



EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0260-R1
Date of Issue : Oct, 23, 2017
Product name : NETWORK STORAGE
Model/Type No. : SRB-160S
Variant Model : -
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 1204, Changwon-daero, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, Korea
Manufacturer : C-PRO ELECTRONICS
Manufacturer Address : #4F,5F, 214, Galmachi-ro, Jungwon-gu, Seongnam-si,
Gyeonggi-do, 13216, Korea
Date of Receipt : Mar, 21, 2017
Test date : Mar, 21, 2017 – Mar, 22, 2017
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jin Bae, Lee
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

**KES Co., Ltd.**

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-17T0260-R1

Page (2) of (66)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Apr, 04, 2017	KES-E1-17T0260	Issued
Oct. 23, 2017	KES-E1-17T0260-R1	Standard Revision

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document Jun be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



TABLE OF CONTENTS

1.0	General Product Description	4
1.1	Test Voltage & Frequency	5
1.2	Variant Model Differences.....	5
1.3	Device Modifications	5
1.4	Equipment Under Test.....	5
1.5	Support Equipments	5
1.6	External I/O Cabling	5
1.7	E.U.T Operating Mode(s)	6
1.8	Configuration.....	6
1.9	Calibration Details of Equipment Used for Measurement	7
1.10	Test Facility	7
1.11	Laboratory Accreditations and Listings	7
2.0	Test Regulations.....	8
2.1	Conducted Emissions at Mains Power Ports	10
2.2	Conducted Emissions at Telecommunication Ports	11
2.3	Radiated Electric Field Emissions(Below 1 GHz)	12
2.4	Radiated Electric Field Emissions(Above 1 GHz)	13
2.5	Harmonic Current Emissions.....	14
2.6	Voltage Fluctuations and Flicker	15
3.0	Criteria for compliance.....	16
3.1	Electrostatic Discharge.....	18
3.2	Radiated Electric Field Immunity	21
3.3	Electrical Fast Transients/Bursts	24
3.4	Surge Transients	26
3.5	Conducted Disturbance	29
3.6	Voltage Dips and Short Interruptions	31
APPENDIX A – TEST DATA.....		33
Conducted Emissions at Mains Power Ports.....		33
Conducted Emissions at Telecommunication Ports		37
Radiated Electric Field Emissions(Below 1 GHz)		40
Radiated Electric Field Emissions(Above 1 GHz).....		41
Harmonic Current Emissions and Voltage Fluctuations and Flicker		45
Test Setup Photos and Configuration		48
Conducted Voltage Emissions		48
Conducted Telecommunication Emissions		49
Radiated Electric Field Emissions(Below 1 GHz)		50
Radiated Electric Field Emissions(Above 1 GHz).....		51
Harmonic Current Emissions and Voltage Fluctuations and Flicker		52
Electrostatic Discharge		53
Radiated Electric Field Immunity		53
Electrical Fast Transients/Bursts		54
Surge Transients		55
Conducted Disturbance.....		56
Voltage Dips and Short Interruptions.....		57
EUT External Photographs		58
EUT Internal Photographs		59



1.0 General Product Description

Main Specifications of E.U.T are:

General	
OS	Linux
Network Protocols	iSCSI(IP-SAN), DHCP, HTTP, TCP/IP, UDP/IP, SNMP v1/v2c/v3, SMTP, DNS, NTP
Supported RAID Level	RAID0, RAID10, RAID5, RAID5+Hot Standby, RAID6
Maximum iSCSI Volume	8
Network Bonding	Failover and Load Balancing
One-Touch Button Setup	Creates an RAID5 volume and iSCSI target node(s)
Hardware	
CPU	ARM v7 Quad Core 1.6GHz
Floating Point	Yes
RAM Size	DDR3 2.0 GB (Expandable up to 8GB)
Internal HDD	3.5" SATA (III)/ SATA (II) x 16 (HDDs not included)
	Hardware RAID PCI Express to SATA Solution
Hot Swappable HDD	Yes
Dimension	482(W) x 133(H) x 548(D) mm
Weight	15.2kg (without HDDs)
LAN	1 Gbps RJ-45 Port x 4
Power Source(520W, Redunant)	
Frequency	50~60Hz
AC Voltage	100~240VAC
Current	8.5/4A at 100/240V
MTBF	Over 100,000 hours (25 °C, Full Load)
Environment and Packing	
Environment	RoHS Compliant, Lead Free
EMC/Safety	KC, FCC, CE



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 ☒ 230 Vac ☐ 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
NETWORK STORAGE	SRB-160S	-	C-PRO ELECTRONICS	E.U.T

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
NoteBook	LG15N54	410NZET022292	LG Electronics Inc.	-
NoteBook Adaptor	DA-1900-08	9700591703	Dongguang Lite Power 2nd Plant	-

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK STORAGE (E.U.T)	RJ-45	NoteBook	RJ-45	3.0	U

* Unshielded=U, Shielded=S

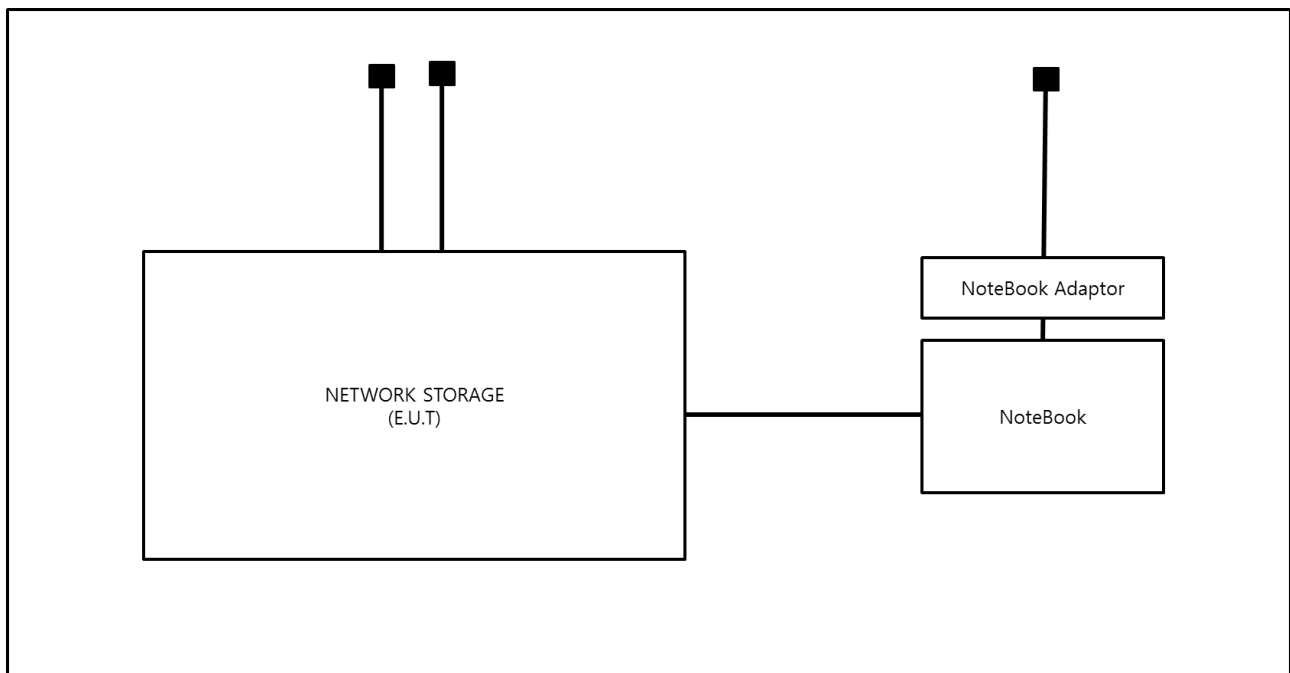
1.7 E.U.T Operating Mode(s)

operating
Connect to the RJ-45 port. When the PING test is completed, the test is performed. When the test is completed, the data is read / written to the hard disk.

E.U.T Test operating S/W		
Name	Version	Manufacture Company
-	-	-

1.8 Configuration

■ AC Main
□ DC Main



1.9 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.

1.10 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 and CISPR Publication 32.

1.11 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)	



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

☒ 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

Mar, 21, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	05, 02, 2017
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	Shield Room #3	-	SEMITEC	-	-
☒	EMI Test S/W	EMC32	R & S	9.12.00	-

Test Conditions

Temperature: 19,1 °C

Relative Humidity: 35,8 %

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.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Mar, 21, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	05, 02, 2017
☒	8-Wire ISN CAT3	CAT3 8158	Schwarzbeck Mess	8158-0019	04, 01, 2017
☒	8-Wire ISN CAT5	CAT5 8158	Schwarzbeck Mess	8158-0030	04, 01, 2017
☒	8-Wire ISN CAT6	NTFM 8158	Schwarzbeck Mess	8158-0029	08, 11, 2017
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	Shield Room #3	-	SEMITEC	-	-
☒	EMI Test S/W	EMC32	R & S	9.12.00	-

Test Conditions

Temperature: 19,1 °C
Relative Humidity: 35,8 %

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

Mar, 21, 2017

Test Location

☐ Open Area Test Site #1

☒ Open Area Test Site #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI TEST RECEIVER	ESVS10	Rohde & Schwarz	826008/014	04, 18, 2017
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018
☒	Open Area Test Site 2	-	KES	-	-
☒	Antenna Mast	-	DAIL EMC	-	-
☒	Turn Table	-	DAIL EMC	-	-
☒	EMI Test S/W	-	-	-	-

Test Conditions

Temperature: 11,9 °C

Relative Humidity: 41,0 %

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

Mar, 21, 2017

Test Location

Semi Anechoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Log-Periodic Antenna	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018
☒	EMI Test Receiver	ESU26	R & S	100552	04, 24, 2017
☒	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 14, 2017
☒	Semi Anechoic Chamber #2	-	SEMITEC	-	-
☒	Antenna Mast	-	AUDIX	-	-
☒	Turn Table	-	AUDIX	-	-
☒	EMI Test S/W	e3	AUDIX	8.083b	-

Test Conditions

Temperature: 19,1 °C

Relative Humidity: 35,8 %

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Mar, 22, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	AC Source	ACS 500 N	EM TEST	V1024106760	08, 08, 2017
☒	Digital Power Analyzer	DPA 500 N	EM TEST	V1024106759	08, 08, 2017
☒	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

Test Conditions

Temperature: 19,0 °C

Relative Humidity: 34,7 %

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

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Mar, 22, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	AC Source	ACS 500 N	EM test	V1024106760	08, 08, 2017
☒	Digital Power Analyzer	DPA 500 N	EM test	V1024106759	08, 08, 2017
☒	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

Test Conditions

Temperature: 19,0 °C

Relative Humidity: 34,7 %

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 +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

Mar, 22, 2017

Test Location

EMS-ESD: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2018
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-
☒	EMS Test S/W	-	-	-	-

Test Conditions

Temperature: 19,0 °C
Relative Humidity: 34,7 %
Atmospheric Pressure: 100,2 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

