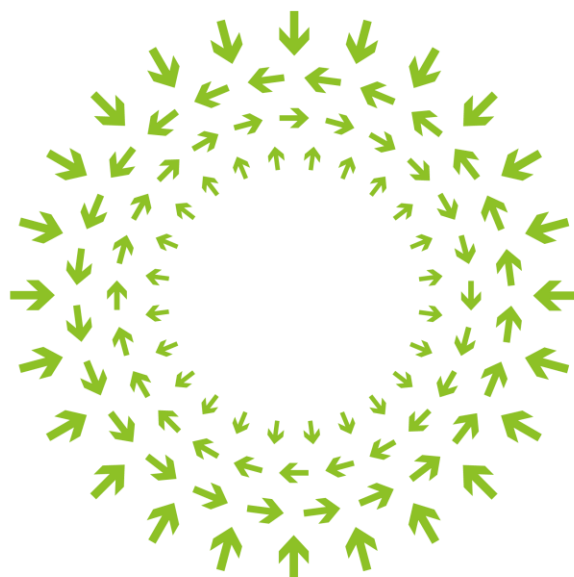




OPEN
Compute Project

SK Telecom CNA-SSX2RC (Service-Optimized Hybrid Network Appliance)

Author: Sohn, Minho

Revision History

VERSION	REVISED DATE	AUTHOR	CONTENT REVISED
0.1	2016/7/1	SOHN, MINHO	INITIAL VERSION
0.2	2016/8/19	SOHN, MINHO	TABLES & FIGURES MODIFIED TYPO CORRECTED

Scope

This document defines the technical specifications for the SK Telecom CNA-SSX2RC submitted to the Open Compute Project Foundation as Service Optimized Hybrid Network Appliance.

Contents

OVERVIEW.....	6
LICENSE	6
1. FEATURE HIGHLIGHTS.....	8
2. PHYSICAL OVERVIEW	9
2.1 MECHANICAL DIMENSION	9
2.2 TOP VIEW.....	10
2.3 FRONT VIEW	11
2.4 REAR VIEW.....	11
3. LED DEFINITION	12
4. FIELD REPLACEABLE COMPONENTS.....	13
4.1 POWER SUPPLY MODULES.....	13
4.2 FAN MODULES	15
5. SYSTEM OVERVIEW.....	17
5.1 PCB BOARD BLOCK DIAGRAM	17
5.1.1 Overall Diagram.....	17
5.1.2 Xeon Server PCB Board.....	19
5.1.3 Switch PCB (RRC Switch Main Board).....	20
5.1.4 CPU Subsystem (RRC Switch CPP CPU Board)	21
5.1.5 Interface Module PCB (10G Module & 40G+10G Module).....	22
5.2 PCB BOARD SET.....	23
5.2.1 Xeon Server PCB.....	23
5.2.2 Switch PCB (RRC Switch Main Board).....	24
5.2.3 CPU Subsystem (RRC Switch CPP CPU Board)	25
5.2.4 Interface Module PCB (10G Module & 40G+10G Module).....	27
5.2.5 Other H/W PCB (FAN, PSU, Riser Card and etc)	28
6. IO AND CONNECTORS	30
6.1 RS232 INTERFACE.....	30
6.2 MANAGEMENT ETHERNET INTERFACES	30
6.3 USB INTERFACE	30
7. SOFTWARE SUPPORT	31
7.1 XEON SERVER SOFTWARE SUPPORT.....	31

7.2	SWITCH CPP SOFTWARE SUPPORT	31
8.	POWER/ENVIRONMENT/AGENCY CERTIFICATIONS	31



Overview

The CNA-SSX2RC Network Appliance is the converged system, with a hyper performance server & a datacenter switch internally. It features a dual Xeon CPU server and a high speed L2/L3 switch with a total switching throughput of 960 Gbps. Its switching board is equipped with three network interface modules that can provide 12 ports of 10 Gbps or 2 ports of 40 Gbps + 4 ports of 10 Gbps Ethernet ports per each module. Additionally, for management function, this system provides an RJ-45 console port and an Out-Of-Band (OOB) management port. It also provides USB interfaces in the front panel for the administrators to upgrade code by using USB cable or USB stick.

License

All semiconductor devices that may be referred to in this specification, or required to manufacture products described in this specification, will be considered referenced only, and no intellectual property rights embodied in or covering such semiconductor devices shall be licensed as a result of this specification or such references. Notwithstanding anything to the contrary in the CLA, the licenses set forth therein do not apply to the intellectual property rights included in or related to the semi-conductor devices identifies in the specification. These references include without limitation the reference to devices listed below. For clarity, no patent claim that reads on such semiconductor devices will be considered a "Granted Claim" under the applicable Contributor License Agreement for this specification.

As of July 1, 2016, the following persons or entities have made this Specification available under the Open Compute Contributor License Agreement (OCP CLA) which is available at

<https://rightsignature.com/documents/KRR45RI3NI87GXBISGTEYR?rt=a28d66efbcb945959e122c5334cc22f8>

SK Telecom Co., Ltd.

*OCPHL - Reciprocal

You can review the signed copies of the Open Compute Contributor License Agreement for this Specification at <http://opencompute.org/licensing/>, which may also include additional parties to those listed above.

Your use of this Specification may be subject to other third party rights. THIS SPECIFICATION IS PROVIDED "AS IS." No support of any kind will be provided by the contributors. The contributors expressly disclaim any warranties (express, implied, or otherwise), including implied warranties of

merchantability, non-infringement, fitness for a particular purpose, or title, related to the Specification. The entire risk as to implementing or otherwise using the Specification is assumed by the Specification implementer and user. IN NO EVENT WILL ANY PARTY BE LIABLE TO ANY OTHER PARTY FOR LOST PROFITS OR ANY FORM OF INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY CHARACTER FROM ANY CAUSES OF ACTION OF ANY KIND WITH RESPECT TO THIS SPECIFICATION OR ITS GOVERNING AGREEMENT, WHETHER BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE), OR OTHERWISE, AND WHETHER OR NOT THE OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

1. Feature Highlights

The CNA-SSX2RC Network Appliance is the converged system, with a hyper performance server & a datacenter switch internally. It features a dual Xeon CPU server and a high speed L2/L3 switch with a total switching throughput of 960 Gbps. Its switching board is equipped with three network interface modules that can provide 12 ports of 10 Gbps or 2 ports of 40 Gbps + 4 ports of 10 Gbps Ethernet ports per each module. Additionally, for management function, this system provides an RJ-45 console port and an Out-Of-Band (OOB) management port. It also provides USB interfaces in the front panel for the administrators to upgrade code by using cable or USB stick.

