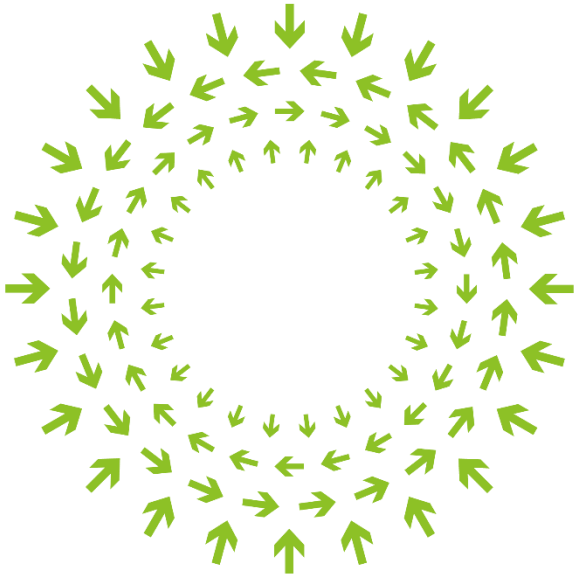


OPEN

Compute Project

Delta AG5648V1 Hardware Specification

Revision .00

Delta Electronics, Inc.

Fremont CA

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1. Revision History

Rev	Date	Description	Page	Editor
0.0	03/30/2018	Initial draft		Lakai Lee

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Delta Electronics, Inc.

3. Scope

This document defines the technical specification for the AG5648V1 switch submitted to the Open Compute Project Delta Open Platform Switch

Overview

The AG5648V1 is next generation leaf switch for Data Center Networks, as well as Enterprise network deployments. It leverages the 100G technology (4x25G Serdes) to offers 48-port 25G SFP28 and 6-port 100G QSFP28 in a compact 1RU form factor. 2.5 times speed upgrade from current 10Gigabits leaf switch. The 48ports 25G are backward compatible to 10G and the 100G uplink offer dual speed – 40G and 100G. Total I/O bandwidth upgrade to 1.8T which is 2.5time capacity performance of current 10G downlink and 40G uplink switch (720G). The switch will provide customer Intel 1.7GHz x86 Dual-Core or 2.4GHz x86 Quad-Core CPU modules. Modularized CPU brings our customers the flexibility of CPU selection.

AG5648V1	48ports 25G SFP28 + 6ports 100G QSFP28

Feature

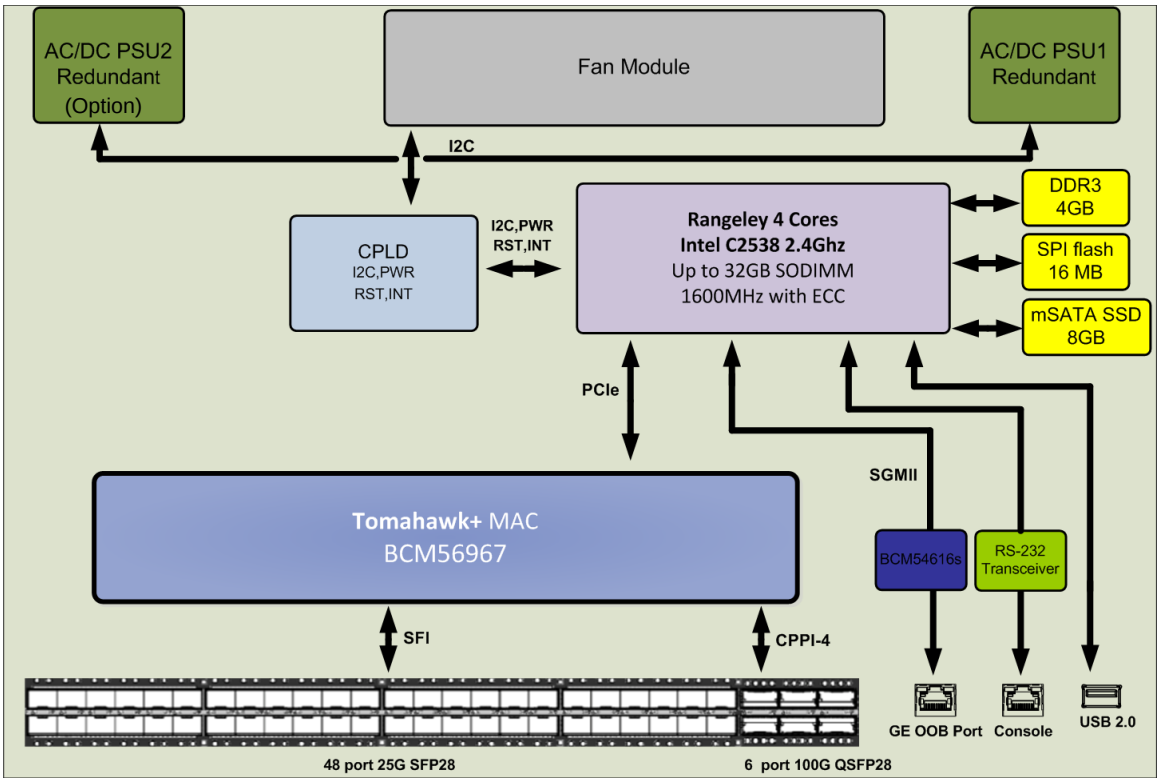
- External Serial RS232 port (RJ45 type).
- Support one USB ports for USB-A type
- 48 25Gbps SFP28 ports and 6 100Gbps QSFP28 ports in front.
- The 25G port support 10G/25G speeds
- The 100G port support 10G/25G speed by FAN out cable, the port also supports 40G QSFP28 transceiver.
- Front panel Management port. (RJ45 type)
- Front panel LED display for System, Locator, and FAN and power status indicates.
- On board high performance CPU system with high density memory, Intel Rangeley C2538/4GB DDR3 SDRAM.
- Temperature monitoring. (TMP75).
- Backup BIOS
- Software readable thermal monitor.
- RTC time clock support.
- Hot plugging redundant power supply.
- Current monitoring for Power management.
- FAN removable and monitoring.
- Standard 1U chassis high