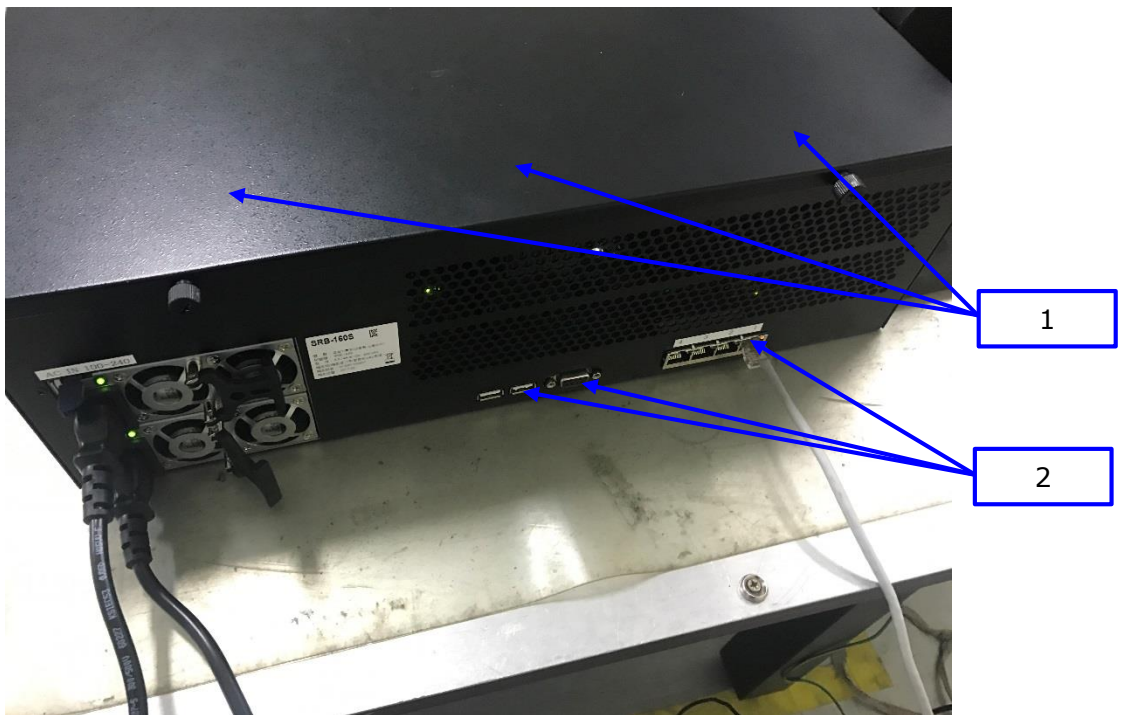
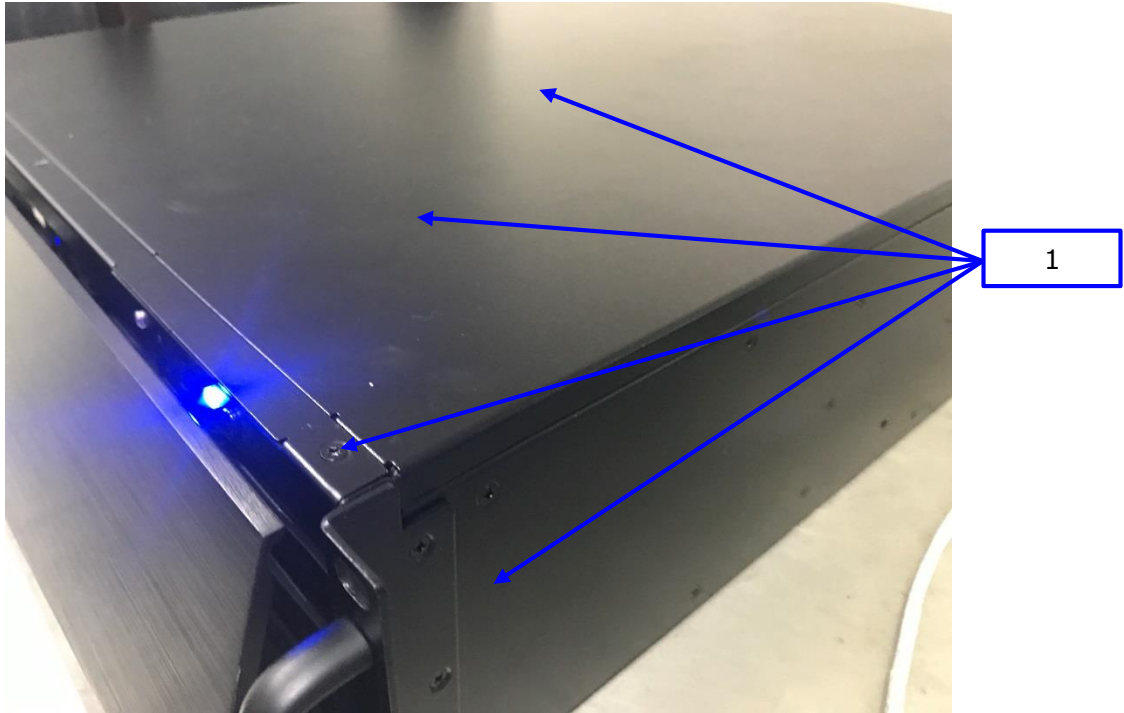
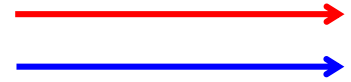
Discharge Voltage:	Contact ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	Air ☒ 2 kV ☒ 4 kV ☐ 6 kV ☒ 8 kV ☐ 15 kV	HCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV	VCP ☐ 2 kV ☐ 4 kV ☒ 6 kV ☐ 8 kV ☐ 15 kV
--------------------	---	---	---	---

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

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

**KES Co., Ltd.**

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-17T0260-R1

Page (20) of (66)

Test Data

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact Discharge	Complied	-
2	Port	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.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Mar, 21, 2017

Test Location

EMS-RS: ☐ Semi Anechoic Chamber #1☒ Semi Anechoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	SIGNAL GENERATOR	ESG-3000A	HP	US37040210	11, 01, 207
☒	AMPLIFIER	ITA0300-200	Infinitech	-	11, 01, 207
☒	AMPLIFIER	ITA0750-200	Infinitech	-	11, 01, 207
☒	AMPLIFIER	ITA1500-100	Infinitech	-	11, 01, 207
☒	AMPLIFIER	ITA2500-100	Infinitech	-	11, 01, 207
☒	GPB INTERFACE CONTROL	SYSTEM CONTROL UNIT	Infinitech	-	-
☒	POWER SUPPLY	SYSTEM POWER SUPPLY	Infinitech	-	-
☒	POWER METER	E4419B	Agilent	MY45101506	06, 27, 2017
☒	AVERAGE POWER SENSOR	E9301A	Agilent	-	06, 27, 2017
☒	AVERAGE POWER SENSOR	E9301A	Agilent	MY41495698	11, 17, 2017
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 D	SCHWARZBECK	9128D038	-
☐	MICROPHONE	MP201	BSWA	520963	11, 11, 2017
☐	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 08, 2017
☒	SEMI ANECHOIC CHAMBER #2	-	SEMITEC	-	-
☒	EMS Test S/W	KTI_RS2012	KOREA TECHNOLOGY INSTITUTE CO., LTD	2.1.1	-



Test Conditions

Temperature: 19,1 °C
Relative Humidity: 35,8 %
Atmospheric Pressure: 100,1 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.**

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-17T0260-R1

Page (23) of (66)

Test Data

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Mar, 22, 2017

Test Location

EMS-EFT: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
☒	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	Capacitive Coupling Clamp	HFK	EM TEST	070925	06, 27, 2017
☒	EMS Test S/W	iec.control	EM TEST AG	5.0.9.0	-

Test Conditions

Temperature: 19,0 °C
Relative Humidity: 34,7 %
Atmospheric Pressure: 100,2 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 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)
L – N – PE	Complied	Complied

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

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

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.



3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Mar, 22, 2017

Test Location

EMS-Surge: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	CDN	CNV 508N1	EM TEST	P1551168979	04, 27, 2017
☐	CDN	CNV 508T5	EM TEST	P1549168422	04, 27, 2017
☒	EMS Test S/W	iec.control	EM TEST	5.0.9.0	-

Test Conditions

Temperature: 19,0 °C
Relative Humidity: 34,7 %
Atmospheric Pressure: 100,2 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



Test Data

Power Lines

☒ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

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

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.



3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Mar, 22, 2017

Test Location

EMS-CS: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Continuous Wave Generator	CWS 500N1	EM TEST	V0936105119	08, 08, 2017
☒	6 dB Attenuator	ATT6	EM TEST	1208-34	08, 08, 2017
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 08, 2017
☐	CDN	CDN-T2-RJ11	EM TEST	0909-07	08, 08, 2017
☐	CDN	CDN-T4	EM TEST	0909-08	08, 08, 2017
☐	CDN	CDN-T8RJ45	EM TEST	0909-09	08, 08, 2017
☐	CDN	CDN-AF2	EM TEST	0909-10	08, 08, 2017
☐	CDN	CDN-AF4	EM TEST	0909-11	08, 08, 2017
☐	MICROPHONE	MP201	BSWA	520963	11, 11, 2017
☐	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 08, 2017
☒	EM Injection Clamp	EM 101	Liithi	35943	02, 03, 2018
☒	EMS Test S/W	icd.control	EM TEST	5.3.7	-

Test Conditions

Temperature: 19,0 °C
Relative Humidity: 34,7 %
Atmospheric Pressure: 100,2 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

Test Data

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N - PE	CDN (☐ M2, ☒ M3)	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN (☐ M2, ☐ M3)	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	EM Injection Clamp	Complied

Notes: CDN = Coupling Decoupling Network

“blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Mar, 22, 2017

Test Location

EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
☒	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
☒	EMS Test S/W	iec.control	EM TEST	5.0.9.0	-

Test Conditions

Temperature: 19,0 °C
Relative Humidity: 34,7 %
Atmospheric Pressure: 100,2 kPa



Test Specifications & Observations/Remarks

- Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 20 % dip	☒ 250 / 5000	<u>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5000	<u>Complied</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria

APPENDIX A – TEST DATA

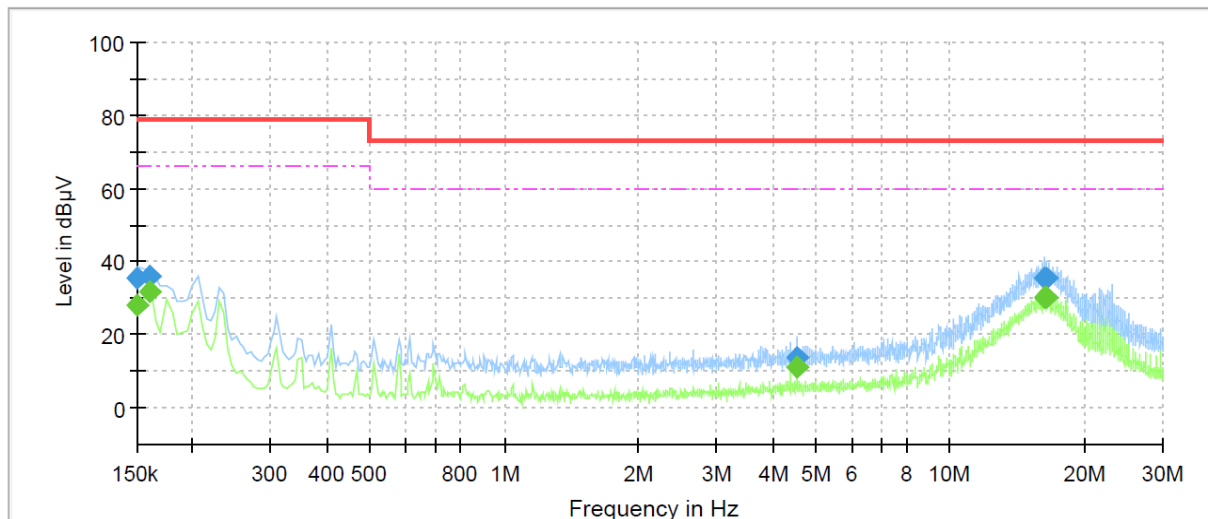
Conducted Emissions at Mains Power Ports