- 2U / 19 inch Rack mount type
- Dual Xeon E5-2600 v3 CPU (Haswell-EP) based compute node
- Intel RRC(Red Rock Canyon) based switch node
- Front loading type switch port module (10G 12ports module, 10G 4ports + 40G 2ports module)
- 1+1 Redundant Power Supply with failure warning
- Optimized airflow design for cooling (front & rear panel air hole & airflow guide for CPU cooling installed)
- Front panel
 - Hot-swap bay for 2.5inch SATA HDD/SSD (max 4EA)
 - LCD Display for Power Usage Information
 - USB ports for compute node & switch node
 - Mgmt. ports for compute node & switch node
 - Console ports for compute node & switch node
- Rear panel
 - Two PCIe Gen3 Slots (for HBA card, RAID card, Flash accelerator and so on)
 - 1+1 PSU with power usage metering
 - VGA port for compute node

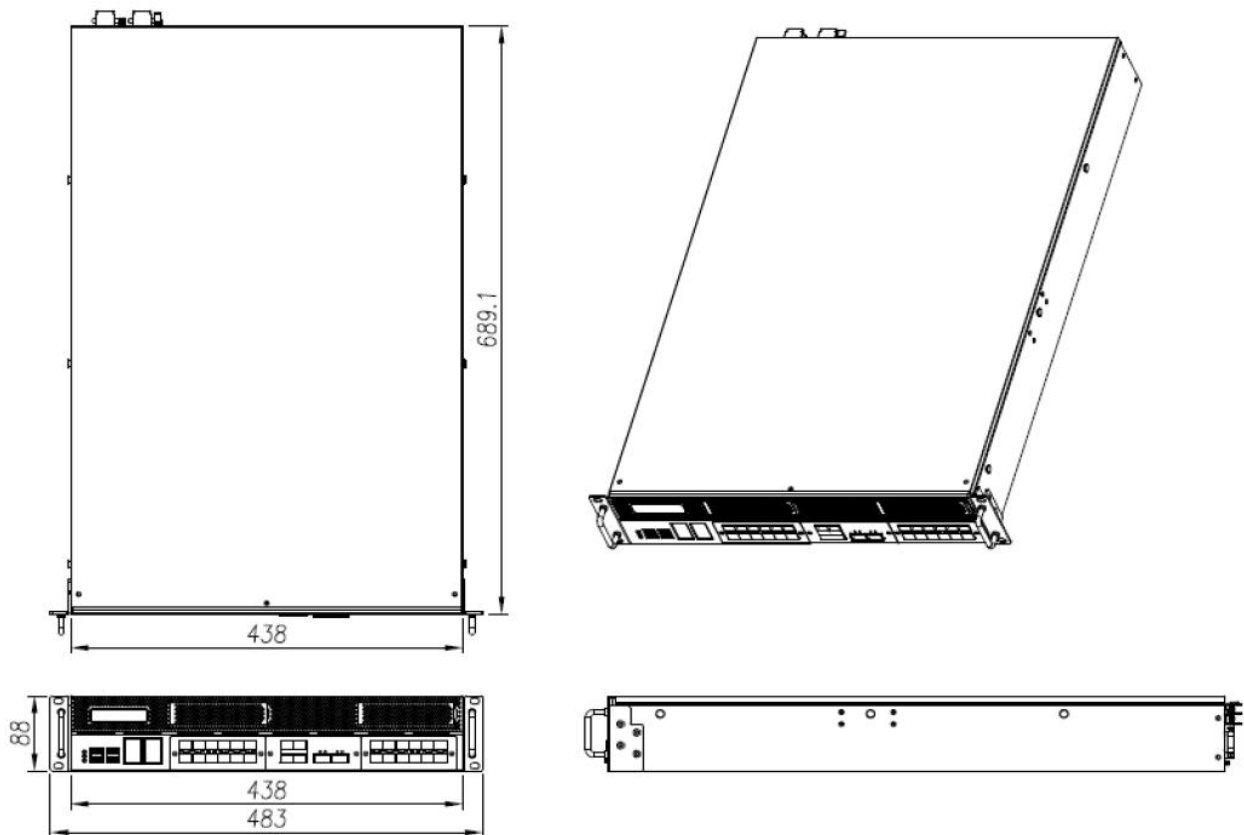
2. Physical Overview

2.1 Mechanical Dimension

- Table 1 / Mechanical Dimension

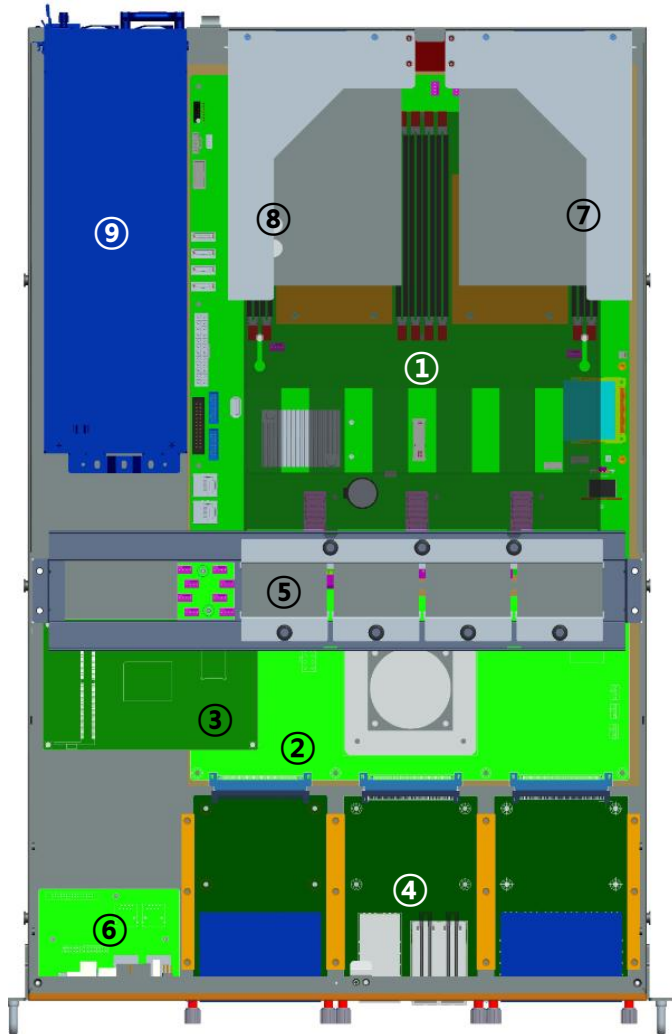
Dimension (mm x mm)	
Height x Width x Depth	88 x 438 x 689

- Figure 1 / Chassis Dimension



2.2 Top View

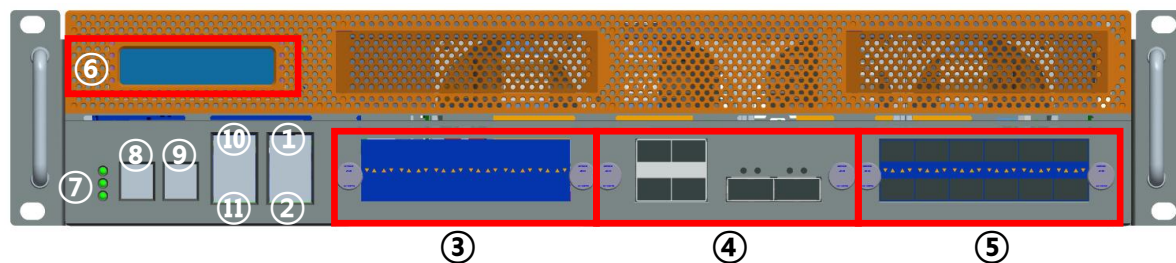
- Figure 2 / top view



- ① Xeon Server Board
- ② Switch Board
- ③ Switch CPP Board
- ④ Switch Interface Module Board
- ⑤ Fan board
- ⑥ IO Board
- ⑦ PCIe Slot #1
- ⑧ PCIe Slot #2
- ⑨ PSU(1+1)