AG5648V1 configuration table

	AG5648V1
CPU	Intel Rangeley C2538
MAC	BCM56967
PHY (OOB Port)	BCM54616SC0KFBG
PSU	AC 550W*1 DPS-550LB H
Air flow	Forward (I/O to back)

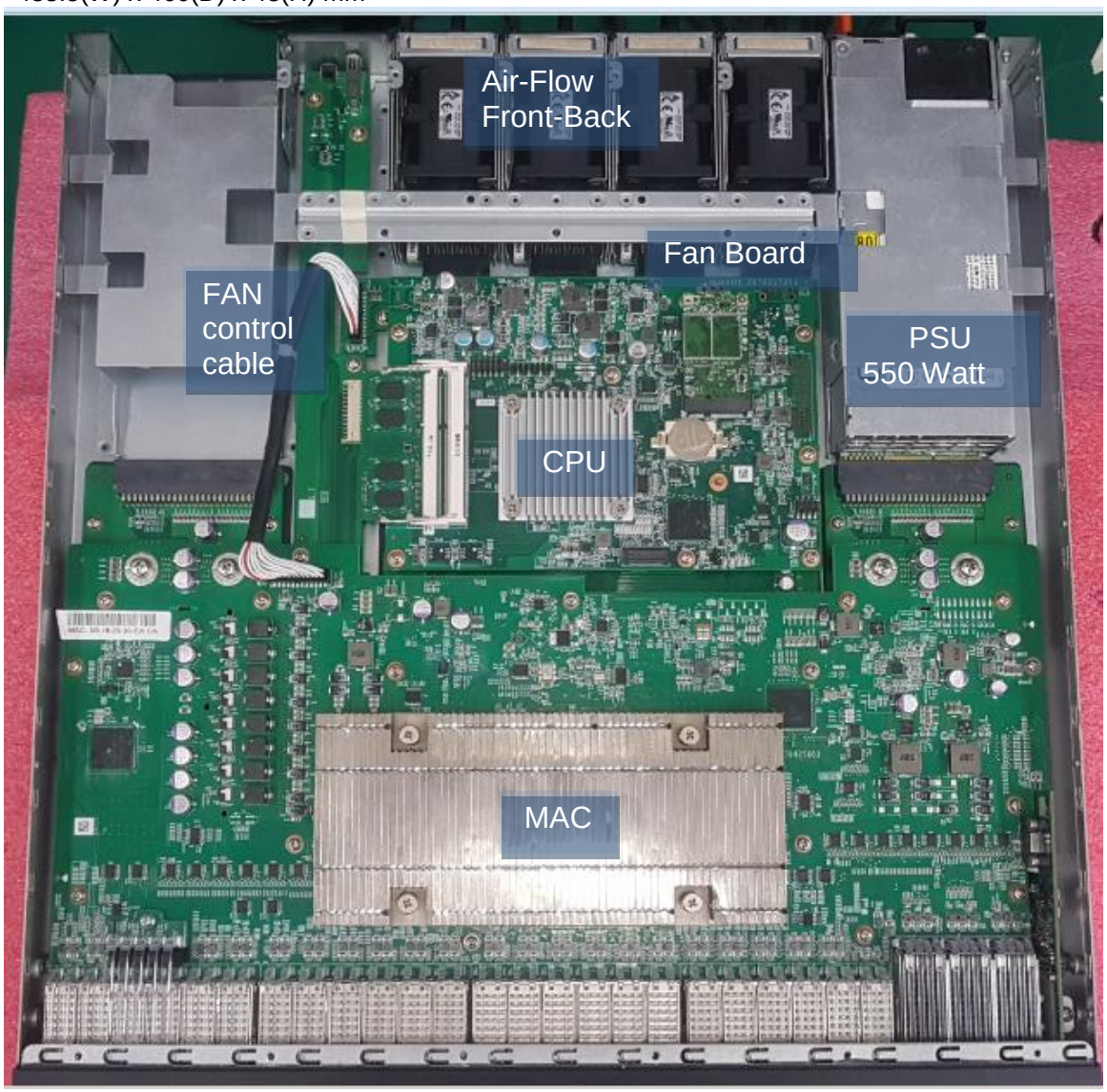
4. Hardware Functionality

4.1. Block Diagram

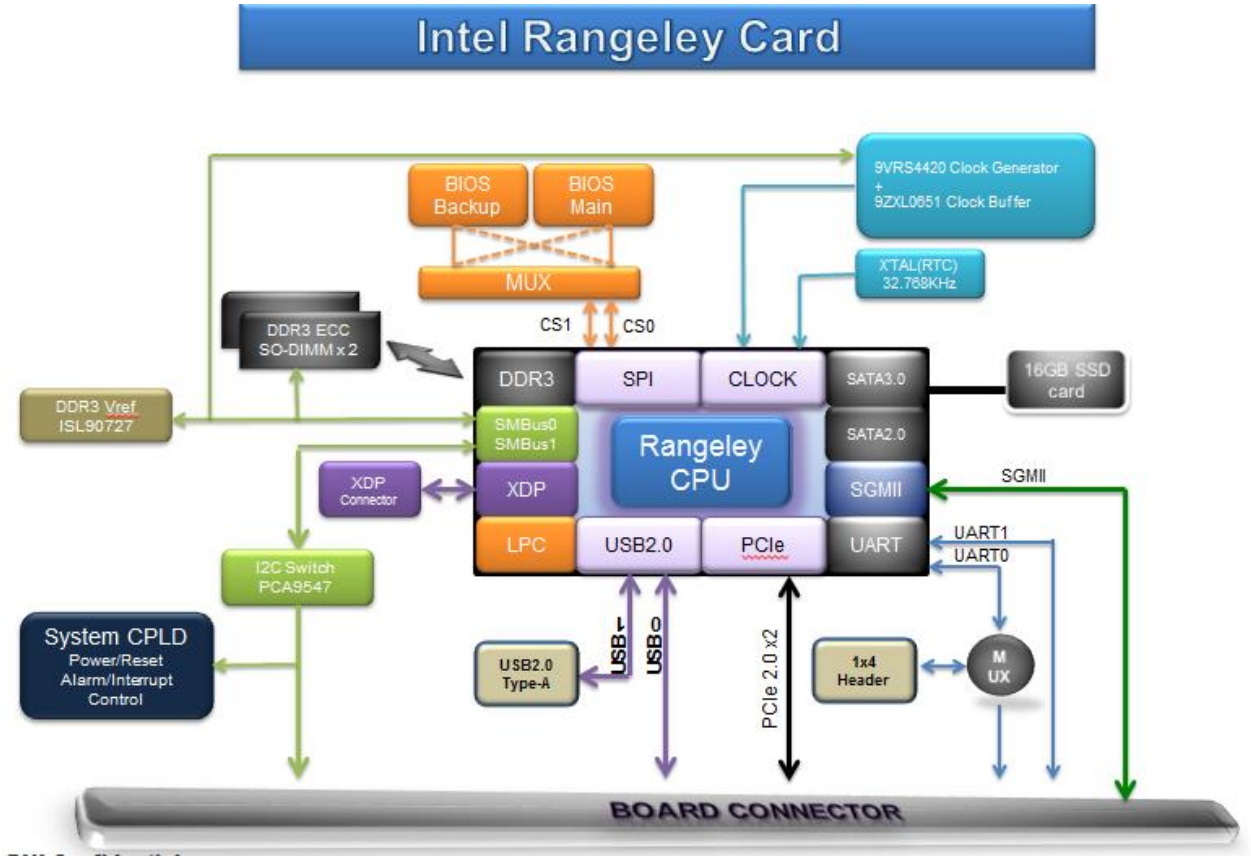


4.2. Physical Dimensions

438.5(W) x 460(D) x 43(H) mm



4.3. CPU Subsystem



4.3.1. CPU Rangeley

The AG5648V1 is design with Intel Atom™ Processor. The Intel® Atom™ Processor C2000 Product Family for Communications Infrastructure is the next generation of System-On-Chip (SoC) 64-bit processor built on the 22-nanometer process technology..

Rangeley Key Feature

The main SoC architectural features are:

- **SKUs containing two, four, or eight cores**
  - — Intel® Xeon® processor Instruction Set Architecture (ISA) compatibility
  - — Out-of-order instruction execution
  - — Intel® Virtualizahtion Technology, VT-x2
  - — 1 MB sared L2 Cache (per two cores), 4 MB L2 total for the eight-core SKU
  - — SKU base frequencies of 1.7GHz and 2.4GHz
  - — Intel® Turbo Boost Technology for speeds up to 2.7 GHz depending on SKU

- **Dual-Channel DDR3 Memory**
  - — Single- or Dual-Channel Memory Controller, SKU dependent