- Power 1

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SRB-160S
Mode	POWER 1 _ H (CE)
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	27.99	66.00	38.01	1000.0	9.000	L1	21.1
0.150000	35.59	---	79.00	43.41	1000.0	9.000	L1	21.1
0.160000	---	31.86	66.00	34.14	1000.0	9.000	L1	21.0
0.160000	36.08	---	79.00	42.92	1000.0	9.000	L1	21.0
4.520000	---	11.30	60.00	48.70	1000.0	9.000	L1	19.7
4.520000	13.77	---	73.00	59.23	1000.0	9.000	L1	19.7
16.260000	---	30.10	60.00	29.90	1000.0	9.000	L1	20.1
16.260000	35.61	---	73.00	37.39	1000.0	9.000	L1	20.1
16.440000	---	30.09	60.00	29.91	1000.0	9.000	L1	20.1
16.440000	35.65	---	73.00	37.35	1000.0	9.000	L1	20.1

♦ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

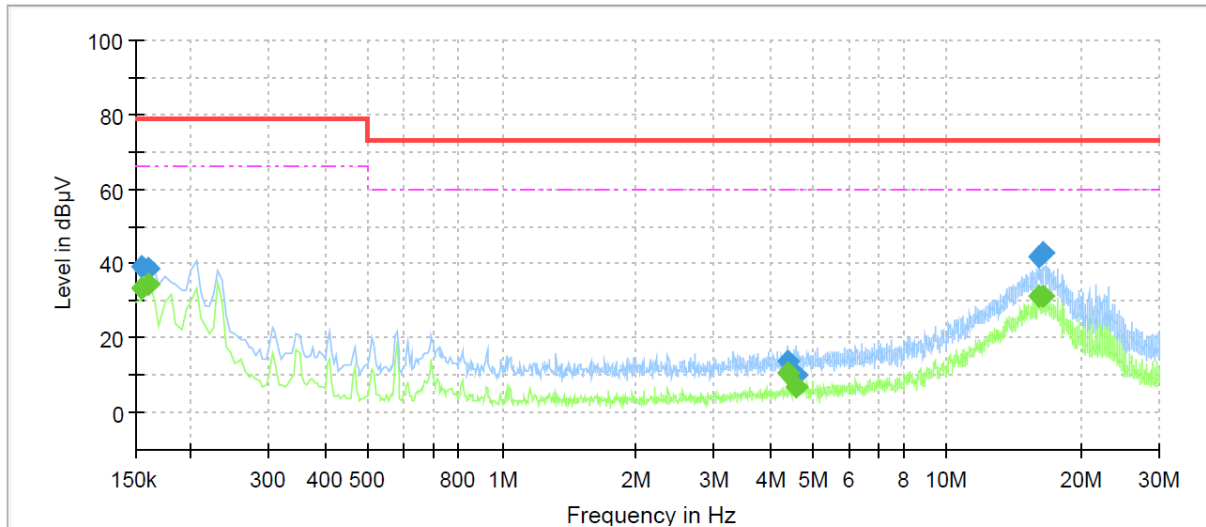
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: SRB-160S
Mode: POWER 1 _ N (CE)
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	33.42	66.00	32.58	1000.0	9.000	N	21.0
0.155000	39.35	---	79.00	39.65	1000.0	9.000	N	21.0
0.160000	---	34.35	66.00	31.65	1000.0	9.000	N	21.0
0.160000	38.66	---	79.00	40.34	1000.0	9.000	N	21.0
4.400000	---	10.44	60.00	49.56	1000.0	9.000	N	19.7
4.400000	13.63	---	73.00	59.37	1000.0	9.000	N	19.7
4.600000	---	6.97	60.00	53.03	1000.0	9.000	N	19.7
4.600000	9.95	---	73.00	63.05	1000.0	9.000	N	19.7
16.180000	---	31.04	60.00	28.96	1000.0	9.000	N	20.1
16.180000	41.88	---	73.00	31.12	1000.0	9.000	N	20.1
16.435000	---	31.19	60.00	28.81	1000.0	9.000	N	20.1
16.435000	42.66	---	73.00	30.34	1000.0	9.000	N	20.1

◆ 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))

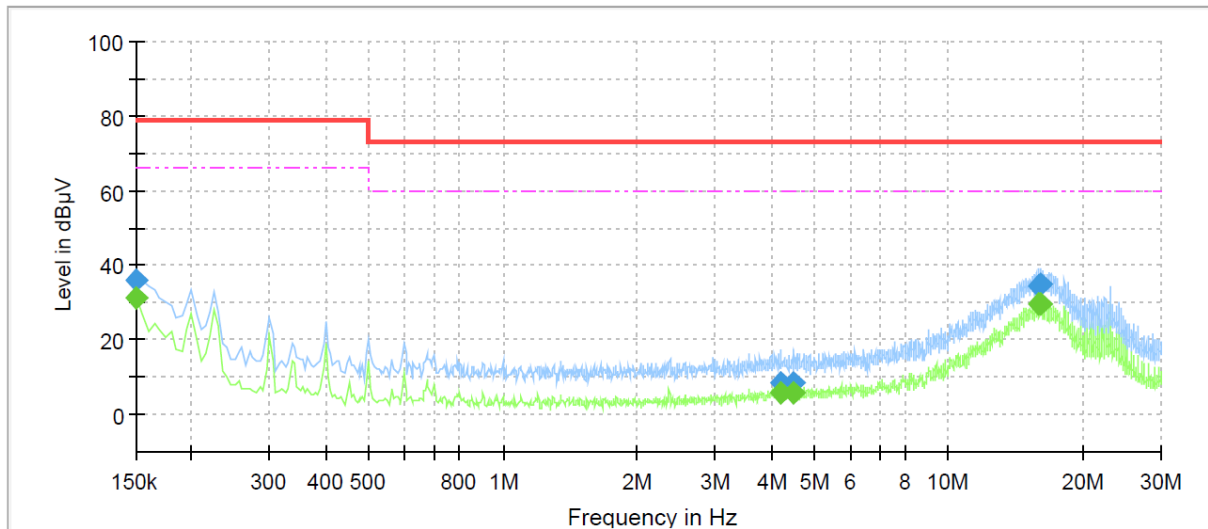
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

- Power 2

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: SRB-160S
Mode: POWER 2 _ H (CE)
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	31.21	66.00	34.79	1000.0	9.000	L1	21.1
0.150000	36.23	---	79.00	42.77	1000.0	9.000	L1	21.1
4.200000	---	5.91	60.00	54.09	1000.0	9.000	L1	19.7
4.200000	8.29	---	73.00	64.71	1000.0	9.000	L1	19.7
4.495000	---	6.03	60.00	53.97	1000.0	9.000	L1	19.7
4.495000	8.58	---	73.00	64.42	1000.0	9.000	L1	19.7
15.900000	---	29.66	60.00	30.34	1000.0	9.000	L1	20.1
15.900000	34.65	---	73.00	38.35	1000.0	9.000	L1	20.1
16.165000	---	29.45	60.00	30.55	1000.0	9.000	L1	20.1
16.165000	34.92	---	73.00	38.08	1000.0	9.000	L1	20.1

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

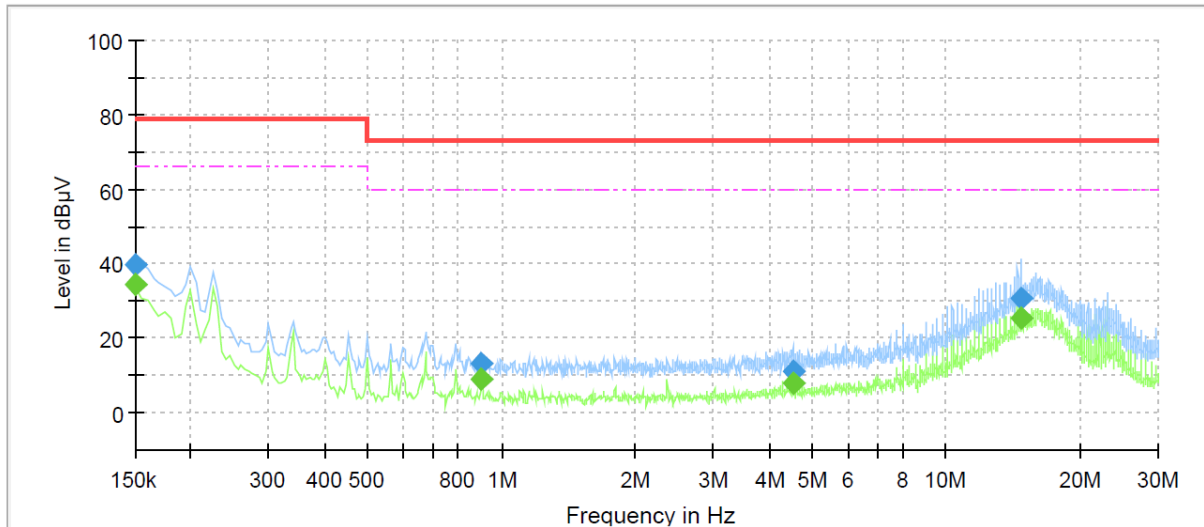
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SRB-160S
Mode	POWER 2 _ N (CE)
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	34.63	66.00	31.37	1000.0	9.000	N	21.0
0.150000	39.76	---	79.00	39.24	1000.0	9.000	N	21.0
0.900000	---	9.13	60.00	50.87	1000.0	9.000	N	20.2
0.900000	13.26	---	73.00	59.74	1000.0	9.000	N	20.2
4.510000	---	7.90	60.00	52.10	1000.0	9.000	N	19.7
4.510000	10.91	---	73.00	62.09	1000.0	9.000	N	19.7
14.770000	---	25.69	60.00	34.31	1000.0	9.000	N	20.1
14.770000	30.74	---	73.00	42.26	1000.0	9.000	N	20.1

◆ 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))

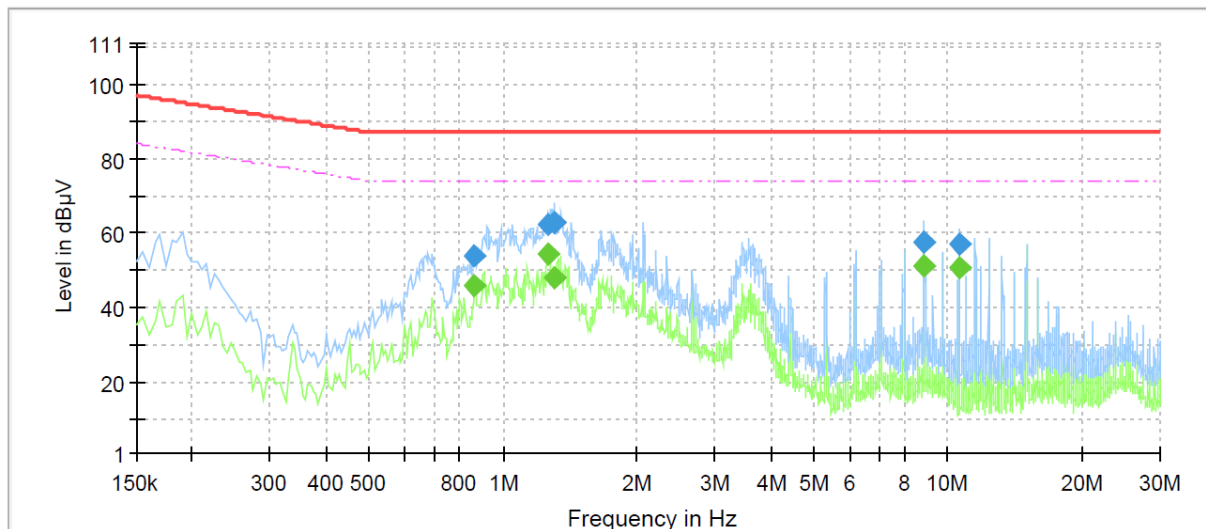
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: SRB-160S
Mode: 10 Mbps _ (CE)
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.865000	---	45.94	74.00	28.06	1000.0	9.000	Single Line	20.5
0.865000	53.85	---	87.00	33.15	1000.0	9.000	Single Line	20.5
1.265000	---	54.56	74.00	19.44	1000.0	9.000	Single Line	20.2
1.265000	62.19	---	87.00	24.81	1000.0	9.000	Single Line	20.2
1.305000	---	48.25	74.00	25.75	1000.0	9.000	Single Line	20.2
1.305000	62.68	---	87.00	24.32	1000.0	9.000	Single Line	20.2
8.805000	---	51.30	74.00	22.70	1000.0	9.000	Single Line	19.9
8.805000	57.78	---	87.00	29.22	1000.0	9.000	Single Line	19.9
10.600000	---	50.71	74.00	23.29	1000.0	9.000	Single Line	20.0
10.600000	57.28	---	87.00	29.72	1000.0	9.000	Single Line	20.0