2.3 Front View

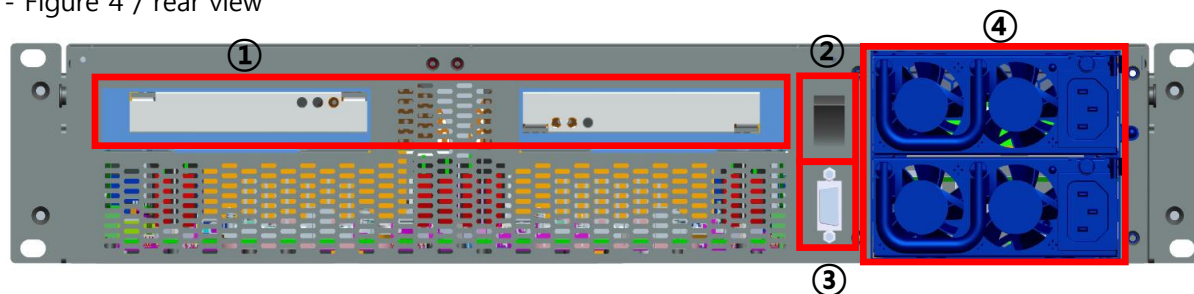
- Figure 3 / front view



- | | |
|-----------------------------|---------------------------|
| ① CPP management port | ⑥ 2-Line LCD |
| ② CPP management console | ⑦ System LEDs |
| ③ 12 x SFP+ ports | ⑧ Host USB port |
| ④ 4 x SFP+ + 2 x QSFP ports | ⑨ CPP USB port |
| ⑤ 12 x SFP+ ports | ⑩ Host management port |
| | ⑪ Host management console |

2.4 Rear View

- Figure 4 / rear view



- | |
|---------------------------------|
| ① Add-on Card |
| ② Power Switch |
| ③ VGA port |
| ④ Redundant power supply module |

3. LED Definition

- Front Panel LED Definitions

- Table 2 / LED behavior for system

	LED	Color	State	Description
1	HDD	Green	Blink	HDD access activity
			Off	No disk activity
2	STATUS	Green	On	CPU or System Overhead/Fan
			Off	Running/ normal operation
3	POWER	Green	On	Power on
			Off	Power off

- Table 3 / LED behavior for Management ports

LED	Color	State	Description
Link/Active	Green	On	LAN linked
	Green	Blinking	LAN accessing
	Off	Off	No LAN linked
Speed	Orange	On	Gigabit mode
	Green	On	100M mode
	Off	Off	10M mode

- Table 4 / LED behavior for Ethernet ports

LED	Color	State	Description
Link/Speed	Orange	On	10G/40G Port Linked
Link/Active	Yellow	On	Port Linked
	Yellow	Blinking	Port activity
Off		Off	No Port linked

- Table 5 / LED definition of Power supply

LED	State	Description
Power		

4. Field Replaceable Components

4.1 Power Supply Modules

- Table 6 / power supply Part number

Description	Manufacturer	Part number
Redundant Switching Power Supply	ZIPPY TECHNOLOGY	G1W2-5860V3V

- Table 7 / power supply connector pin out

P24

Pin #	Description	Pin #	Description
1	+3.3 VDC	13	+3.3 VDC
2	+3.3 VDC	14	-12 VDC
3	GND	15	GND
4	+5 VDC	16	PS-ON
5	GND	17	GND
6	+5 VDC	18	GND
7	GND	19	GND
8	POK	20	N/C
9	+5 Vsb	21	+5 VDC
10	+12 VDC	22	+5 VDC
11	+12 VDC	23	+5 VDC
12	+3.3 VDC	24	GND

PA, PB, PC

Pin #	Description	Pin #	Description
1	GND	5	+12 VDC
2	GND	6	+12 VDC
3	GND	7	+12 VDC
4	GND	8	+12 VDC

PD, PE

Pin #	Description
1	+12 VDC
2	GND
3	GND
4	+5V

PF, PG, PH, PI

Pin #	Description
1-3	+3.3 VDC
4-6	GND
7-9	+5 VDC
10-12	GND
13-15	+12 VDC

TTL SIGNAL

Pin #	Description
1	TTL1
2	TTL2

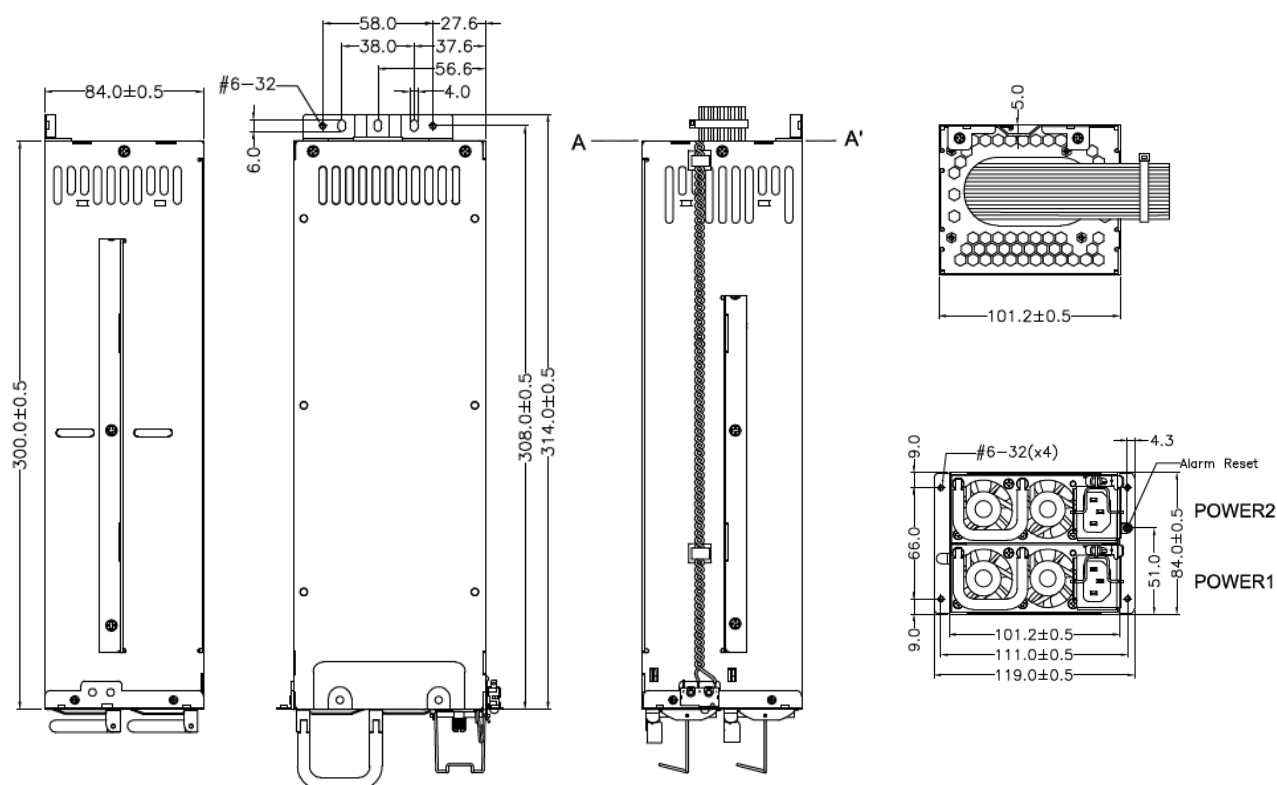
PMBus SIGNAL

Pin #	Description
1	SERIAL CLOCK
2	SERIAL DATA
3	N/A
4	GND
5	N/A

- Table 8 / power supply mechanical spec

Dimension (mm x mm)	
Height x Width x Depth	84 x 101.2 x 300

- Figure 5 / power supply mechanical spec



- Table 9 / power supply LED definition

LED	State	Description
Power	Green	Normal

4.2 Fan Modules

- Table 10 / fan Module Part number

The K2632SI supports four 60x60x38mm fans shown below.