  - — DDR3L (1.35V), DDR3 (1.5V), SKU dependency
  - — SDRAM speeds up to 1600 MT/s depending on SKU
  - — ECC support
  - — Support for single- or dual-rank DIMMs
  - — Support for two DIMMs per channel
  - — Up to 32-Gbytes DDR3 memory capacity support

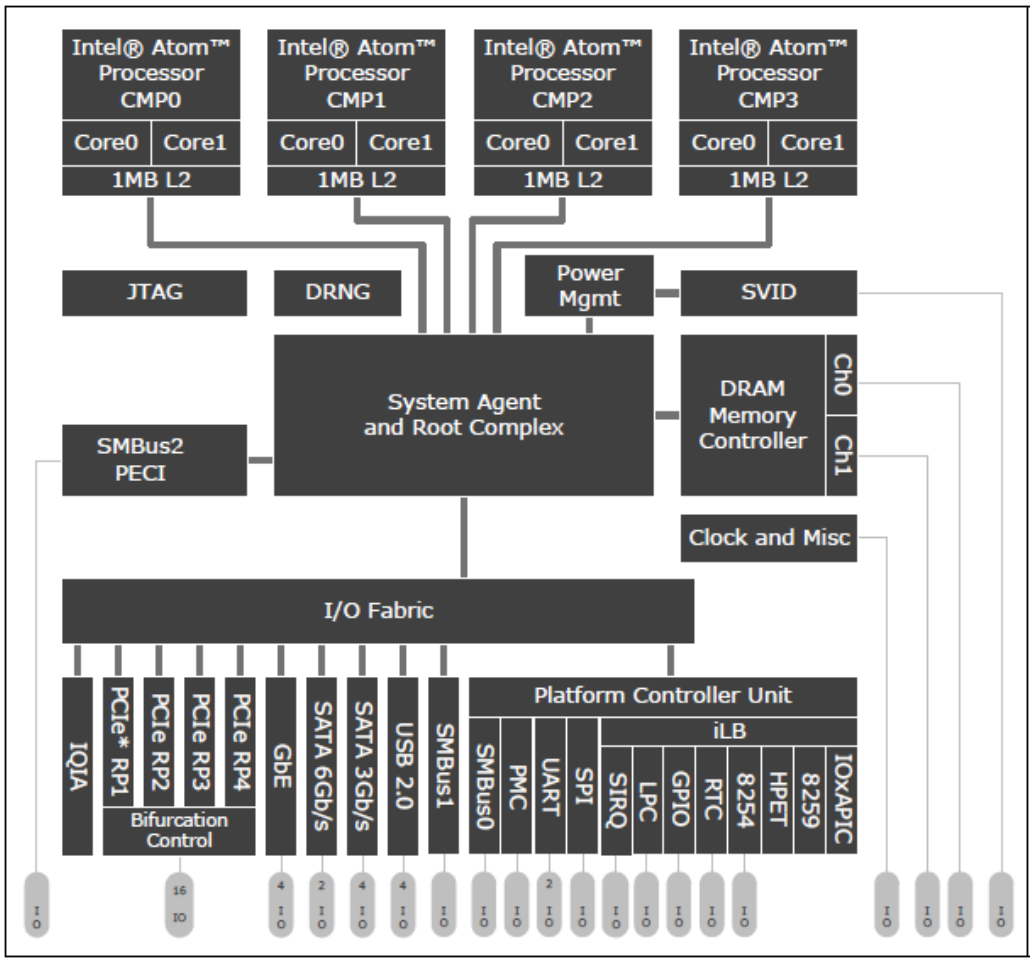
- **Integrated**
  — PCI Express* Gen 2 Root Ports, up to 8 or 16 lanes depending on SKU, bifurcates to 4 controllers
  • Network Controller Sideband Interface (NC-SI) allows for connectivity to a Baseboard Management Controller (BMC) for the purpose of enabling out-of-band remote manageability.
  • SMBus ports are available and continue to be available to enable network manageability implementations.
  • SoC designs can use either SMBus or NC-SI for connectivity to the BMC, but not both.
  • The SoC GbE Interface provides support for IEEE 802.3 1000BASE-KX and also introducing non-standard 2.5 GbE implementations.
  — Ports SATA2 x4 or X2, depending on SKU, to support high-capacity rotational media
  — Two SATA3 Ports to support solid-state drives (SSDs) requiring high rates of I/O operations per second (IOPS)
  — USB 2.0 x4, EHCI compliant
  — SMBus x4 (Host, PECI, normal SPD, and LAN interface)