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

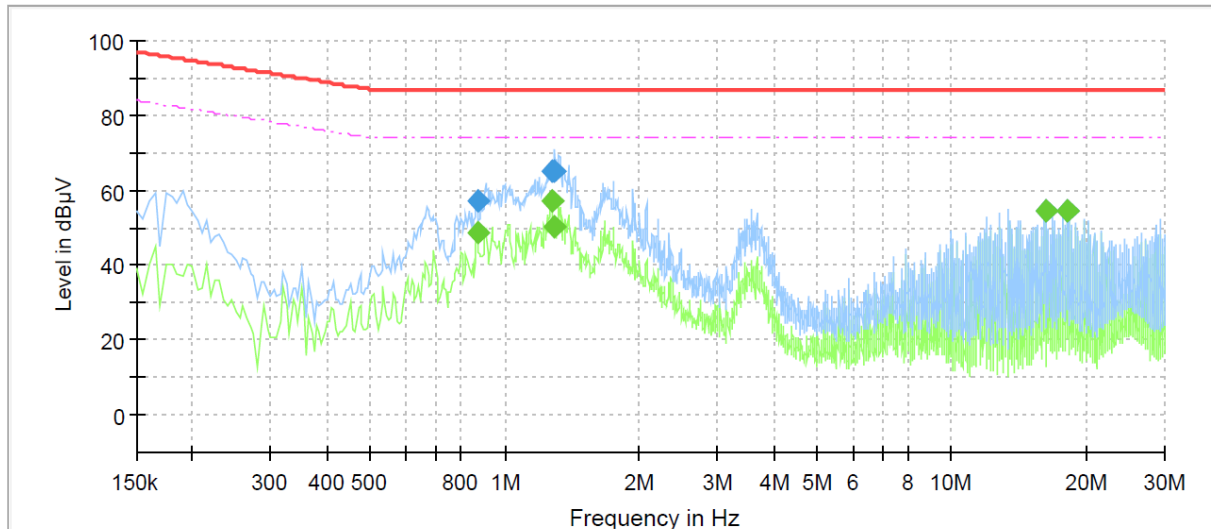
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: SRB-160S
Mode: 100 Mbps _ (CE)
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.870000	---	48.45	74.00	25.55	1000.0	9.000	Single Line	20.0
0.870000	57.14	---	87.00	29.86	1000.0	9.000	Single Line	20.0
1.270000	---	57.00	74.00	17.00	1000.0	9.000	Single Line	19.7
1.270000	65.28	---	87.00	21.72	1000.0	9.000	Single Line	19.7
1.295000	---	50.19	74.00	23.81	1000.0	9.000	Single Line	19.7
1.295000	64.85	---	87.00	22.15	1000.0	9.000	Single Line	19.7
16.230000	---	54.62	74.00	19.38	1000.0	9.000	Single Line	19.6
16.230000	54.74	---	87.00	32.26	1000.0	9.000	Single Line	19.6
18.245000	---	54.43	74.00	19.57	1000.0	9.000	Single Line	19.6
18.245000	54.54	---	87.00	32.46	1000.0	9.000	Single Line	19.6

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

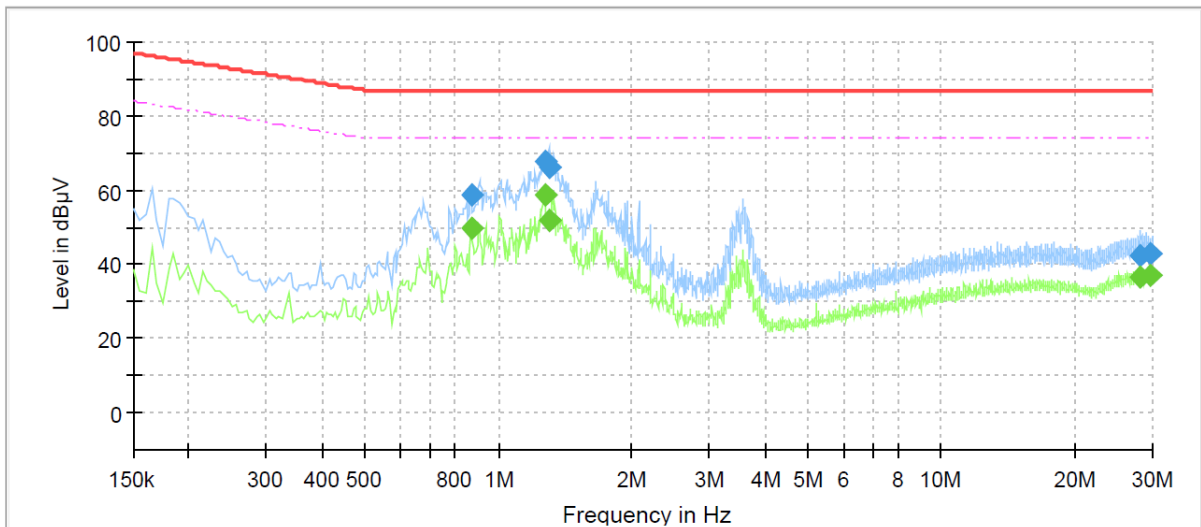
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SRB-160S
Mode	1 000 Mbps _ (CE)
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.870000	---	49.88	74.00	24.12	1000.0	9.000	Single Line	19.9
0.870000	58.83	---	87.00	28.17	1000.0	9.000	Single Line	19.9
1.270000	---	58.60	74.00	15.40	1000.0	9.000	Single Line	19.6
1.270000	67.84	---	87.00	19.16	1000.0	9.000	Single Line	19.6
1.300000	---	51.97	74.00	22.03	1000.0	9.000	Single Line	19.6
1.300000	66.36	---	87.00	20.64	1000.0	9.000	Single Line	19.6
27.990000	---	36.73	74.00	37.27	1000.0	9.000	Single Line	19.7
27.990000	42.32	---	87.00	44.68	1000.0	9.000	Single Line	19.7
29.715000	---	36.98	74.00	37.02	1000.0	9.000	Single Line	19.7
29.715000	42.63	---	87.00	44.37	1000.0	9.000	Single Line	19.7

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



Radiated Electric Field Emissions(Below 1 GHz)

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB μ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB μ V/m]	[dB μ V/m]	[dB]
68.12	8.30	V	1.00	9.33	1.92	19.55	40.00	20.45
169.61	10.60	H	3.58	8.70	2.99	22.29	40.00	17.71
294.93	7.30	V	1.18	13.33	4.06	24.69	47.00	22.31
363.82	7.50	H	3.95	14.82	4.34	26.66	47.00	20.34
386.90	7.30	V	1.00	15.32	4.51	27.13	47.00	19.87
637.11	8.10	H	4.00	19.44	5.98	33.52	47.00	13.48

* H : Horizontal, V : Vertical

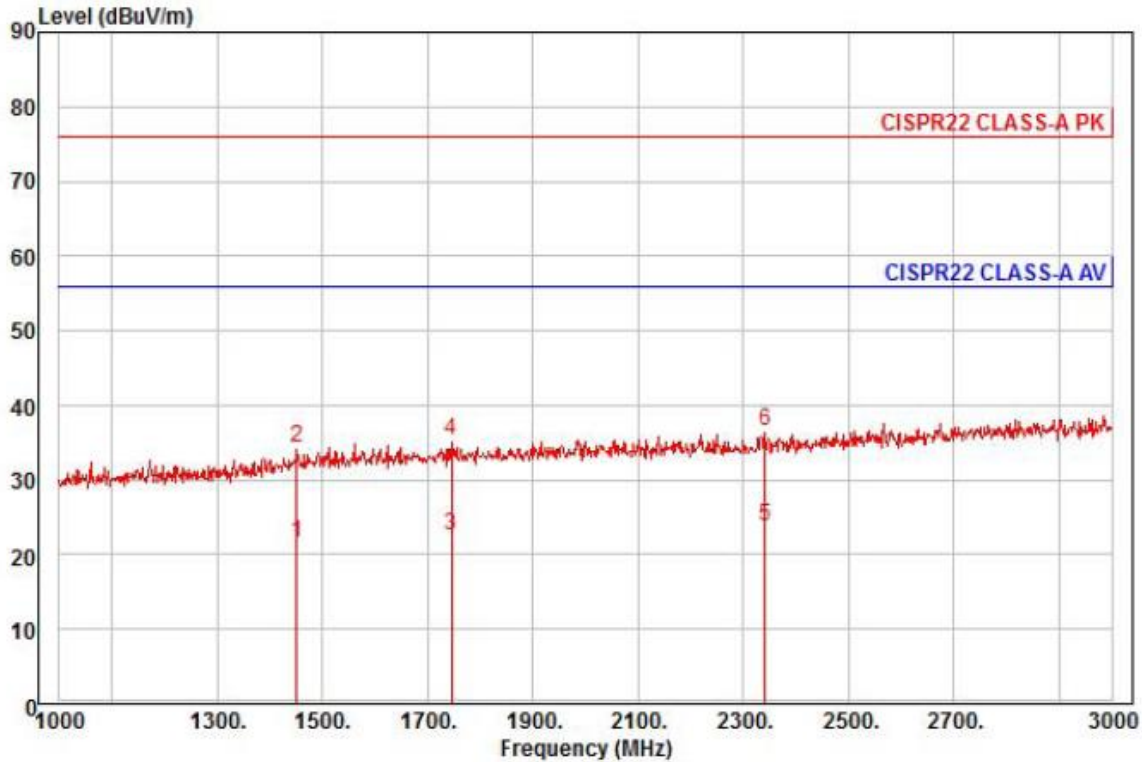
◆ Calculation

Corrected Amplitude [dB μ V] = Amplitude[dB μ V] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

Radiated Electric Field Emissions(Above 1 GHz)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SRB-160S
Mode :
Memo : CE

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1452.00	29.39	23.49	7.88	39.15	287	56.00	-34.39	horizontal	Average
2	1452.00	42.22	23.49	7.88	39.15	287	76.00	-41.56	horizontal	Peak
3	1746.00	28.54	24.69	8.69	39.29	209	56.00	-33.37	horizontal	Average
4	1746.00	41.32	24.69	8.69	39.29	209	76.00	-40.59	horizontal	Peak
5 pp	2342.00	26.14	26.95	10.17	39.42	170	56.00	-32.16	horizontal	Average
6 pk	2342.00	38.85	26.95	10.17	39.42	170	76.00	-39.45	horizontal	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