Description	Manufacturer	Part number
Fan	M-FAN	DZ0638B12MG

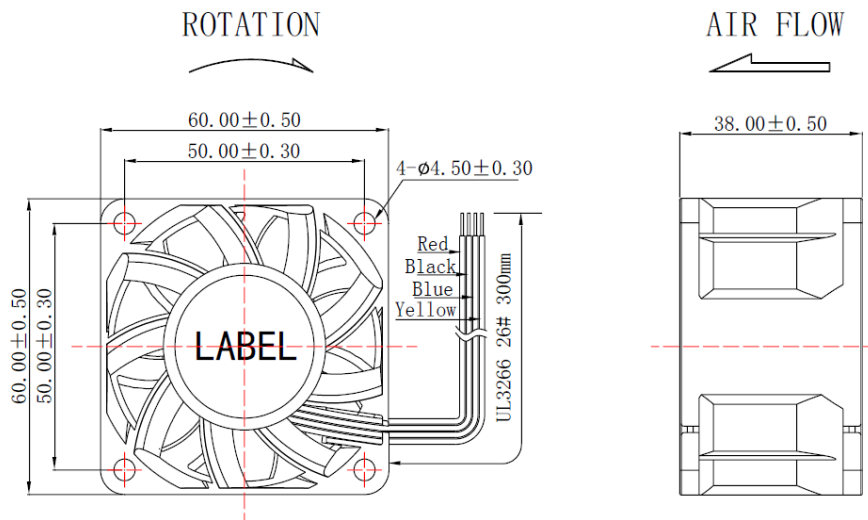
- Table 11 / Fan Module connector pin out

	Lead Wire	Specification
1	Red(+)	UL3266 26# 4 wires 300±10mm
2	Black(-)	
3	Blue(PWM)	
4	Yellow(FG)	

- Table 12 / FAN Module mechanical spec

Dimension (mm x mm)	
Height x Width x Depth	60 x 60 x 38

- Figure 6 / FAN Module mechanical spec



5. System Overview

The CNA-SSX2RC Hybrid Network Appliance consists of the following PCBs.

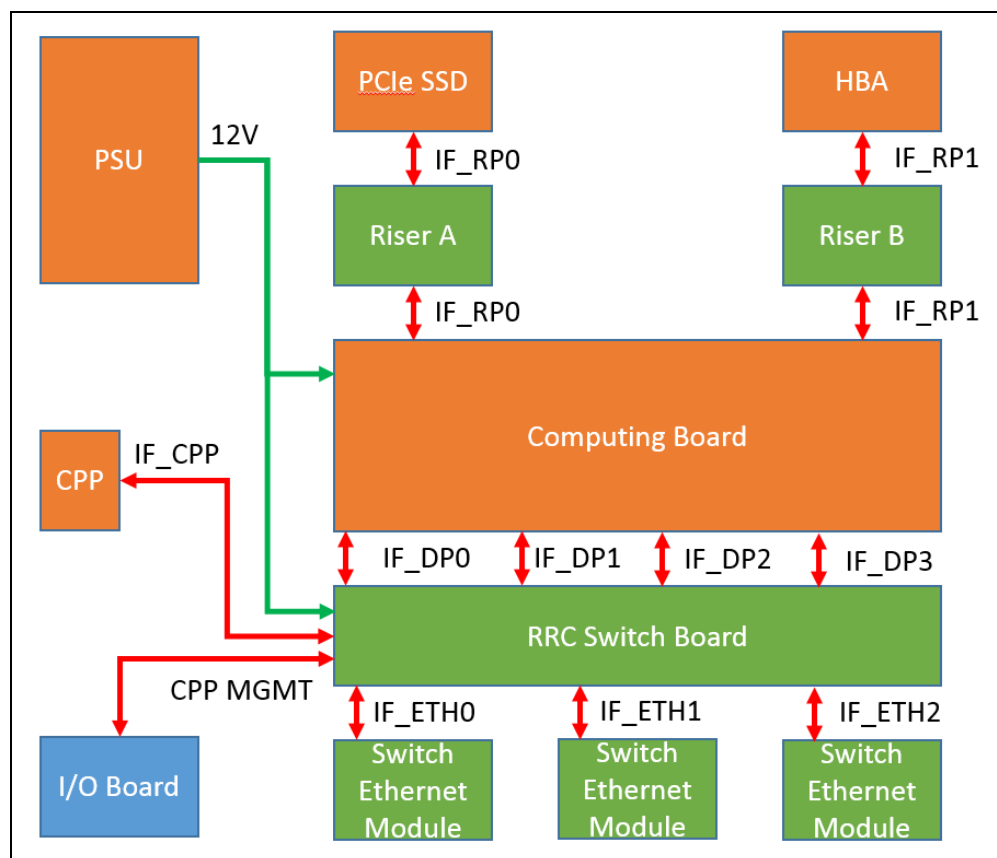
- Table 13 / PCBs overview

PCB Function	PCB Layer	Dimension (mm x mm)
Xeon Server Main Board	12	355.6 x 312.42
Switch Main Board	8	331 x 143
Switch CPU Subsystem	16	93 x 153
Interface Module	8	95 x 138
FAN	2	40 x 40
PCIe Riser Card	6	149 x 59
IO Board	4	100 x 75

