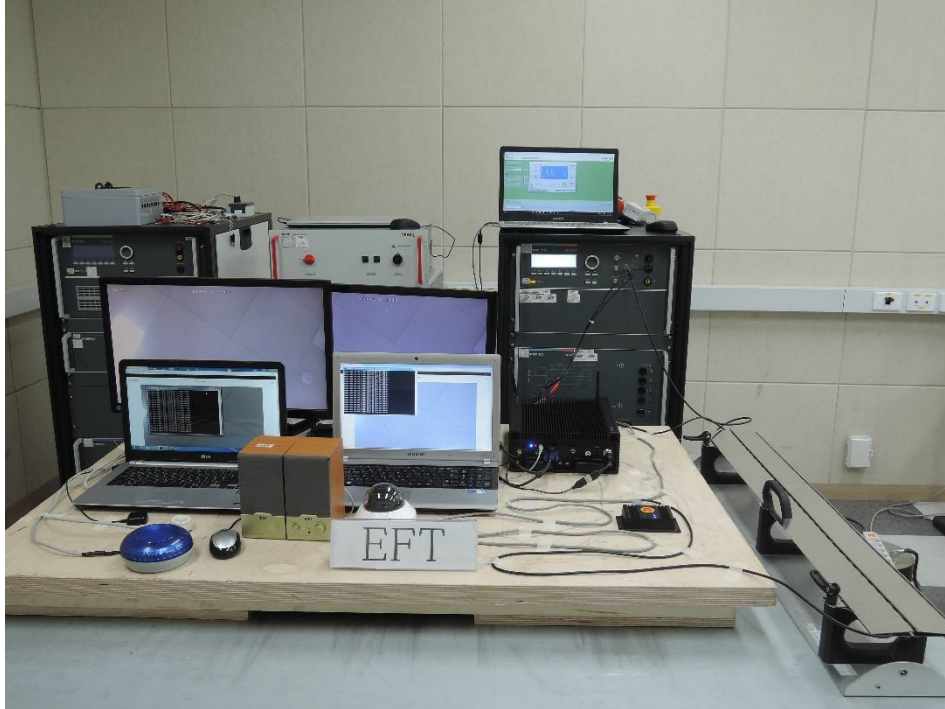


Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients

N/A

Conducted Disturbance



Voltage Dips and Short Interruptions

N/A

EUT External Photographs

(Top)



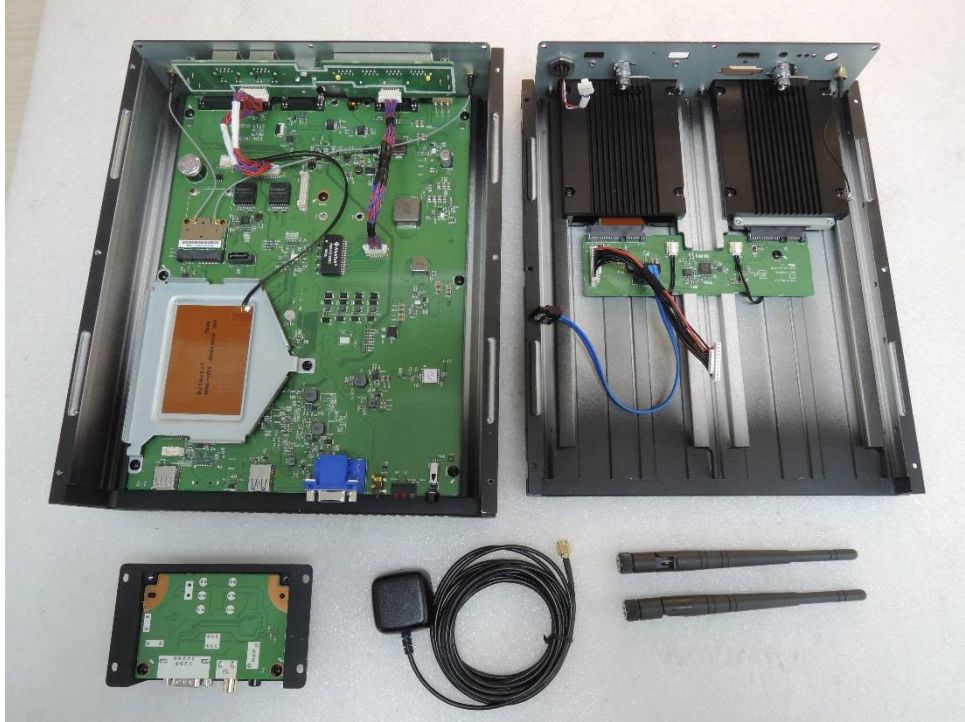
(Bottom)