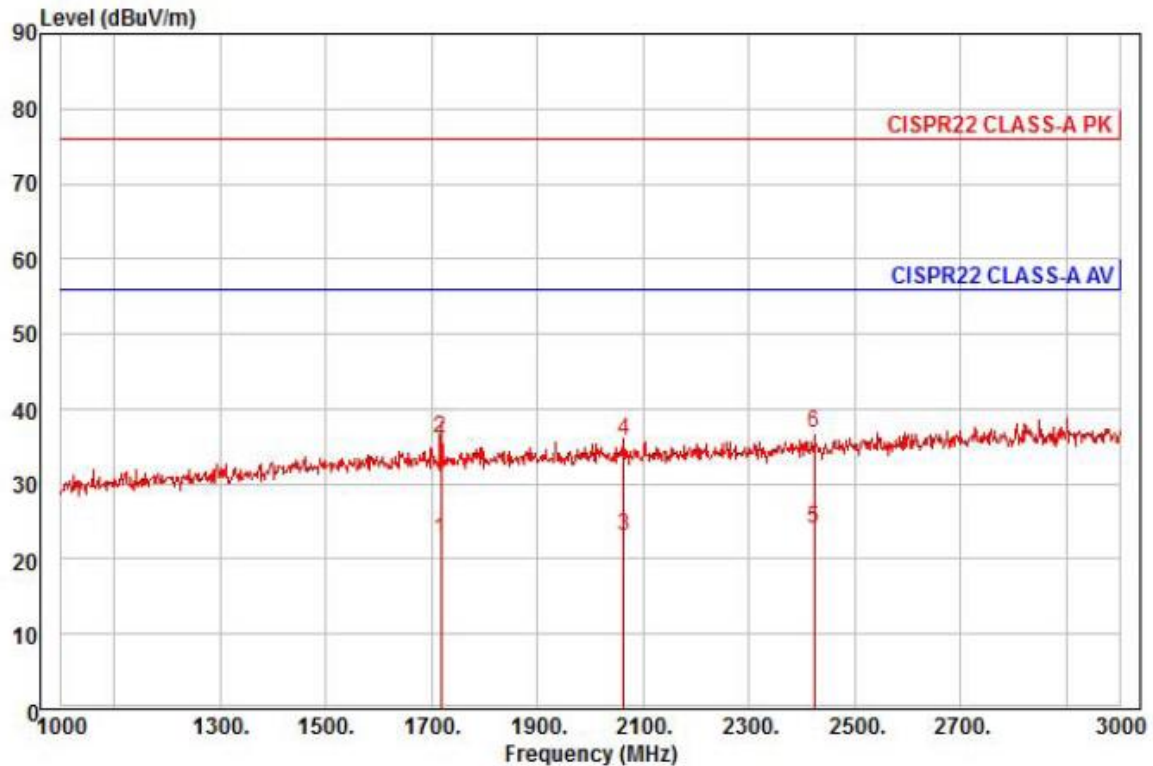
KES Co., Ltd.

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-17T0260-R1

Page (42) of (66)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SRB-160S
Mode :
Memo : CE

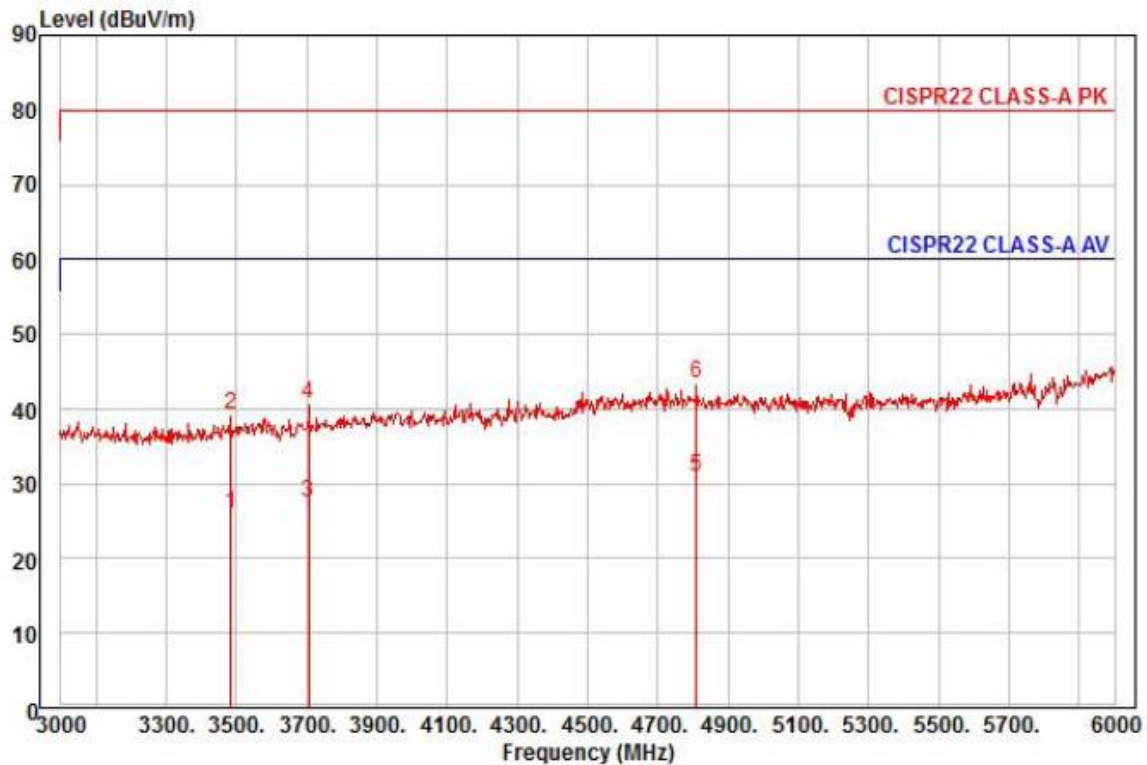
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1718.00	28.61	24.59	8.62	39.28	37	56.00	-33.46	vertical	Average
2	1718.00	42.22	24.59	8.62	39.28	37	76.00	-39.85	vertical	Peak
3	2064.00	27.24	25.85	9.48	39.41	199	56.00	-32.84	vertical	Average
4	2064.00	39.94	25.85	9.48	39.41	199	76.00	-40.14	vertical	Peak
5 pp	2424.00	25.86	27.27	10.37	39.45	168	56.00	-31.95	vertical	Average
6 pk	2424.00	38.53	27.27	10.37	39.45	168	76.00	-39.28	vertical	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SRB-160S
Mode :
Memo : CE

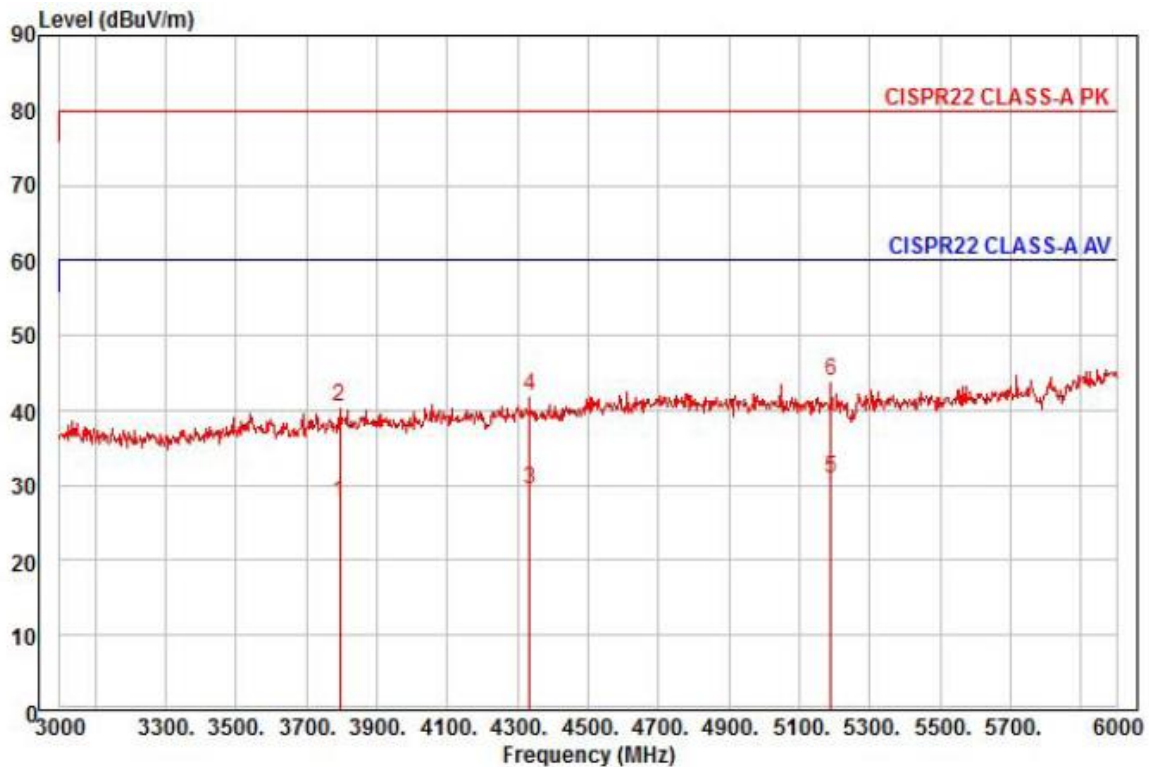
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3483.00	23.92	30.27	12.60	40.85	222	60.00	-34.06	horizontal	Average
2	3483.00	37.21	30.27	12.60	40.85	222	80.00	-40.77	horizontal	Peak
3	3705.00	24.50	30.74	13.00	40.81	162	60.00	-32.57	horizontal	Average
4	3705.00	37.73	30.74	13.00	40.81	162	80.00	-39.34	horizontal	Peak
5 pp	4809.00	23.08	33.07	15.11	40.46	37	60.00	-29.20	horizontal	Average
6 pk	4809.00	35.76	33.07	15.11	40.46	37	80.00	-36.52	horizontal	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SRB-160S
Mode :
Memo : CE

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3795.00	24.47	30.94	13.17	40.77	278	60.00	-32.19	vertical	Average
2	3795.00	37.01	30.94	13.17	40.77	278	80.00	-39.65	vertical	Peak
3	4335.00	23.71	32.33	14.16	40.75	33	60.00	-30.55	vertical	Average
4	4335.00	36.26	32.33	14.16	40.75	33	80.00	-38.00	vertical	Peak
5 pp	5190.00	22.34	33.35	15.69	40.59	39	60.00	-29.21	vertical	Average
6 pk	5190.00	35.34	33.35	15.69	40.59	39	80.00	-36.21	vertical	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