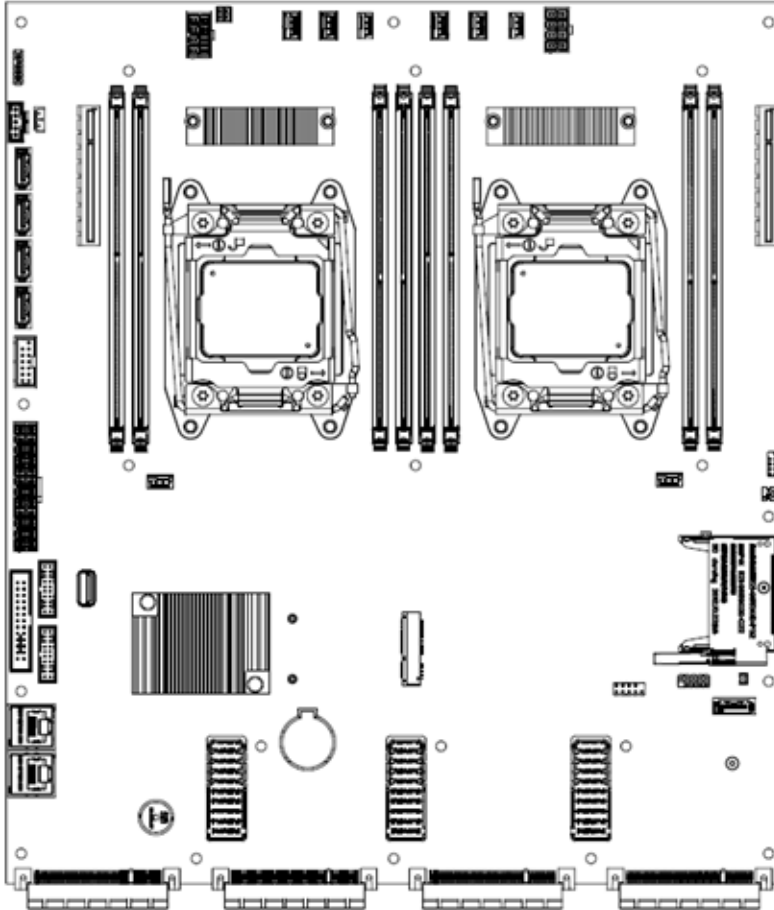
5.1 PCB Board Block Diagram

5.1.1 Overall Diagram

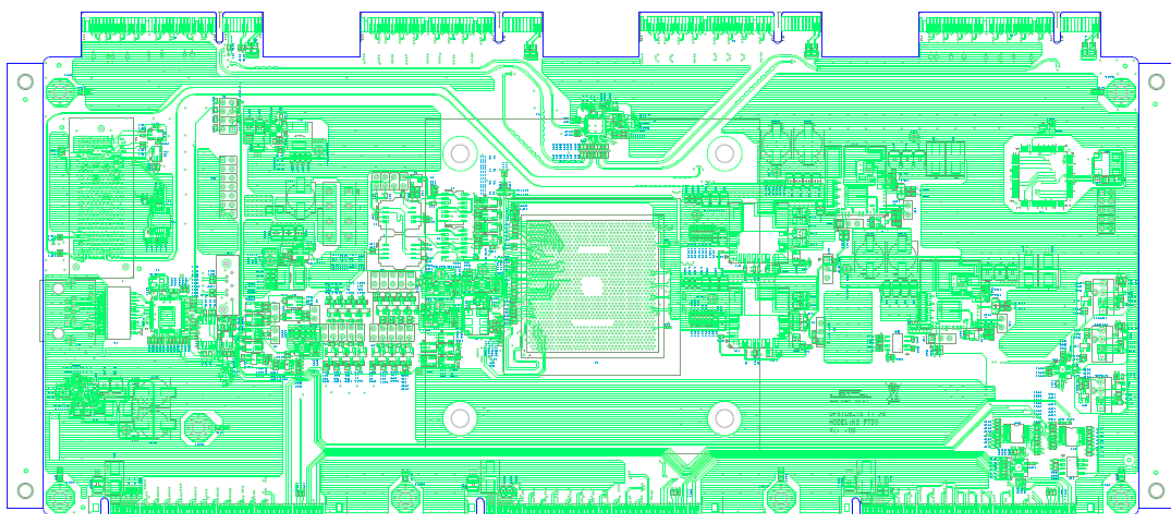
- Figure 7 / All Boards Block Diagram



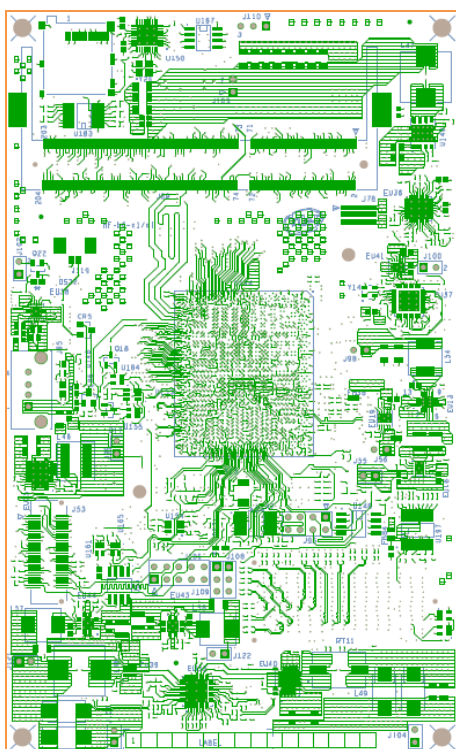
- Figure 8 / All PCB Boards top view



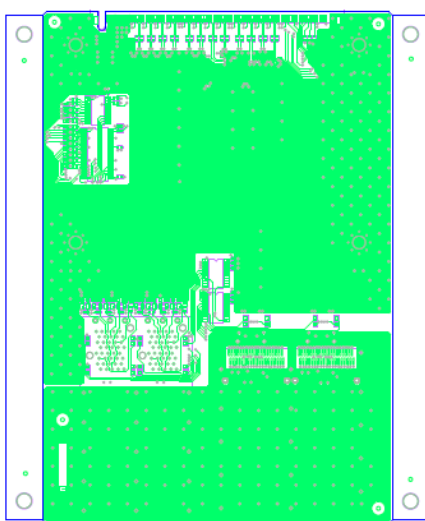
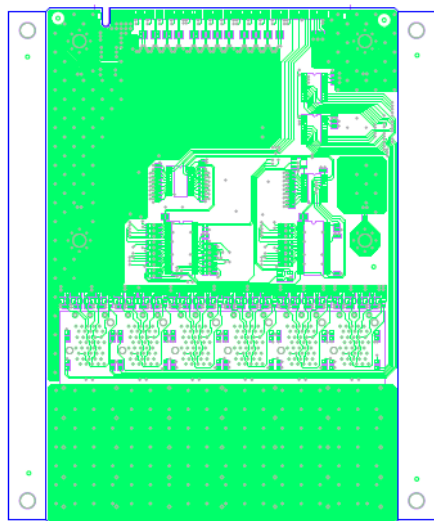
Xeon Server Board



Switch Board



Switch CPP Board



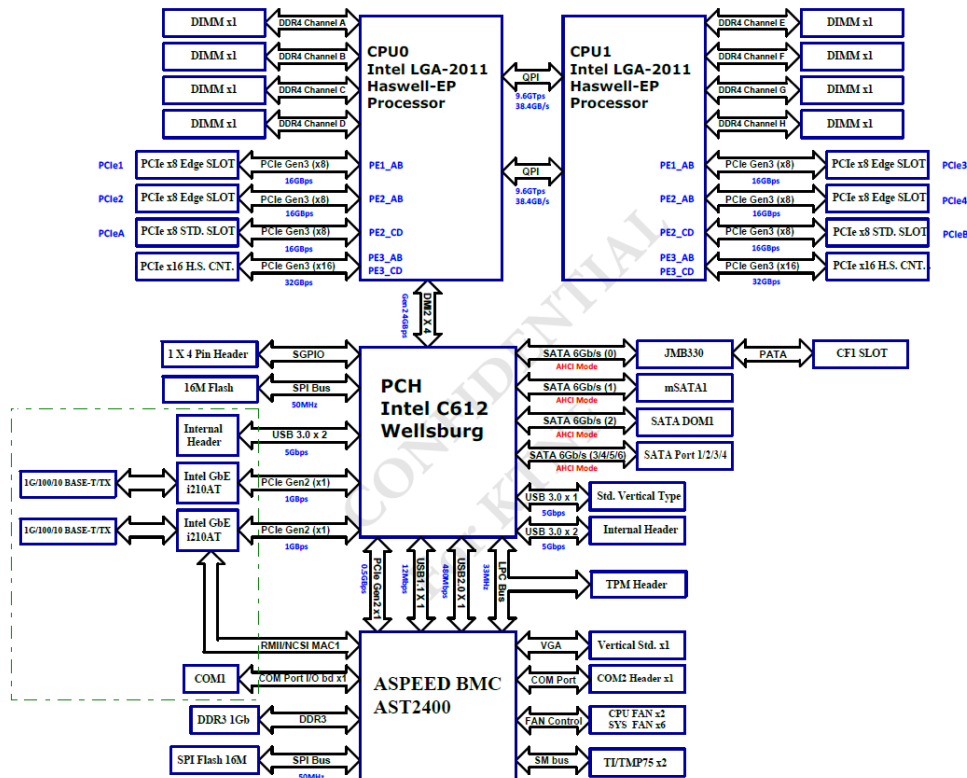
Interface Module Board

5.1.2 Xeon Server PCB

- Table 14 / Xeon Server PCB key components

Description	Manufacturer	Part Number
CPU	Intel	Haswell-EP Xeon E5-2600v3
SDRAM	SKhynix	8x DDR4 2133MHz RDIMM
SPI NOR Flash	Winbond	W25Q6435F
SATADOM	Innodisk	64GB 3ME3 MLC