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EUT Internal Photographs

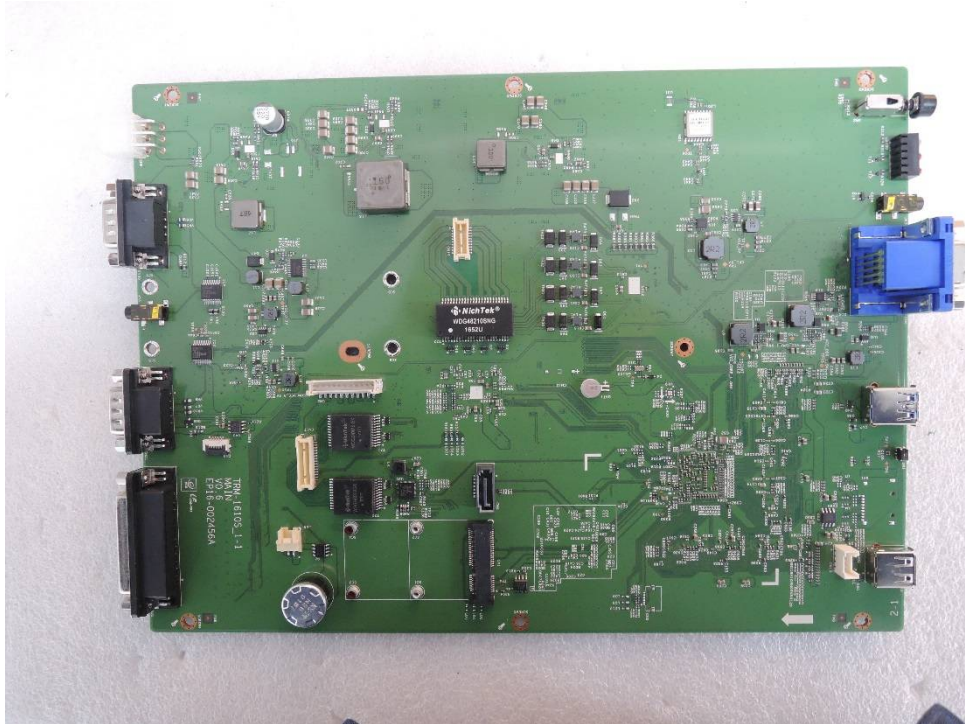
(Internal View)



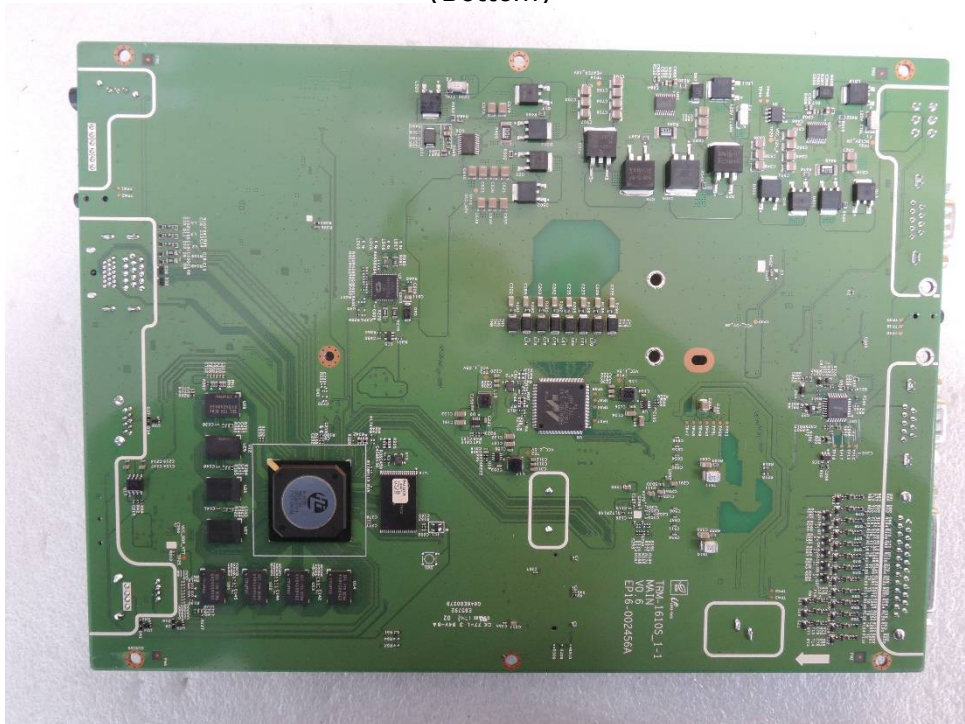
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EUT Internal View – Main board