**Harmonic Current Emissions and Voltage Fluctuations and Flicker****Average harmonic current results**

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	602.543E-3			
2	1.283E-3			PASS
3	190.355E-3	48.235	394.642E-3	PASS
4	251.484E-6			PASS
5	58.124E-3	26.356	220.535E-3	PASS
6	239.747E-6			PASS
7	25.849E-3	22.270	116.071E-3	PASS
8	257.043E-6			PASS
9	33.981E-3	58.551	58.036E-3	PASS
10	334.550E-6			PASS
11	9.967E-3	24.535	40.625E-3	PASS
12	370.051E-6			PASS
13	2.323E-3			PASS
14	577.741E-6			PASS
15	8.658E-3	29.068	29.784E-3	PASS
16	587.796E-6			PASS
17	3.706E-3			PASS
18	332.358E-6			PASS
19	4.408E-3			PASS
20	483.108E-6			PASS
21	5.499E-3	17.229	31.914E-3	PASS
22	344.897E-6			PASS
23	4.008E-3			PASS
24	259.247E-6			PASS
25	8.966E-3	33.438	26.812E-3	PASS
26	406.578E-6			PASS
27	10.988E-3	44.255	24.828E-3	PASS
28	482.673E-6			PASS
29	1.845E-3			PASS
30	458.711E-6			PASS
31	3.858E-3			PASS
32	421.534E-6			PASS
33	17.411E-3	85.763	20.301E-3	PASS
34	617.574E-6			PASS
35	11.138E-3	58.157	19.152E-3	PASS
36	717.114E-6			PASS
37	6.767E-3	37.334	18.125E-3	PASS
38	812.516E-6			PASS
39	5.460E-3	31.776	17.184E-3	PASS
40	910.294E-6			PASS

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



Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	606.110E-3			
2	1.791E-3			PASS
3	191.566E-3	32.361	591.963E-3	PASS
4	426.531E-6			PASS
5	58.697E-3	17.744	330.803E-3	PASS
6	488.693E-6			PASS
7	26.602E-3	15.279	174.107E-3	PASS
8	444.445E-6			PASS
9	34.897E-3	40.087	87.053E-3	PASS
10	562.581E-6			PASS
11	10.336E-3	16.962	60.937E-3	PASS
12	753.961E-6			PASS
13	2.665E-3			PASS
14	945.353E-6			PASS
15	9.033E-3	20.218	44.676E-3	PASS
16	842.213E-6			PASS
17	3.979E-3			PASS
18	544.366E-6			PASS
19	4.955E-3			PASS
20	814.135E-6			PASS
21	5.739E-3	17.982	31.914E-3	PASS
22	610.302E-6			PASS
23	4.478E-3			PASS
24	543.412E-6			PASS
25	9.528E-3	35.536	26.812E-3	PASS
26	627.768E-6			PASS
27	11.410E-3	45.958	24.828E-3	PASS
28	767.954E-6			PASS
29	2.470E-3			PASS
30	836.619E-6			PASS
31	4.170E-3			PASS
32	632.898E-6			PASS
33	17.746E-3	87.416	20.301E-3	PASS
34	948.957E-6			PASS
35	11.760E-3	61.403	19.152E-3	PASS
36	1.040E-3			PASS
37	7.152E-3	39.458	18.125E-3	PASS
38	1.079E-3			PASS
39	5.732E-3	33.354	17.184E-3	PASS
40	1.121E-3			PASS

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



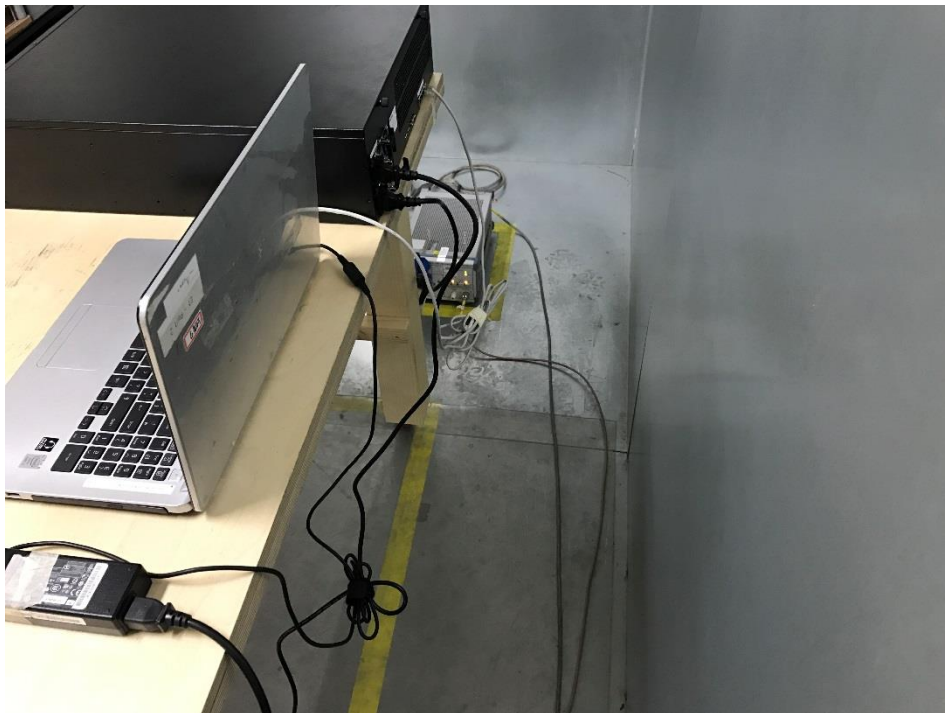
Test Data - Voltage Fluctuations

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.117	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Test Setup Photos and Configuration

Conducted Voltage Emissions



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Conducted Telecommunication Emissions



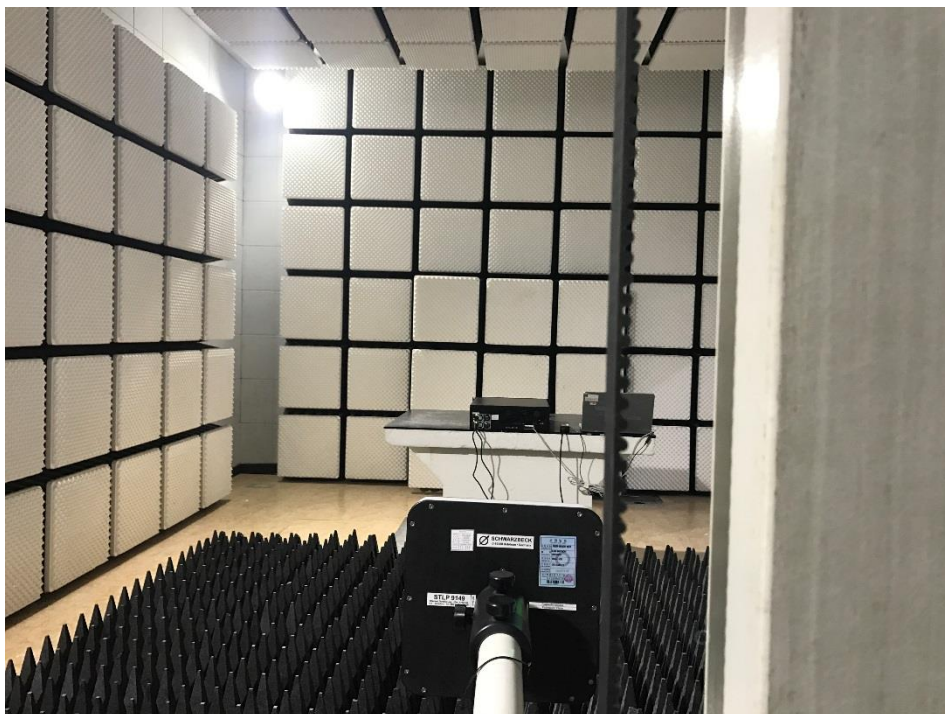
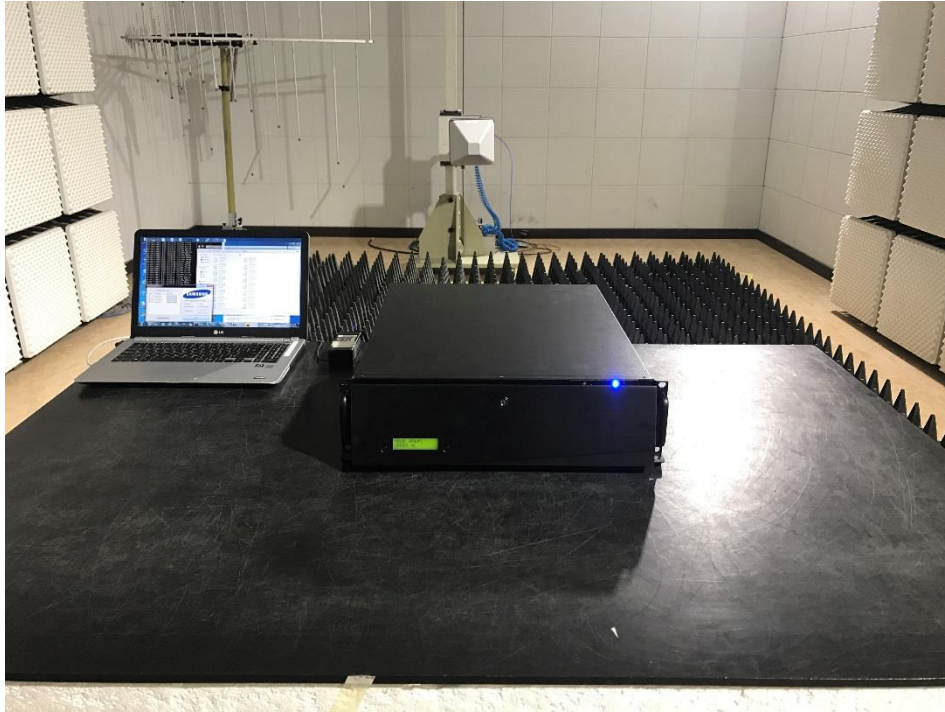
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Radiated Electric Field Emissions(Below 1 GHz)



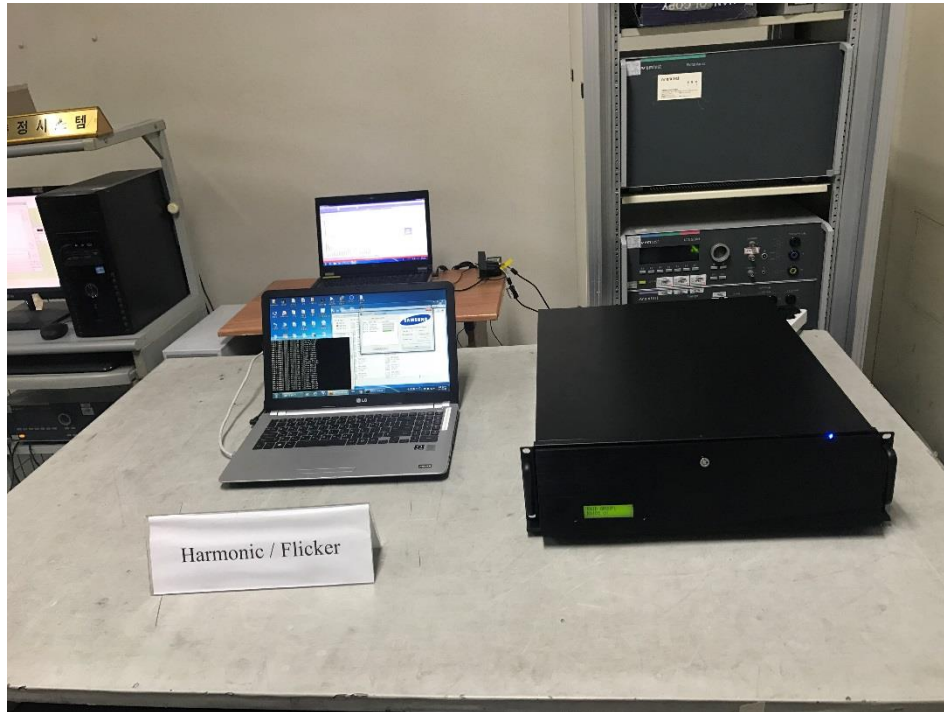
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Radiated Electric Field Emissions(Above 1 GHz)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Harmonic Current Emissions and Voltage Fluctuations and Flicker