- Figure 9 / Xeon Server PCB Block Diagram

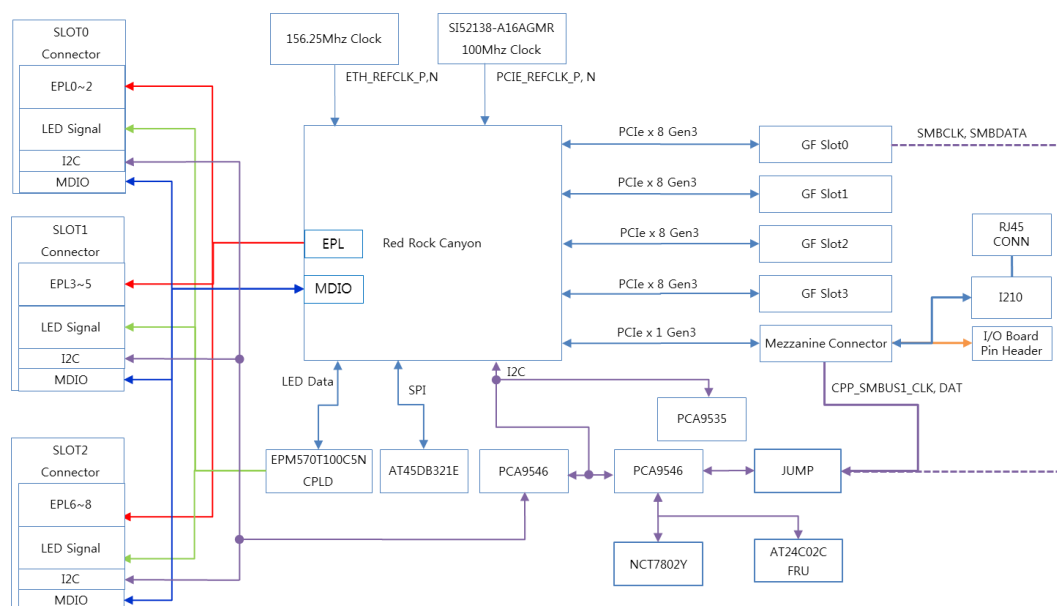


5.1.3 Switch PCB (RRC Switch Main Board)

- Table 15 / Switch PCB key components

Description	Manufacturer	Part Number
Switch Chip	Intel	FM10840
PCIe Clock Generator	Silicon Labs	SI52138-A16AGMR
CPLD	Altera	EPM570T100C5N
Mezzanine Connector(For CPP)	Amphenol	379-3466-200
High Speed Connector	Samtec	ERF8-075-01-L-D-EM2-TR

- Figure 10 / Block Diagram

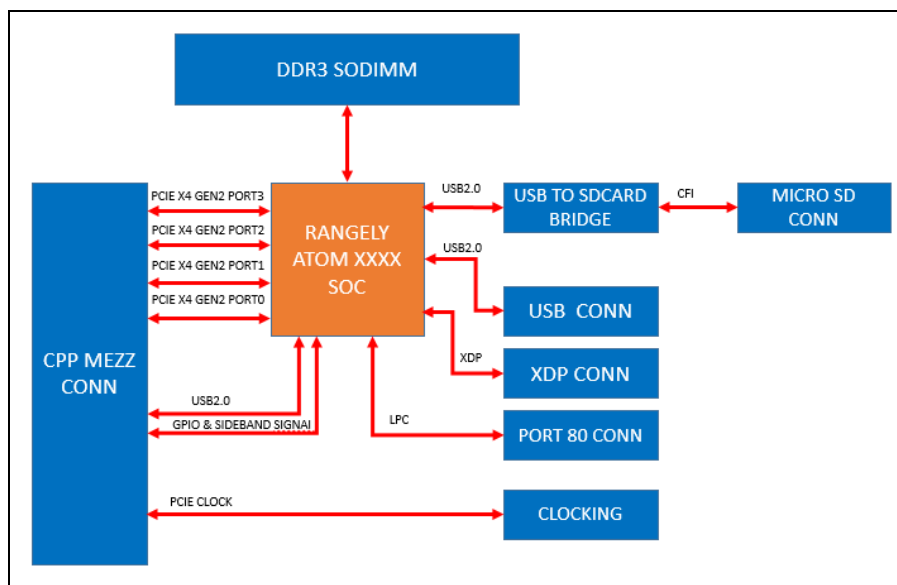


5.1.4 CPU Subsystem (RRC Switch CPP CPU Board)

- Table 16 / CPU Subsystem Board key components

Description	Manufacturer	Part Number
CPU	Intel	Rangeley C2738 core8 2.4G
Clock Generator	IDT	9VRS4420BKLFT-INT
SPI Flash	Winbond	W25Q128FVSI
SATADOM	Innodisk	32GB 3ME3 MLC
Mezzanine Connector	Amphenol	380-3436-200

- Figure 11 / CPU subsystem block diagram

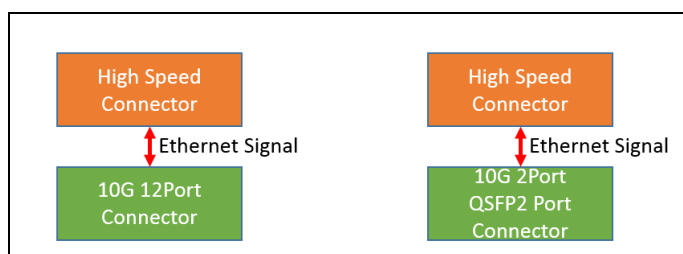


5.1.5 Interface Module PCB (10G Module & 40G+10G Module)

- Table 17 / Interface Module PCB Board key components

Description	Manufacturer	Part Number
High Speed Signal Connector	Samtec	ERM8-075-01-L-D-EM2-TR
SFP+ 2x6 Connector	Nextron	Z-824261000001
SFP+ 2x2 Connector	Nextron	Z-8242210000110
QSFP 1x2 Cage	Nextron	Z-834T012P32701
QSFP Connector	Nextron	Z-8350011120001