(Top)



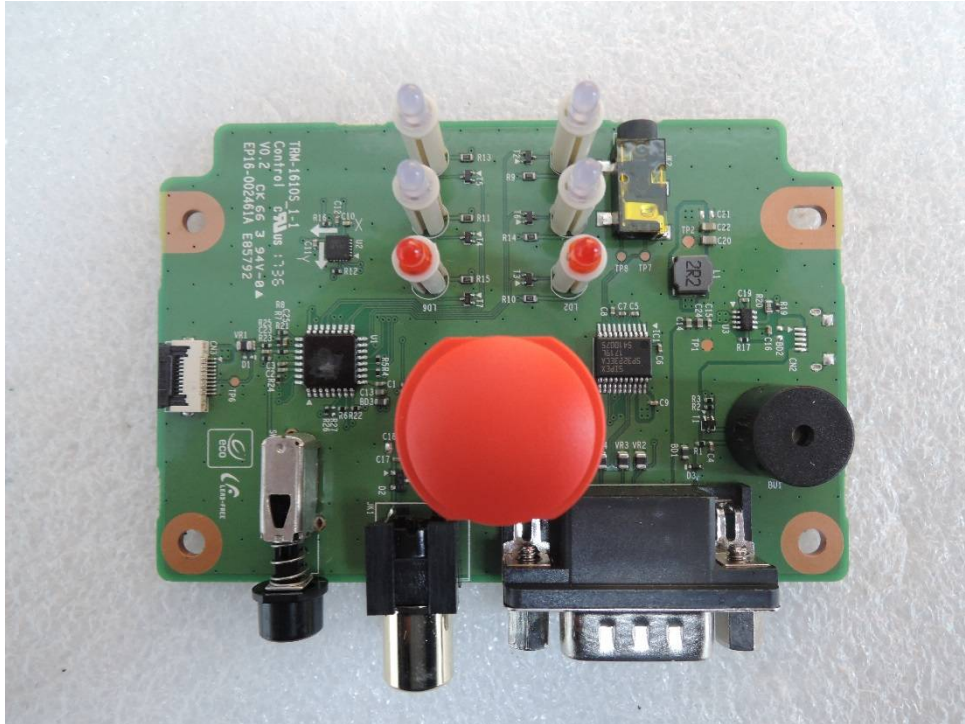
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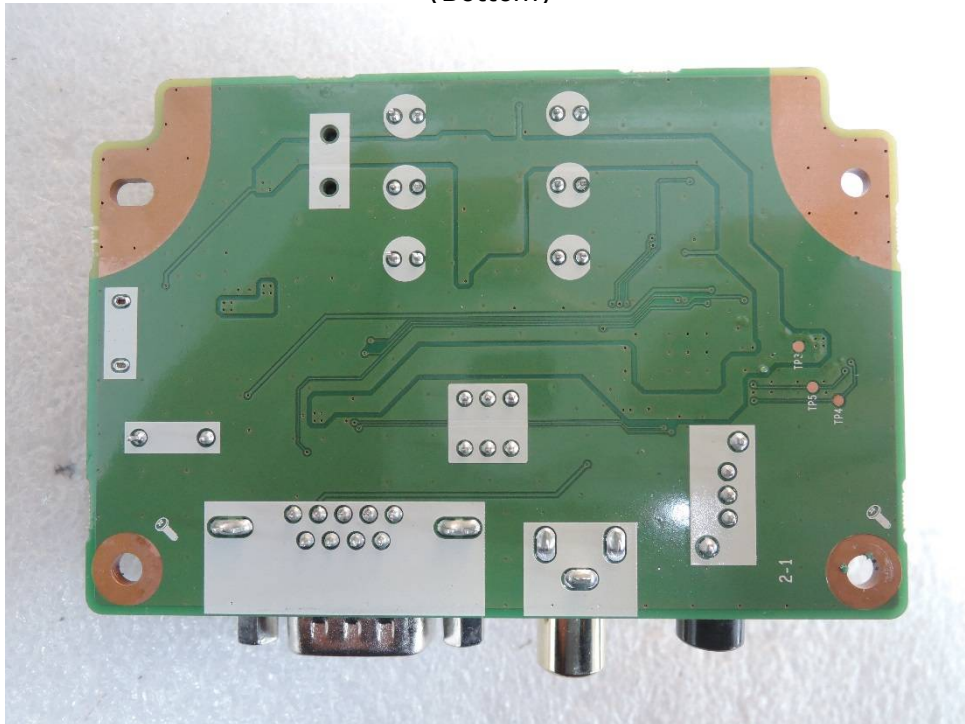
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EUT Internal View – Control box board