- **Based on new Intel SoC design technology**
  — Next-Generation SoC System Agent (SSA)
  — Significant improvements in performance and latency than current Intel® AtomTM processor system agents.
  — Common legacy block controllers (SPI, UART, RTC, HPET, etc.)
- **Power Management**
  — Significant improvements to support lightweight server power management
  — Exposed PECI over SMBus mechanism
  — Highly-optimized Power Management Unit (PMU)
  — Support for Turbo, Power Limiting
  — SVID support to optimize power consumption

- **Server-Class Reliability, Availability and Serviceability (RAS)**
  — Data and address for memory ECC
  — Demand and Patrol Scrub to detect and correct memory errors
  — Significant internal data-path parity protection

- **Enhanced cryptographic/content processing acceleration via integrated Intel QuickAssist Integrated Accelerator**
  — Bulk Encryption (AES, 3DES, RC4)
  — Authentication (SHA1, MD5)
  — Public Key Exchanges/RSA

Rangeley Processor High-Level Block Diagram .



4.3.2. LED Definition for System

- **System LEDs indications including System, PSU, and FAN Status**

Feature	Detailed Description	Comment
System LED	Solid Green – Operating Blinking Green – Booting or System in Diagnostic mode Solid Amber – Critical Alarm Off – Power is Disconnected	At front side
Power LED	Solid Green –2 Power Suppliers are supplied to the switch & operating normally Solid Amber –Booting or Single power supplier is installed/operating. Blinking Amber –2 Power Suppliers are installed, but only single power supply is operating. Off – Power is Disconnected.	At front side
FAN LED	Solid Green – FAN operating normally. Solid Amber – A FAN or more failed	At front side

Note: For FAN LED , when one of FAN LEDs on the rear side failed , fan led on the front panel will display Amber ,

➢ ***QSFP28 port LEDs***

Feature	Detailed Description	Comment
Link/ACT LED	OFF –No link is established on the port. *Solid Green – A valid link is established as 100GE on the port. *Solid Amber – A valid link is established as 40GE on the port. *Solid Blue – A valid link is established as 25GE on the port. (Through break out cable) *Solid Purple –A valid link is established as 10GE on the port. (Through break out cable) *Solid White –A valid link is established as 50GE on the port. (Through break out cable) Four LEDs – Through break-out cable to indicate Port 1/2/3/4 status for 10G/25G Two LEDs – Through break-out cable to indicate Port 1/2 status for 50G Four LEDs (1st ON ONLY) – A valid 10/25/40/50G/100G Link Blinking LED – Packets transmission or reception is occurring	