- Figure 12 / Interface Module PCB Board block diagram



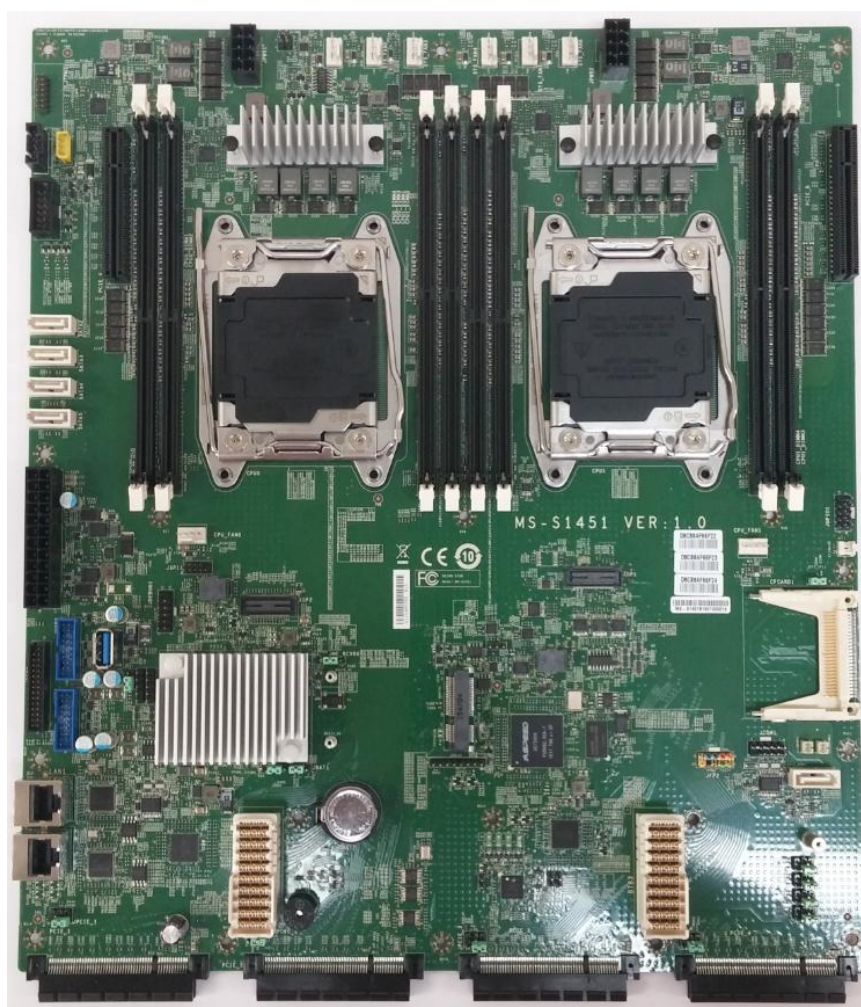
5.2 PCB Board Set

5.2.1 Xeon Server PCB

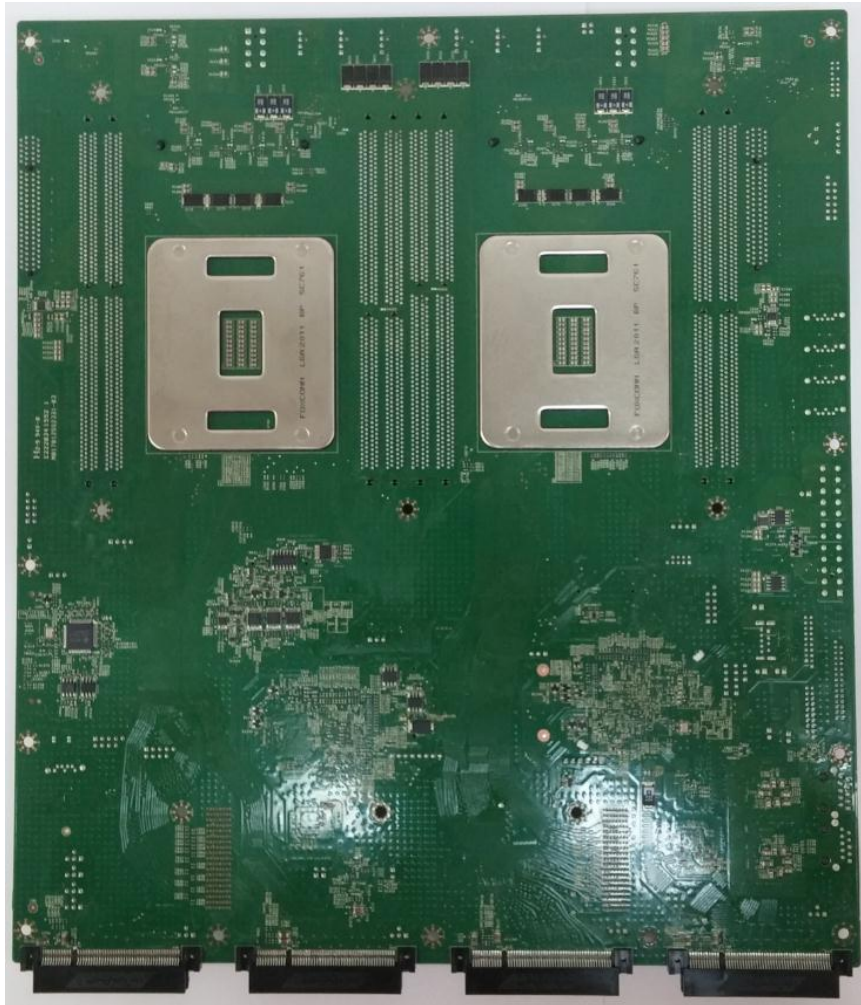
- Table 18 / Xeon Server PCB Dimensions

PCB Function	Dimension (mm x mm)
Xeon Server PCB	355.6 x 312.42

- Figure 13 / Xeon Server PCB top view



- Figure 14 / Xeon Server PCB bottom view

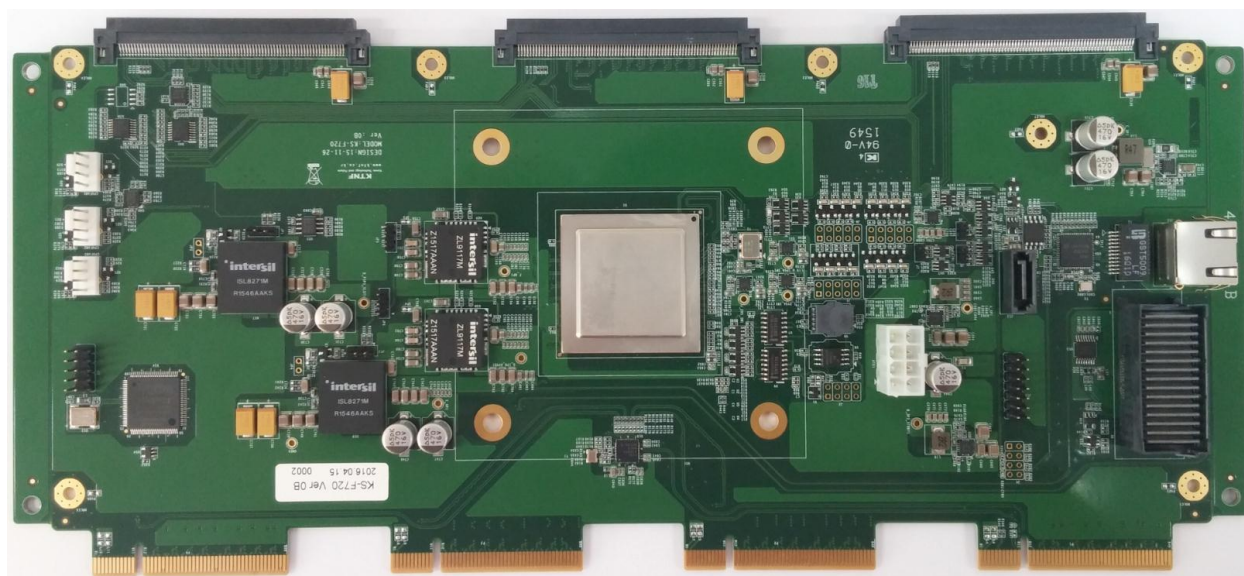


5.2.2 Switch PCB (RRC Switch Main Board)

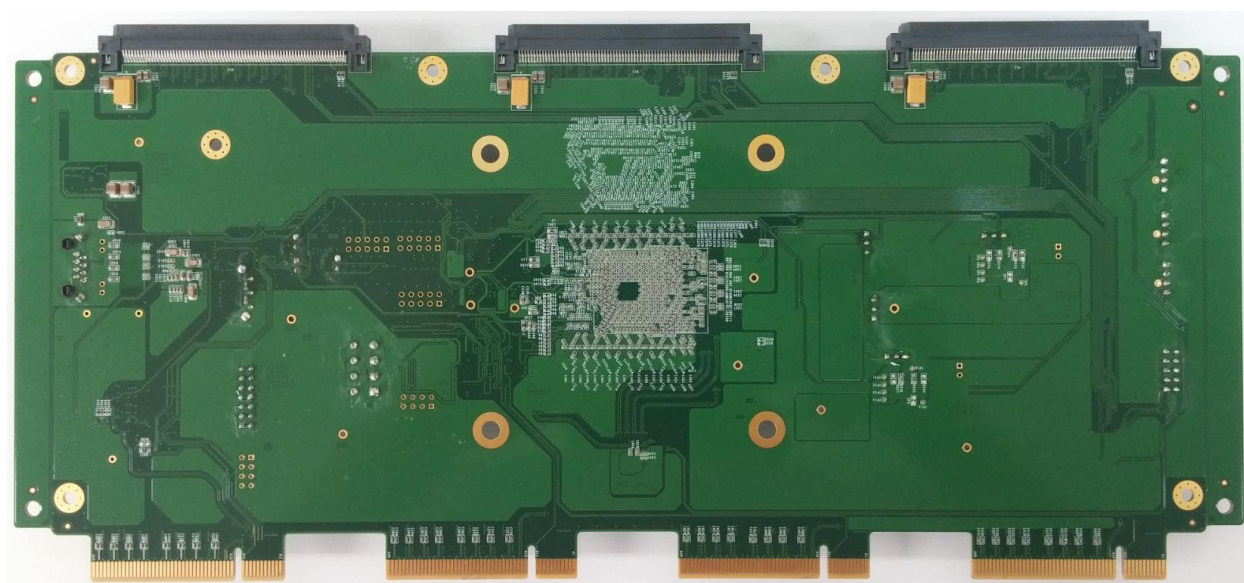
- Table 19 / Switch PCB Dimensions

PCB Function	Dimension (mm x mm)
Switch Main Board	331 x 143

- Figure 15 / Switch PCB top view



- Figure 16 / Switch PCB bottom view



5.2.3 CPU Subsystem (RRC Switch CPP CPU Board)

- Intel CPU (C2558) / SDRAM / PCIe interface
- Table 20 / CPU Subsystem PCB Dimensions