(Top)



(Bottom)



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EUT Internal View – GPS Antenna

(Top)



(Bottom)



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EUT Internal View – Module board

(Top)



(Bottom)



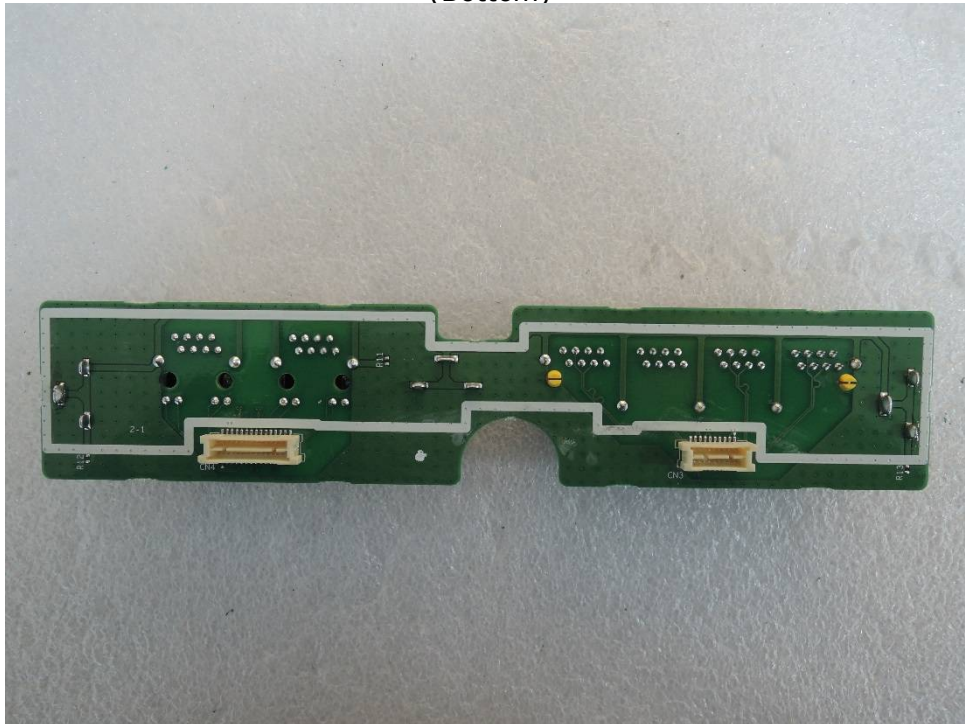
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EUT Internal View – REAR board

(Top)