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Electrostatic Discharge

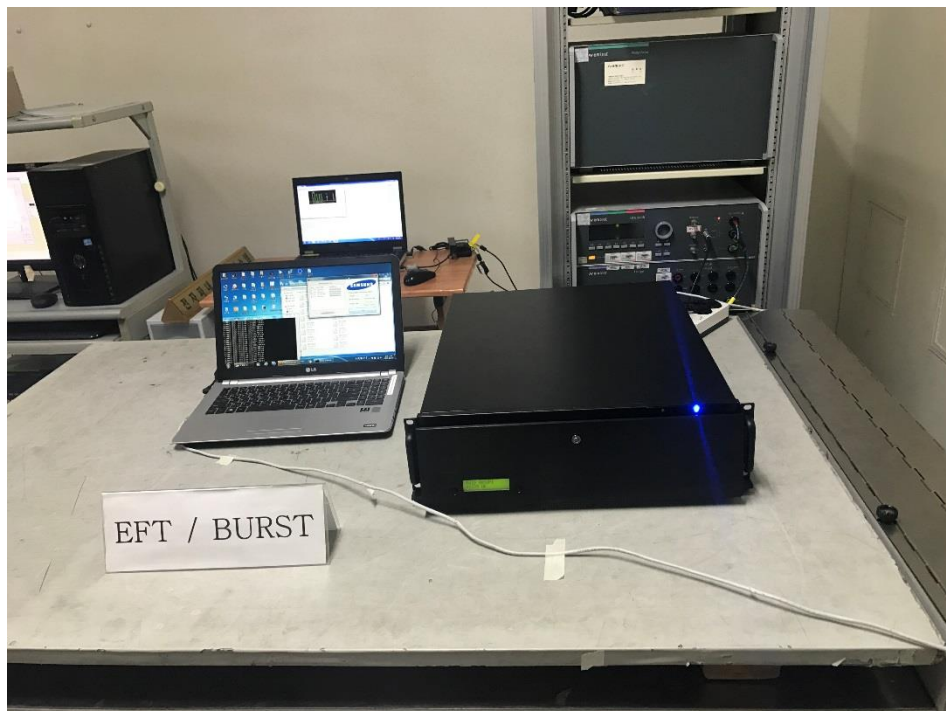
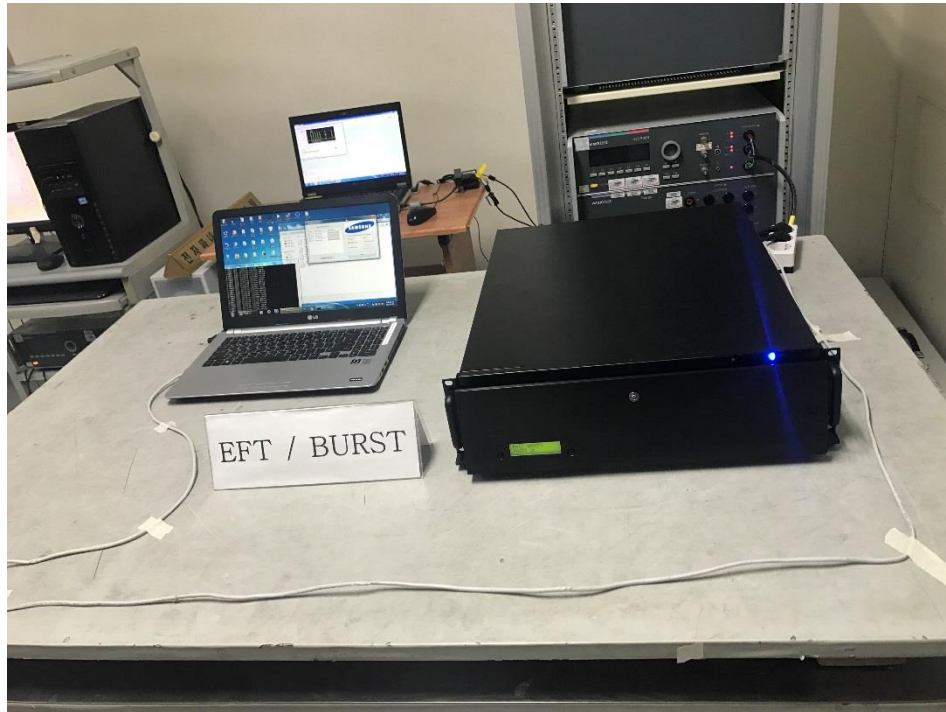


Radiated Electric Field Immunity



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Electrical Fast Transients/Bursts



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Surge Transients



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Conducted Disturbance



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Voltage Dips and Short Interruptions



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT External Photographs

(Top)



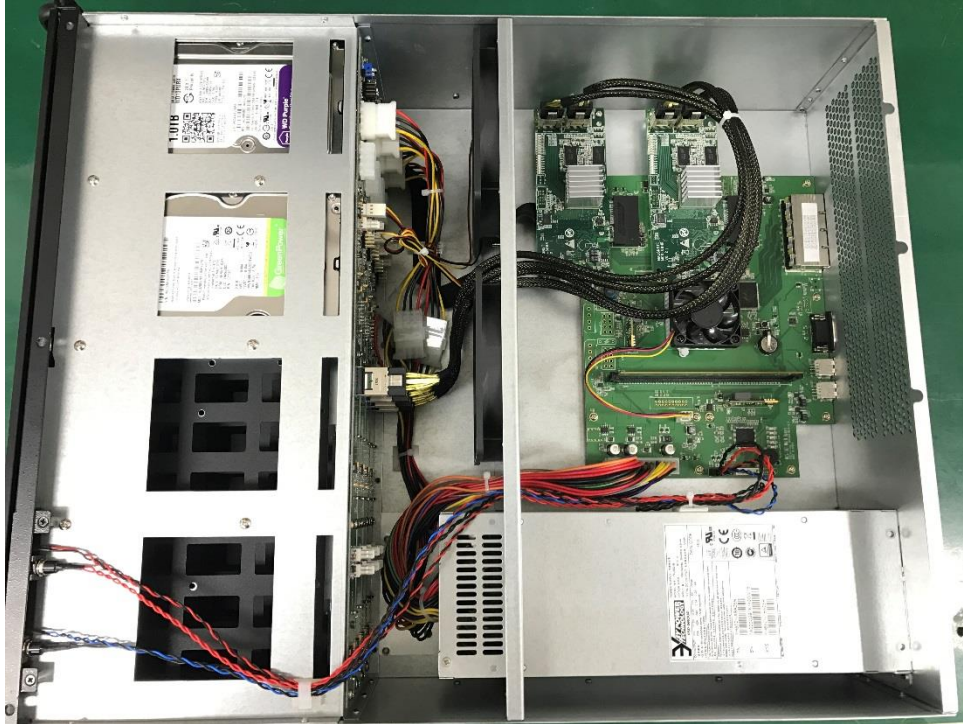
(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal Photographs

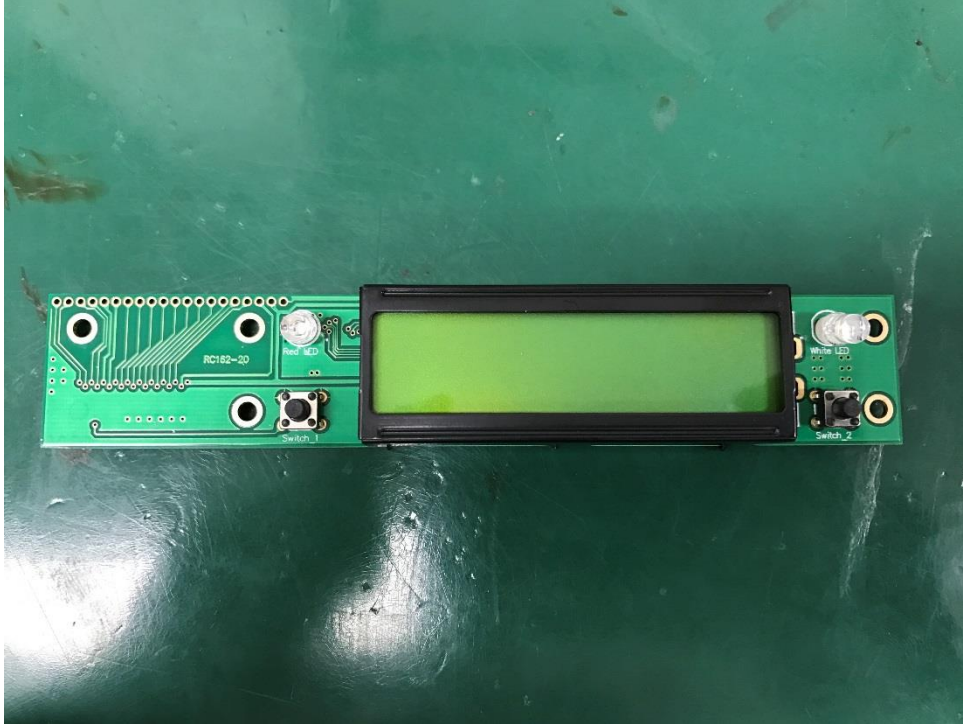
(Internal View)



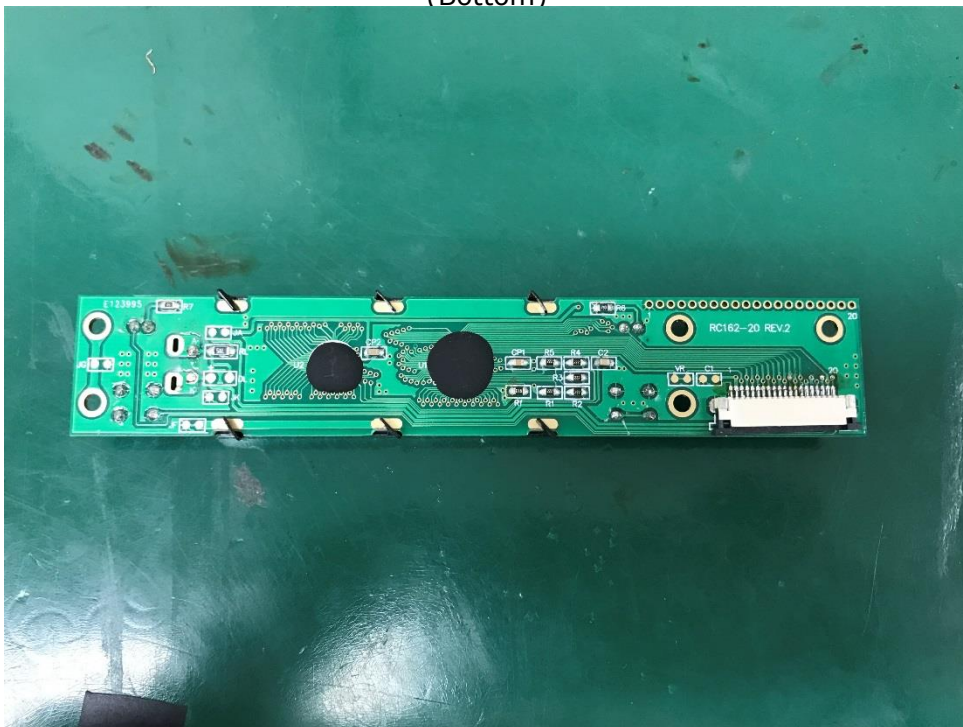
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 1

