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Compute Project

ES200 (Wiwynn 2U Edge Server)

Revision 0.1

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Revision history

Revision	Editor	Description
V0.1 (July 31, 2020)	Daniel Huang	First draft release version

Contents

1	License (OCP CLA Option)	2
2	Introduction.....	5
3	Production Architecture Overview	5
3.1	Server Board Block Diagram	7
3.2	Server Board.....	8
3.2.1	Server Board Placement.....	8
3.2.2	Server Board Dimensions.....	9
3.2.3	Processor	9
3.2.4	PCH.....	9
3.2.5	Memory.....	10
3.2.6	PCIE Lanes.....	11
3.2.7	SATA.....	11
3.2.8	USB.....	11
3.2.9	AST2500	12
3.2.10	TPM.....	12
3.2.11	UART	13
3.2.12	Power connector for Accelerator Card	13
3.2.13	Thermal Design	14
4	Chassis Spec	17
4.1	2U System Overview	17
4.1.1	2U Chassis Dimensions.....	18

2 Introduction

ES200 is an Edge server with 2U short-depth (450mm) chassis design, compatible in EIA-19" rack mount, for CSP/Telco to deploy their Edge applications. The Wiwynn ES200 targets to build a common design for the 2U family which brings storage and I/O bays flexibility to switch by configurations.

3 Production Architecture Overview

ES200 Edge Server main characteristics and features are listed below:

Table 1: Server Feature List

Board Name	Edge Server Mother Board
Form Factor	Width: 438mm (17.2") x Depth: 450mm (17.7"), Height: 2U tall
Mother Board dimension	W 309.8mm x D 363.6mm, 12 layers, 2.36mm, 16 DIMMs
CPU	2S 3 rd Gen Intel Xeon scalable processor
Chipset	Intel PCH C621A
Memory	DIMM Sockets: total 16 sockets, CH A/B/C/D/E/F/G/H 1DPC; (CH B; J2/J10 Support Intel DCPMM) DIMM Types: DDR4 RDIMM, 1.2V DIMM Capacities: 16GB, 32GB
PCIe Expansion Slot	Type: CPU1 native PCIe Gen4 Port PE0 ABCD: x16 PCIe link to sliver riser connector Port PE1 AB: x8 PCIe link to sliver riser connector Port PE2 ABCD: x16 PCIe link to OCP 3.0 connector Port PE3 AB: x8 PCIe link to sliver riser connector DMI: PCIe link x4 to PCH Type: CPU2 native PCIe Gen4 Port PE0 ABCD: x16 PCIe link to OCP 3.0 connector Port PE1 CD: x8 PCIe link to sliver connector Port PE2 AB: x8 PCIe link to sliver connector Port PE2 CD: x8 PCIe link to sliver connector Port PE3 AB: x8 PCIe link to sliver riser connector Type: PCH PCIe link x1 to BMC PCIe link x4 to M.2 connector

Front Side IO	<p>One USB 3.0 port</p> <p>One USB 2.0 port on front IO board</p> <p>One VGA port (D-sub)</p> <p>One RJ45</p> <p>Power button with LED include identification function</p> <p>Reset button</p> <p>UID button with LED</p>
Network	LOM: No
Video	ASPEED AST2500 16MB DDR4 video memory
Fan	2U Fans: Four pluggable 8038 fans
ACPI	ACPI compliance, S0, S5 support. (* No S1 and S3 supports)
Power-Supply	1600 Watts AC to DC power supply
TPM	TPM 2.0
2U PCIe Expansion	<p>Option#1</p> <ul style="list-style-type: none"> (1) Two OCP 3.0 slots PCIe x16 (2) Two Riser card connectivity <ul style="list-style-type: none"> (1) Two PCIe x16 normal card-edge connectors for two x16 electrical (2) One PCIe x8 normal card-edge connectors (3) Six U.2/PCIe connectors (4) One M.2 connector <p>Option#2</p> <ul style="list-style-type: none"> (1) Two OCP 3.0 slots PCIe x16 (2) Two Riser card connectivity <ul style="list-style-type: none"> (1) Two PCIe x16 normal card-edge connectors for one x16, one x8 electrical (2) One PCIe x8 normal card-edge connectors (3) Eight EDSFF E1.S connectors (4) One M.2 connector
Environmental	<p>Operating temperature: -5°C to 55°C</p> <p>Non-operating temperature -40°C to 70°C</p> <p>Operating relative humidity 10% to 90% RH</p> <p>Non-operating relative humidity 5% to 95%RH</p>