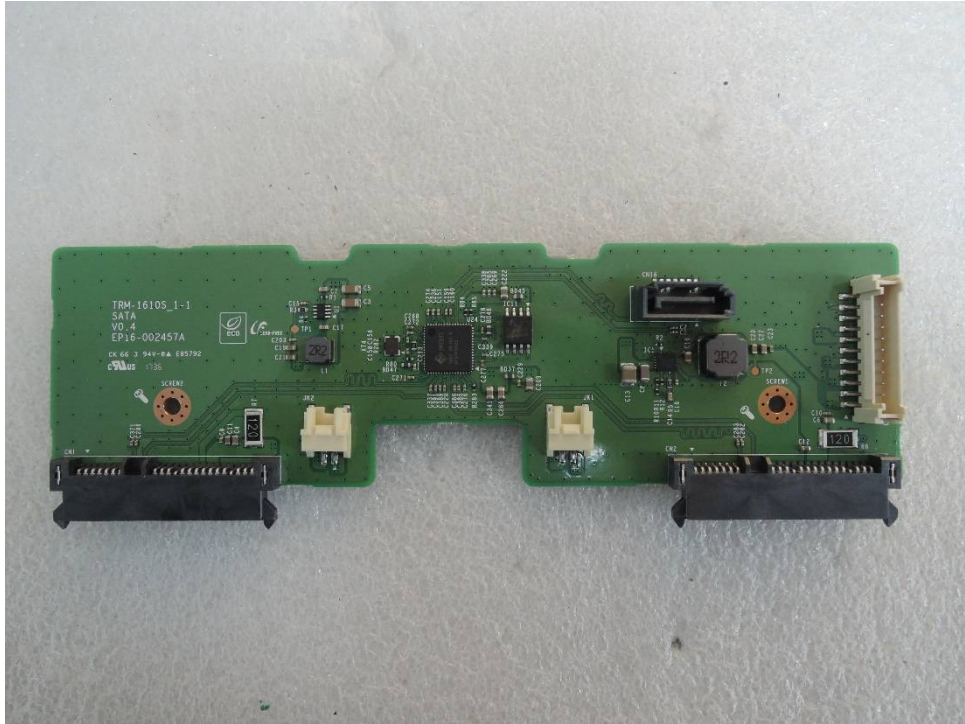
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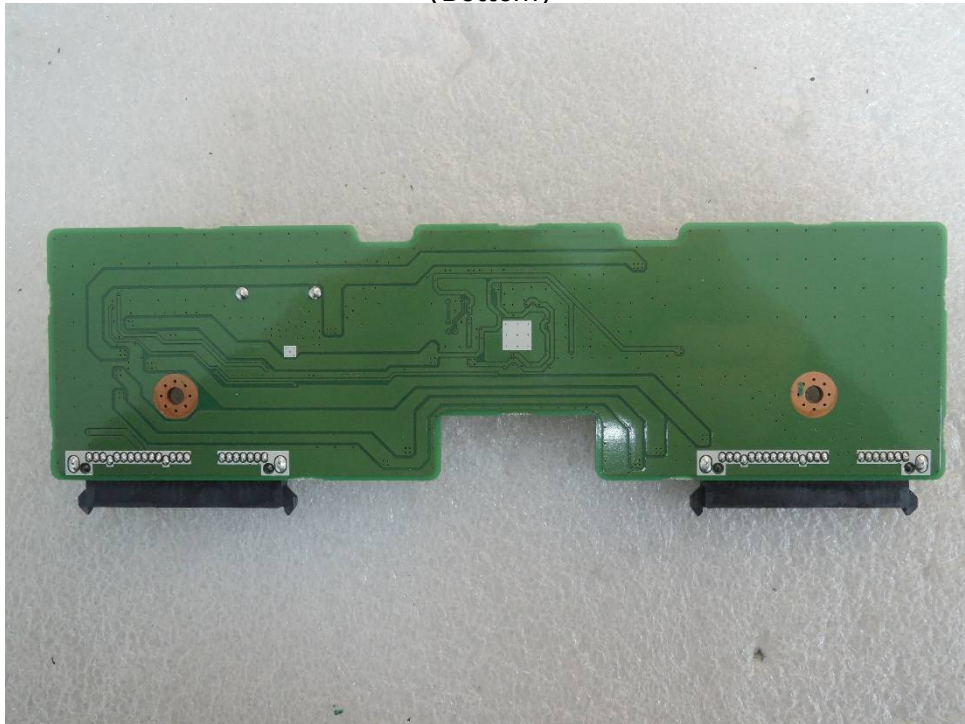
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EUT Internal View – SATA board

(Top)



(Bottom)



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EUT Internal View – SSD

(Top)



(Bottom)



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Label and Location



NVR

Model No : TRM-1610S

Manufacturer : HANWHA TECHWIN(TIANJIN)CO., LTD

Made in China