➢ ***SFP28 port LEDs***

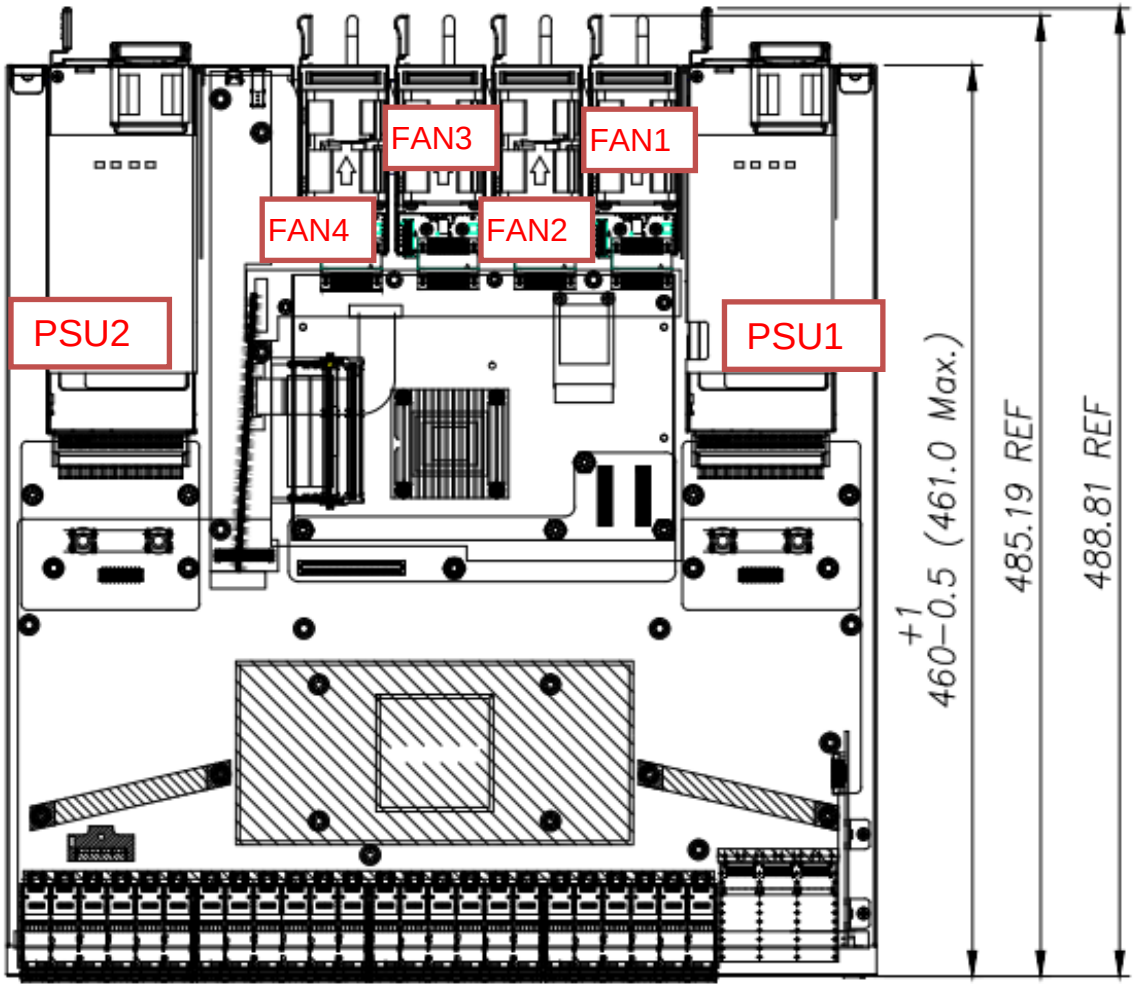
Feature	Detailed Description	Comment
Link/ACT LED	OFF –No link is established Two LEDs / Port Solid Green – A valid 25G link is established Solid Yellow – A valid 10G link is established Blinking LED – Packets transmission or reception is occurring	

➢ ***OOB Management Ethernet port LEDs***

Feature	Detailed Description	Comment
Link LED	■Solid Green = Port linked operating at max port speed, i.e. if auto-negotiated/forced to 1G mode ■Solid Amber = Port linked operating at lower speed, i.e. if auto-negotiated/forced to 10/100M on this port ■Off = No Link	
Activity	■Flashing Green (~30ms) = Port Activity ■Off = No activity	

4.3.3. Pluggable Power Supply & Fan Tray

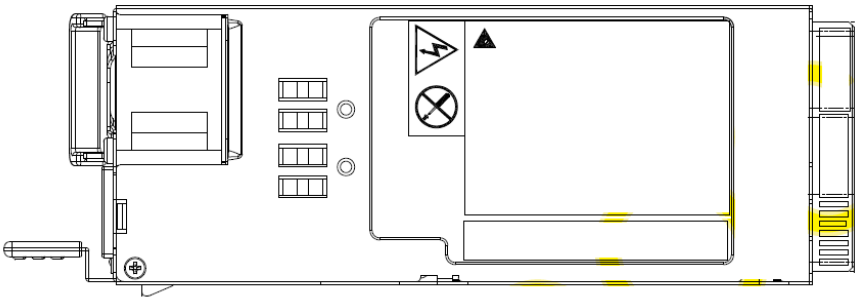
Power Supply & Fan Tray allocation



4.3.3.1. AC / DC Power Supply

- **Delta Power Supply P/N**

Product Name	Air Flow direction
DPS-550LB H	Forward Air Flow: The air flow is from DC connector to AC inlet.



The power supply, having a universal input (90 VAC to 264 VAC) and 12 VDC regulated output. This regulated output supply power to other power supply backup source. The power supply shall incorporate over current protection and OVP.

- **Input Voltage**

  90 to 264 VAC, universal input. Nominal input voltage: 100 to 240VAC.

- **Input Frequency Range**

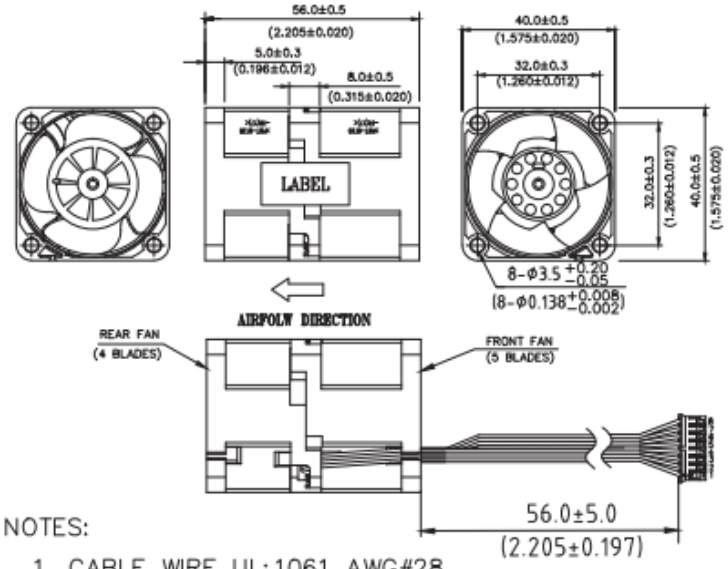
  47 to 63 Hz.