PCB Function	Dimension (mm x mm)
Switch CPU Subsystem	93 x 153

- Figure 17 / CPU Subsystem PCB top view



- Figure 18 / CPU Subsystem PCB bottom view



5.2.4 Interface Module PCB (10G Module & 40G+10G Module)

- Table 21 / Interface Module PCB Dimensions

PCB Function	Dimension (mm x mm)
Interface Module(10G)	95 x 138
Interface Module(40G+10G)	95 x 138

- Figure 19 / Interface Module PCB top view



Interface module (10G)

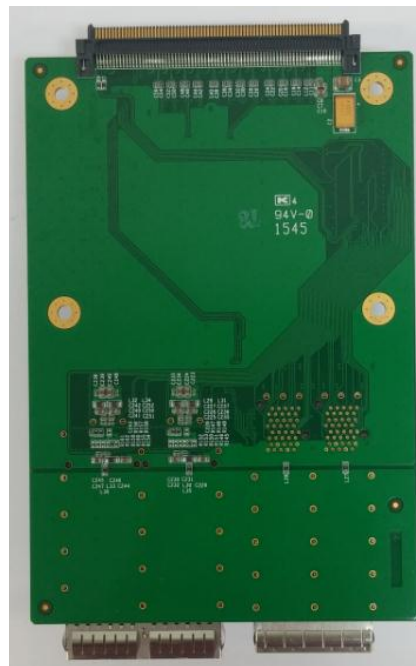


Interface module (40G+10G)

- Figure 20 / Interface Module PCB bottom view



Interface module(10G)



Interface module(40G+10G)

5.2.5 Other HW PCB (FAN, PSU, Riser Card and etc)

- Table 22 / Other HW PCB Dimensions

PCB Function	Dimension (mm x mm)
FAN	40 x 40
Riser Card	149 x 59
IO Board	100 x 75

- Figure 21 / Other HW PCB top view



FAN Board

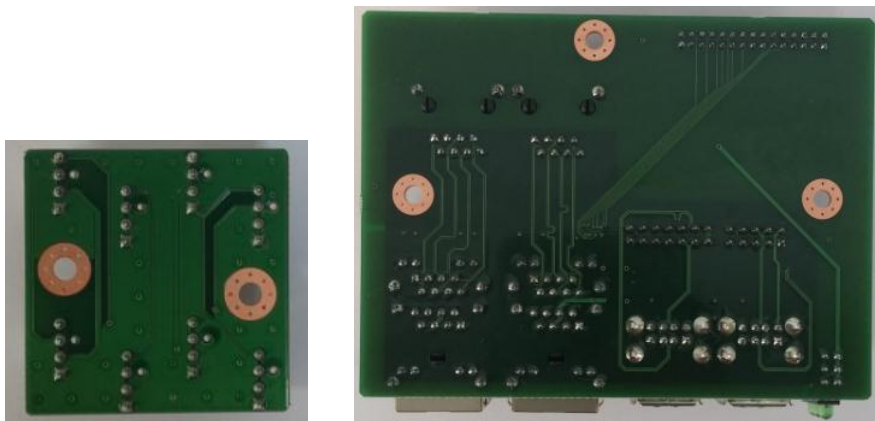


IO Board



Riser Board

- Figure 22 / Other HW PCB bottom view



FAN Board

IO Board





Riser Board

6. IO and Connectors

6.1 RS232 Interface

- Baud Rate: s/w define (57,600 for switch board / 115,200 for server board)
- Data bits: 8
- Stop Bit: 1
- Parity: None
- Flow control: None

6.2 Management Ethernet Interfaces

There are two management Ethernet ports. One is Host management port. The other is CPP management port. All of them support 10/100/1000 RJ-45 GbE port. The LAN controller used is Intel i210AT.

6.3 USB Interface

The CPU contains one Enhanced Host Controller Interface (EHCI) and complies to the EHCI 1.0 Specification. The EHCI supports up to four USB 2.0 root ports. USB 2.0 allows data transfers up to 480 Mbps. The controller integrates a Rate-Matching Hub (RMH) to support USB 1.1 devices. The USB Port 1 interface is configured by the debug software to be a debug port.

7. Software Support

7.1 Xeon Server Software Support

BIOS support

CNA-SSX2RC support AMI AptioV BIOS.

Server Management

CNA-SSX2RC support Aspeed AST2400 IPMI2.0 with iKVM.

OS Support

CNA-SSX2RC supports Linux kernel version 3.18 and later.

7.2 Switch CPP Software Support

Core Boot

CNA-SSX2RC supports Coreboot version Intel Atom C2000 CPP 0.9.7 and later.

ONIE

CNA-SSX2RC supports ONIE version 2014.02 and later.

NOS

CNA-SSX2RC supports IP Infusion OcNOS currently. ETRI N2OS is under test.

8. Power/Environment/Agency Certifications

Power Consumption

The total estimated system power consumption of the CAN-SSX2RC is 350 Watts. This is based upon worst case power assumptions for traffic, optics used, and environmental conditions. Typical power consumption is 450 Watts

Environmental

- Weight 33.07lbs / 15kg
- 0 to 40 Degrees C operating range
- -20 to 80 Degrees C storage temperate range
- Humidity 20% to 80% non-condensing operational
- Humidity 10% to 90% non-condensing storage
- Vibration – IEC 60068-2-36, IEC 60068-2-6

- Shock – IEC 60068-2-29
- Acoustic Noise Level – Under 60dB in 40 degree C

- Table 23 / power consumption and environment table

Power	
Number of power supply	2
Power supply types	AC
Typical operating power	350W
Maximum power	W
AC PSU	860W
Input voltage	100 to 240 VAC(With 10% tolerance)
Frequency	50Hz/60Hz
Efficiency	80% at 230VAC full load
Environment	
Operating temperature	0 ~ 40°C
Storage temperature	-20 ~ 80°C
Operating relative humidity	20% ~ 80%
Storage relative humidity	10% ~ 90%
Dimensions (height x width x depth)	88mm x 438mm x 689mm
Weight	15Kg

- Table 24 / regulatory standards compliance table

Regulatory Standards Compliance	
Regulatory Compliance Safety	FCC/IC Report Class A UL/cUL Listed Mark CCC
Safety	IEC 60950-1 UL/CSA 60950-1 GB4943.1
EMC : Emissions	IEC 61000-4 FCC/IC Report Class A KN22 KN61000-4

Safety (planning)

- UL/ Canada

- China CCC

Electromagnetic Compatibility

- FCC Title 47, Part 15, Subpart B Class A
- KCC
- CCC (planning)

ROHS

Restriction of Hazardous Substances (6/6)

Compliance with Environmental procedure 020499-00 primarily focused on Restriction of Hazardous Substances (ROHS Directive 2002/95/EC) and Waste and Electrical and Electronic Equipment (WEEE Directive 2002/96/EC)