(Top)



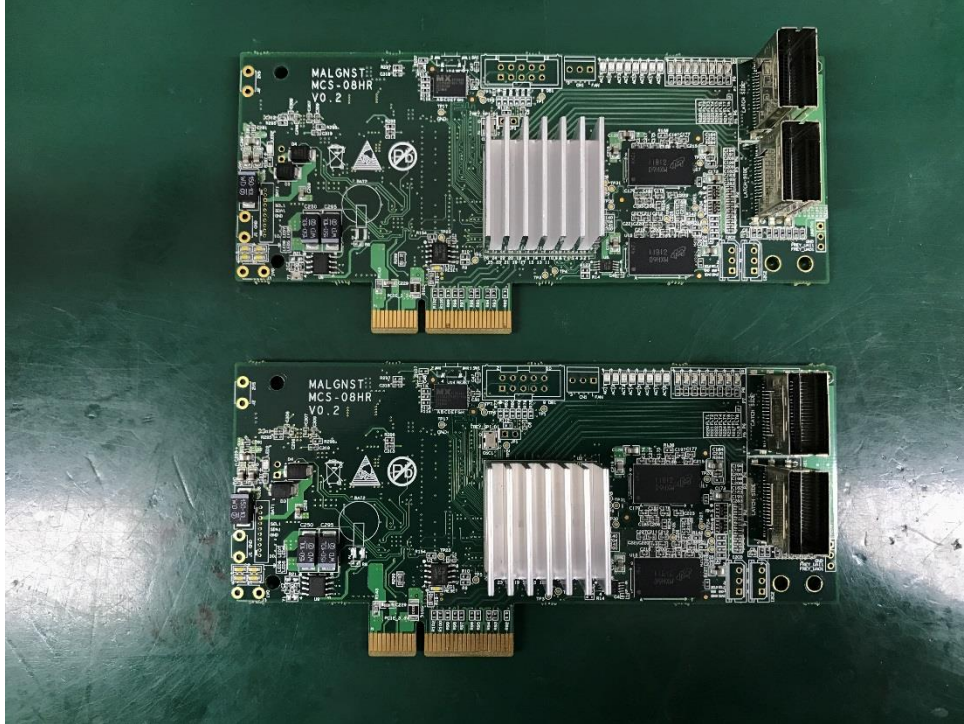
(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 2

(Top)



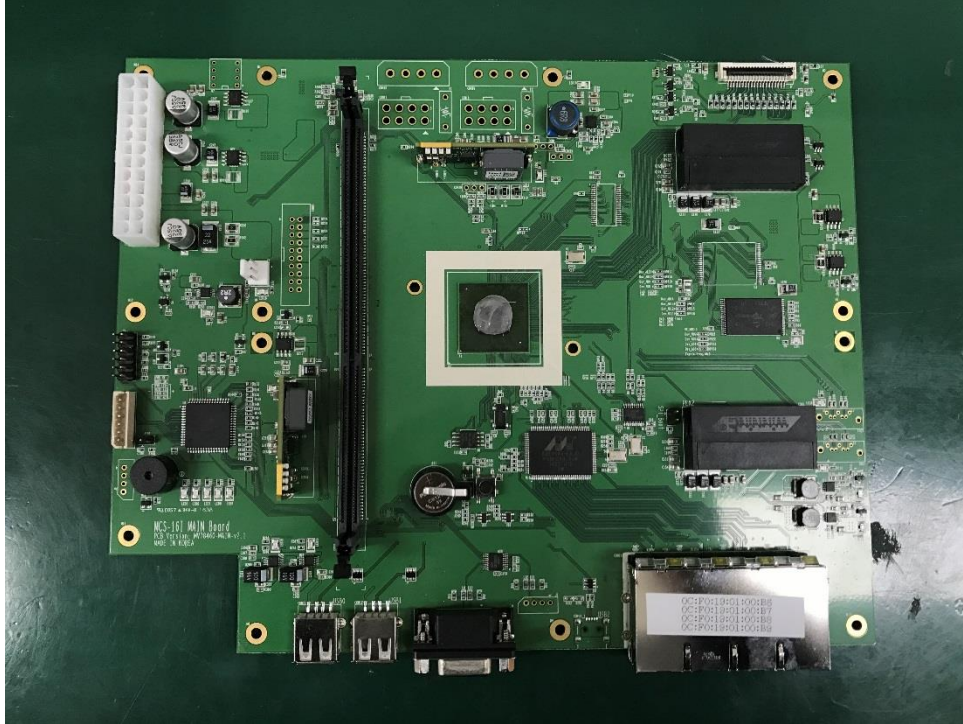
(Bottom)



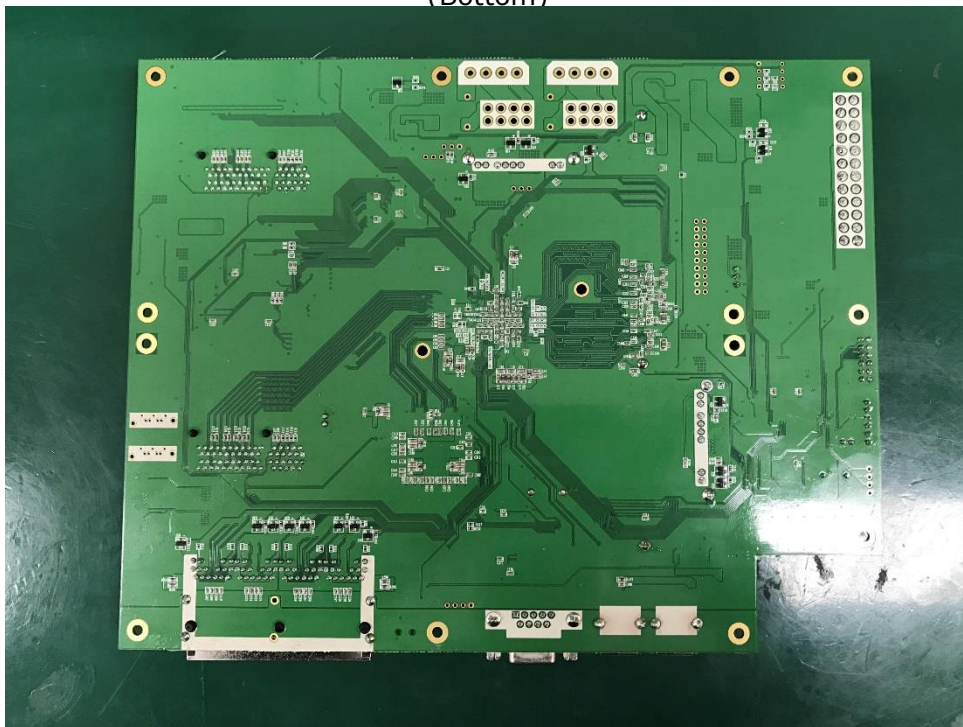
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 3

(Top)



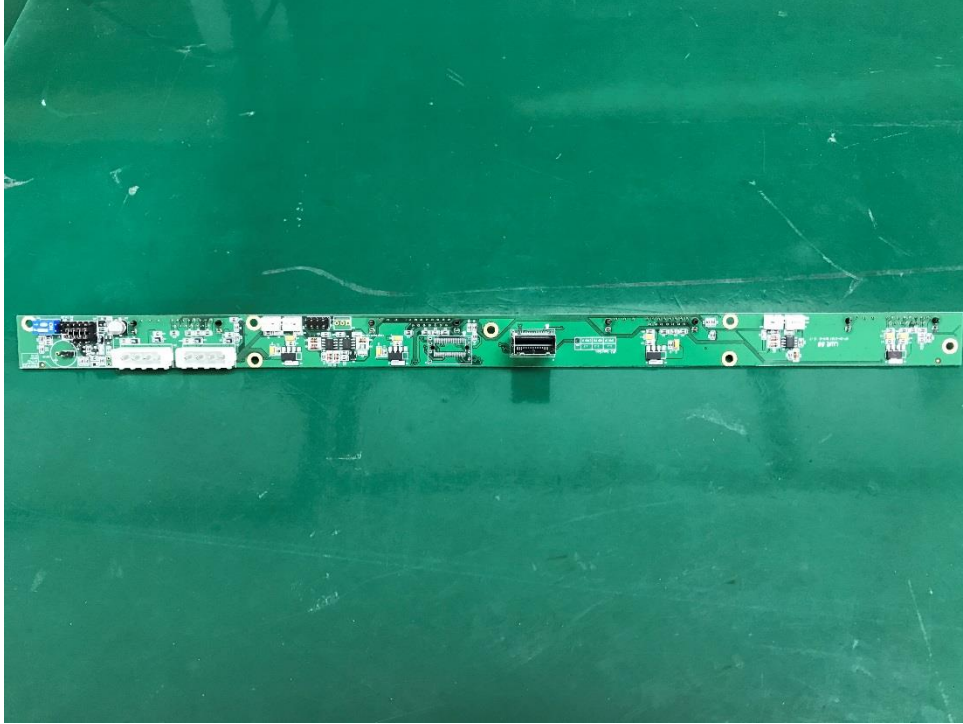
(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 4 (x 4 ea)

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – RAM Board

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – HDD

(Top)

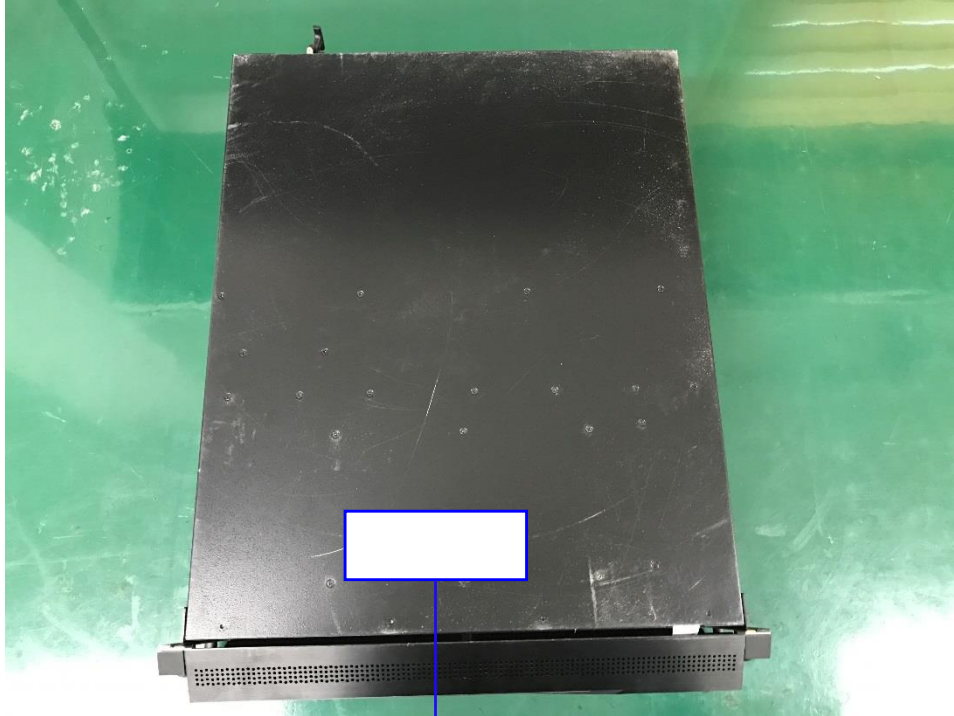


(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Label and Location



NETWORK STORAGE

Model No : SRB-160S

Manufacturer : C-PRO ELECTRONICS

Made in Korea