- **Output Voltage and Current**

Output	Nominal Output Voltage Set Point	Set Point Tolerance	Total Error Band	Minimum Current	Maximum Current
1	12 VDC	+/- 0.5%	+/- 2%	0 Amp	66.6 Amp

4.4. Fan specification

Description	Manufacturer	Part number
Air flow : Front to Back	Delta Electronics	GFC0412DS-SM06XMP

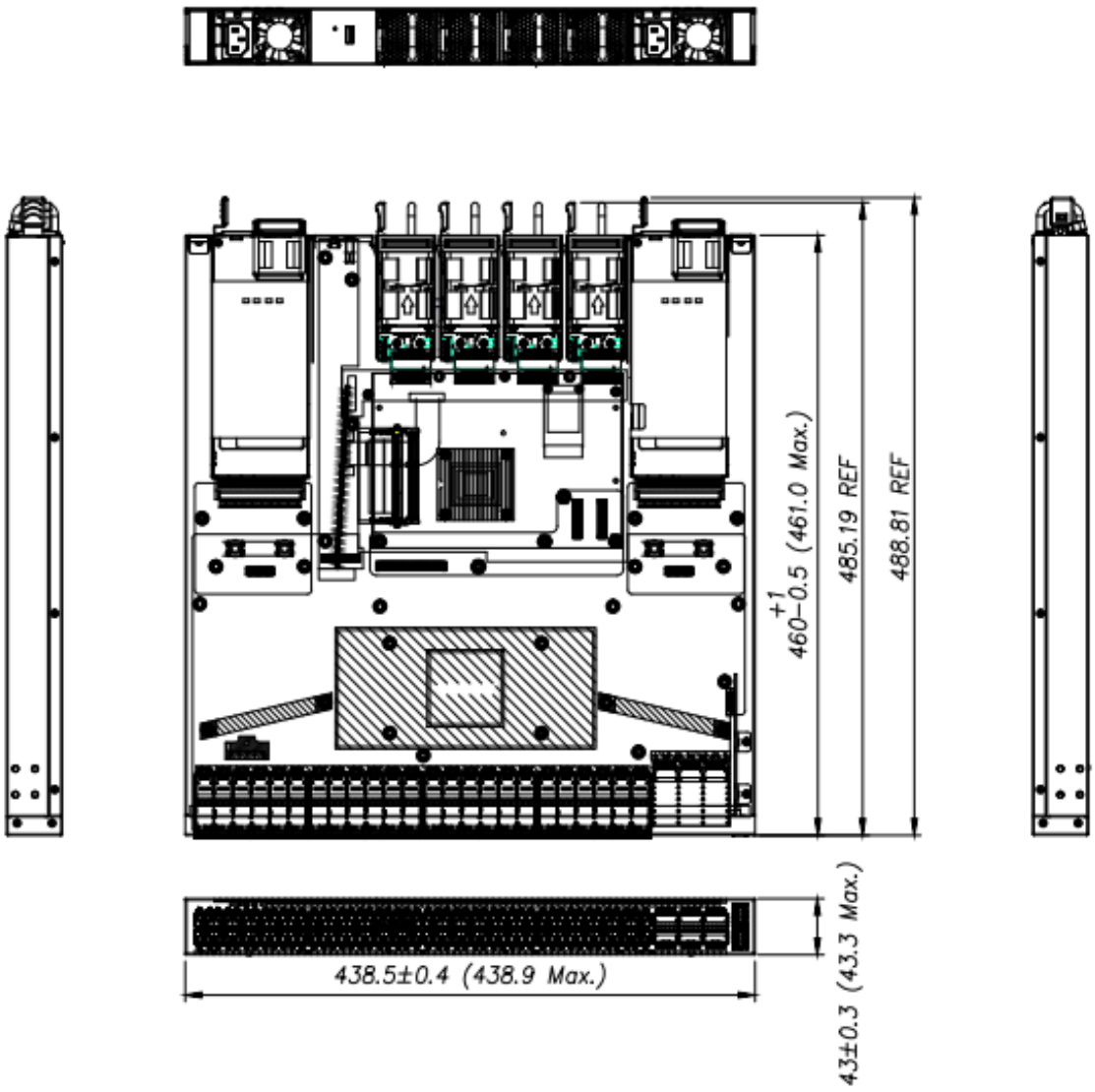


NOTES:

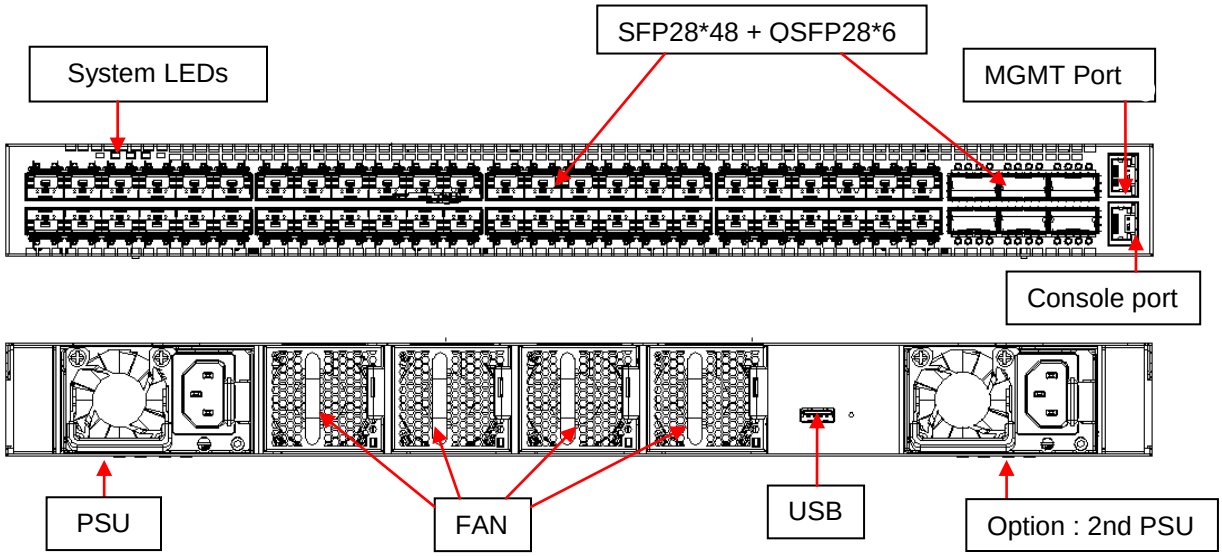
1. CABLE WIRE UL:1061 AWG#28
   FRONT FAN (5 BLADES)
   PIN1: BLACK WIRE----(-)
   PIN2: RED WIRE----(+)
   PIN3: YELLOW WIRE----(FOO)
   PIN4: BLUE WIRE SPEED----(PWM)
   REAR FAN (4 BLADES)
   PIN5: WHITE WIRE----(-)
   PIN6: ORANGE WIRE----(+)
   PIN7: BROWN WIRE----(FOO)
   PIN8: GREEN WIRE SPEED----(PWM)
2. HOUSING: JWT A2001H02-8P OR EQUIVALENT
3. TERMINAL: JWT A2001TOP-2 OR EQUIVALENT
4. THIS PRODUCT IS RoHS COMPLIANT

DIMENSION UNIT: MM(INCH)

4.5. Mechanicals



4.6. Faceplate layout and artwork



- Operating temperature 0-45℃
- Altitude 6000 ft
- 48x25G SFP28
- 6x100G QSFP28
- Standard 19” rack mount support
- N+1 redundant PSU (not applicable in short-term condition)
- N+1 redundant FAN
- Airflow I/O to Fan, I.O to FAN
- Size : 438.5(W) x 460(D) x 43(H) mm

4.7. PCB Stack up

Layer	Type	TU-933
	Solder mask	SM
1	S	0.5oz+plating RTF
	core	2116 59%
2	G	0.5oz
	core	5 mil core(2*1078) VLP
3	S	0.5oz
	prepreg	2*1078 69%
4	G	0.5oz
	core	5 mil core(2*1078) VLP
5	S	0.5oz
	prepreg	2*1078 69%
6	G	0.5oz
	core	5 mil core(2116) RTF
7	V	1 oz
	prepreg	3*2116 59%
8	V	2 oz
		5 mil core(2116) RTF
9	V	2 oz
	core	3*2116 59%
10	V	1 oz
	prepreg	5 mil core(2116) RTF
11	G	0.5oz
	core	2*1078 69%
12	S	0.5oz
	prepreg	5 mil core(2*1078) VLP
13	G	0.5oz
	core	2*1078 69%
14	S	0.5oz
	prepreg	5 mil core(2*1078) VLP
15	G	0.5oz
	core	2116 59%
16	S	0.5oz+plating RTF
	Solder mask	SM

5. Software Support

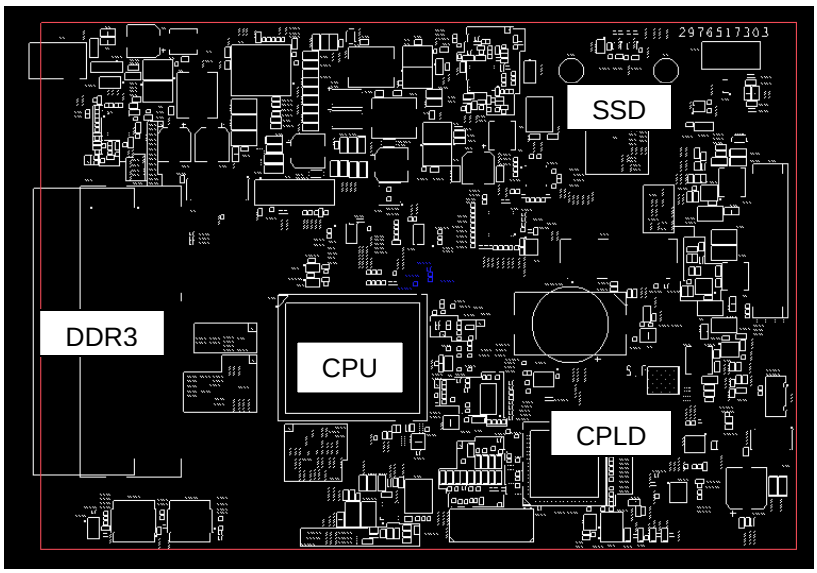
AG5648V1 supports ONIE

6. Critical Components

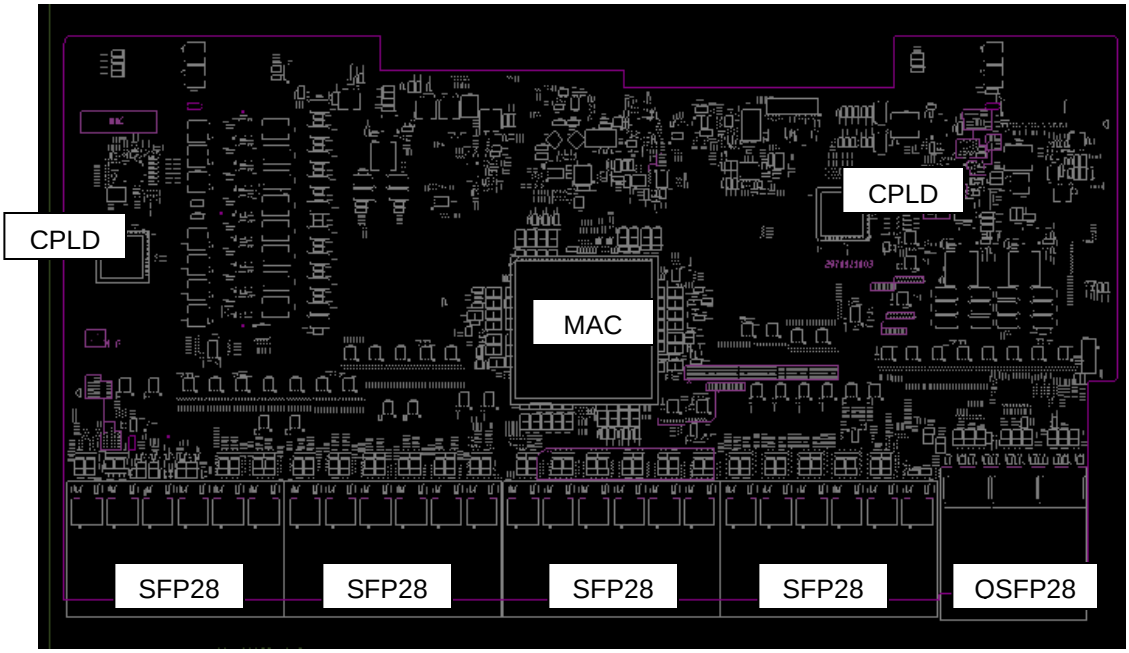
Description	Manufacturer	Part number
IC ETH SW 6P+48P 100GB	Broadcom	BCM56967A1KFSBG
IC ETH X'CEIVER 10/100/GB-T	Broadcom	BCM54616SC0KFBG
IC INT-PRO 2.4GHz	Intel	Rangeley C2538
DDR3 SO-DIMM 4GB 800MHz	SAMSUNG	76.B390G.C5Z0C
SSD M SATA ISLC 8GB 52P	TOSHIBA	DHMSR-08GD09BC1DC-E82

PCB board outlook

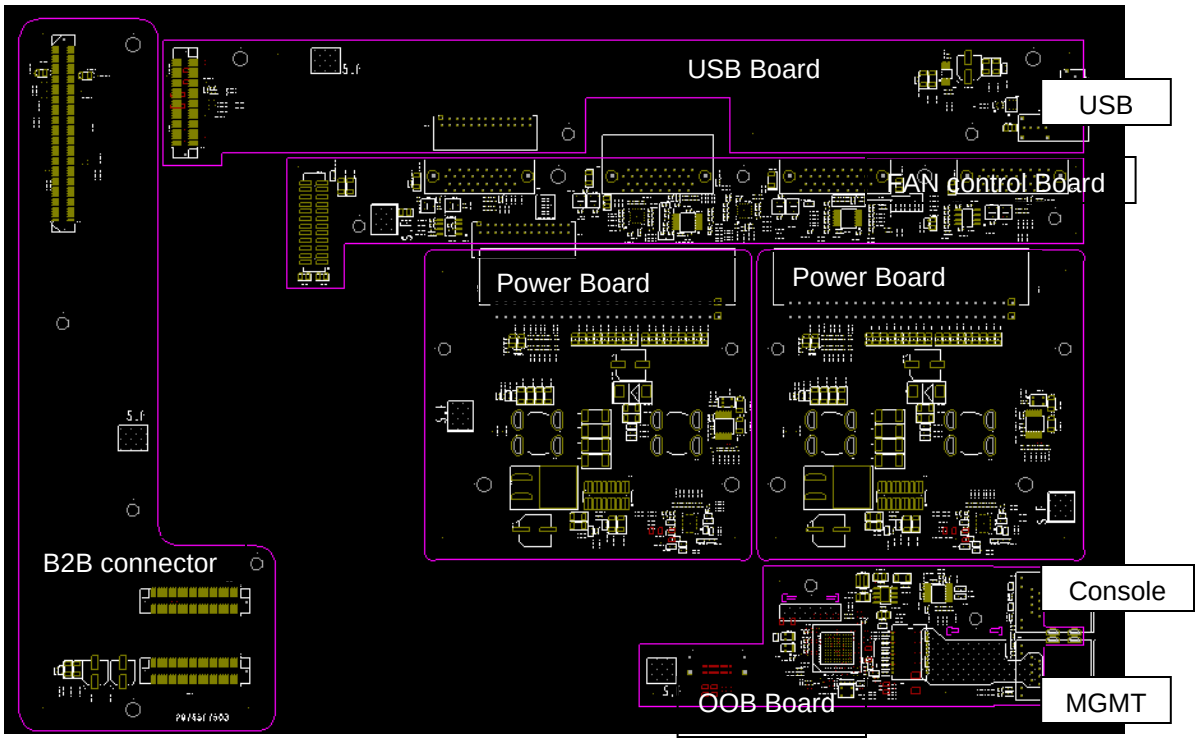
CPU Board



MAIN Board



Power Board/ FAN control Board/ Power Board/ OOB Board



7. Technical Specs and Environmental Requirements

Technical Specifications

Network Protocol and Standards Compatibility
IEEE802.3by
IEEE802.3bj Clause 91
IEEE802.3ap Clause 93
IEEE802.1q Clause 72

Interface
USB connector

Physical Dimensions
438.5(W) x 460(D) x 43(H) mm

Electromagnetic Emission

FCC Class A, CE Class A, VCCI Class A

Safety Agency approval

UL