3.1 Server Board Block Diagram

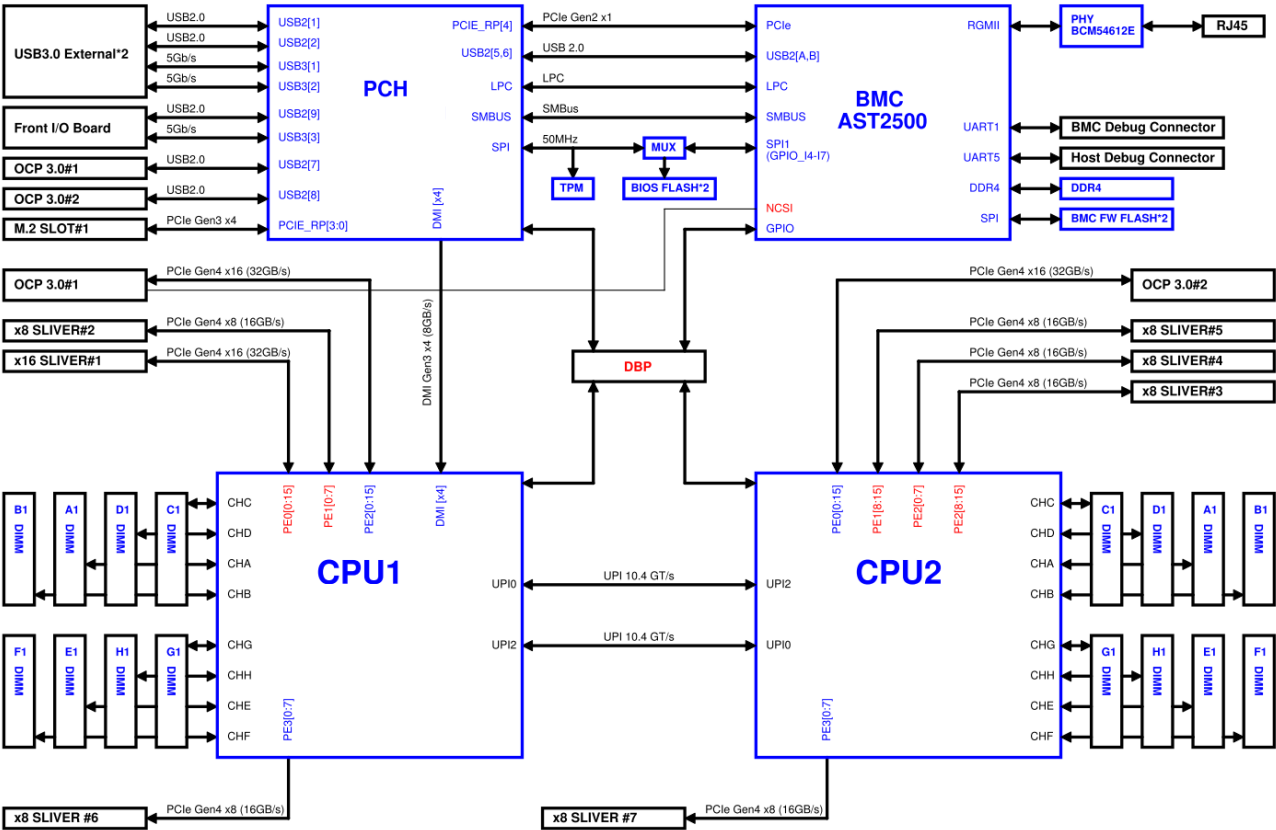


Figure 1: Server Board Block Diagram

3.2 Server Board

3.2.1 Server Board Placement

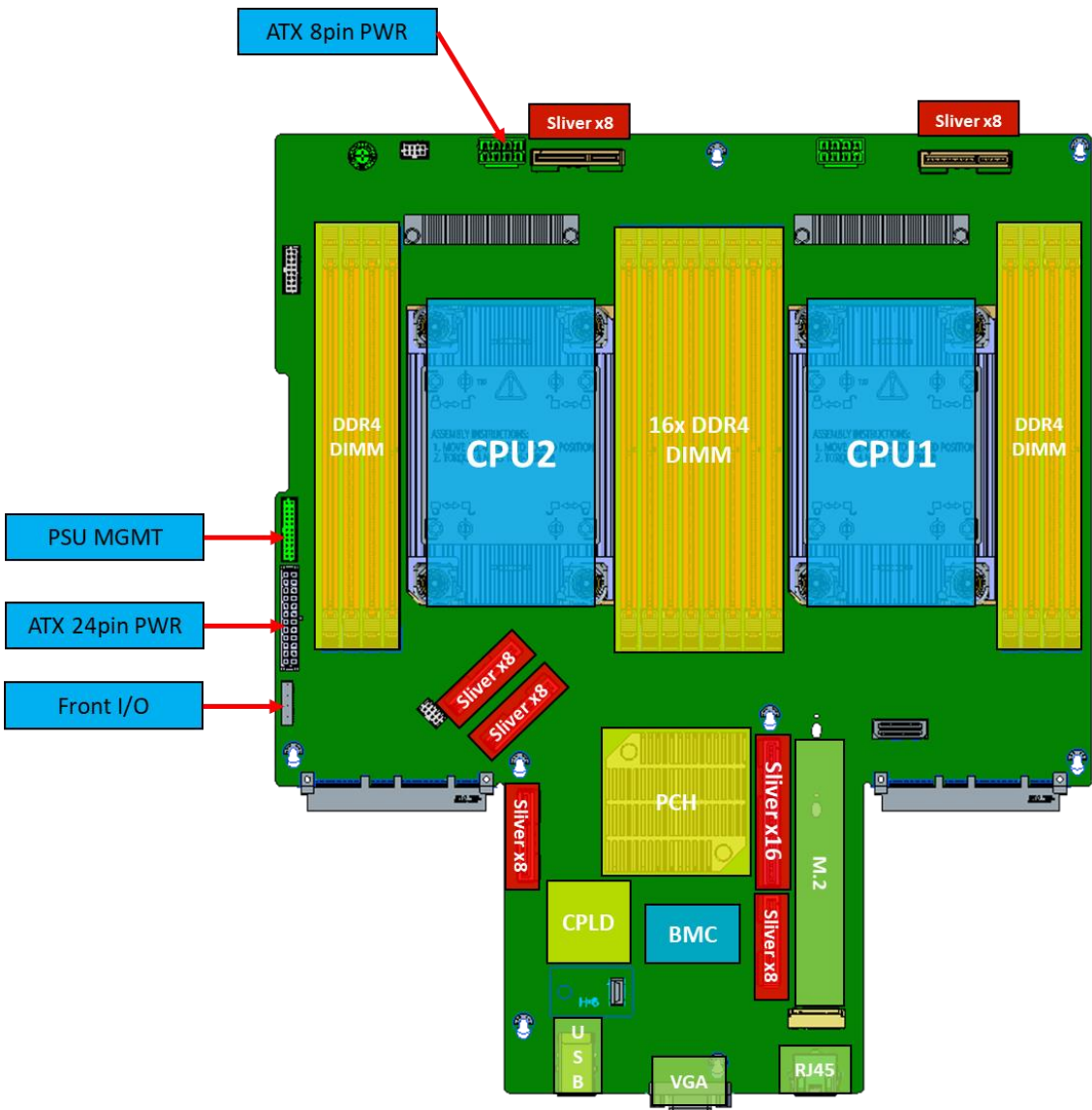


Figure 2: Server Board Placement

3.2.2 Server Board Dimensions

Server Board dimensions are 309.8mm (W) x 363.6mm (L).

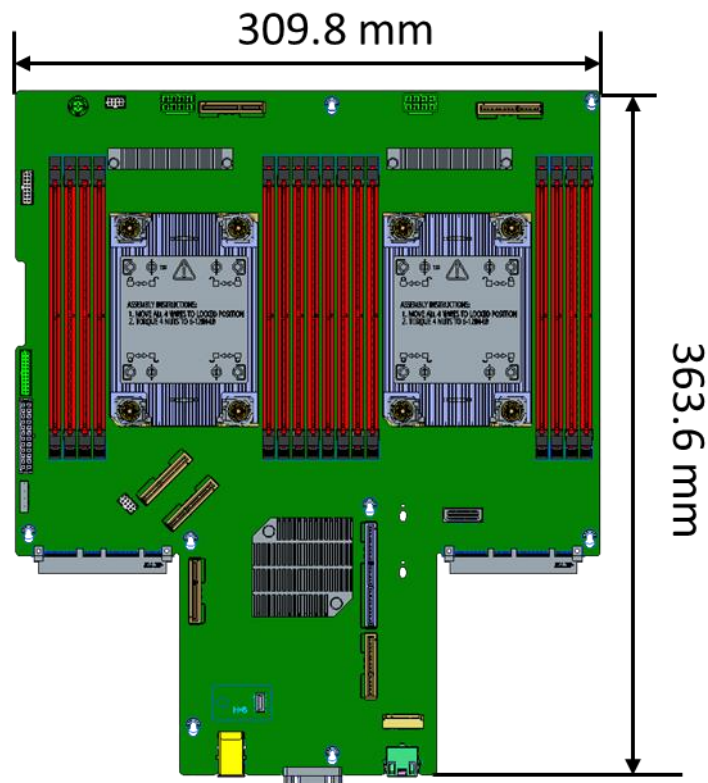


Figure 3: Server Board Dimensions

3.2.3 Processor

ES200 leverage 3rd Gen Intel Xeon scalable processor which is the next generation of 64-bit, multi-core server processor.

3.2.4 PCH

ES200 leverage the PCH which is the same one used in the Intel Skylake or Cascade Lake processors with a refresh version.

3.2.5 Memory

ES200 server board design supports eight DIMM slots per processor. Part of the DIMM slots also supports Intel DCPMM. Here is the population table for a processor.

	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
Config1	DRAM	DRAM/DCPMM	DRAM	DRAM	DRAM	DRAM	DRAM	DRAM

The DIMM identifiers on the silkscreen is indexed from J1 to J16 in ES200 server board DCPMM can only be populated on J2 and J10 locations (please refer to the following picture).he J6 and J14, must be depopulated with any DIMM, when J2 and J10 are populated with DCPMM.

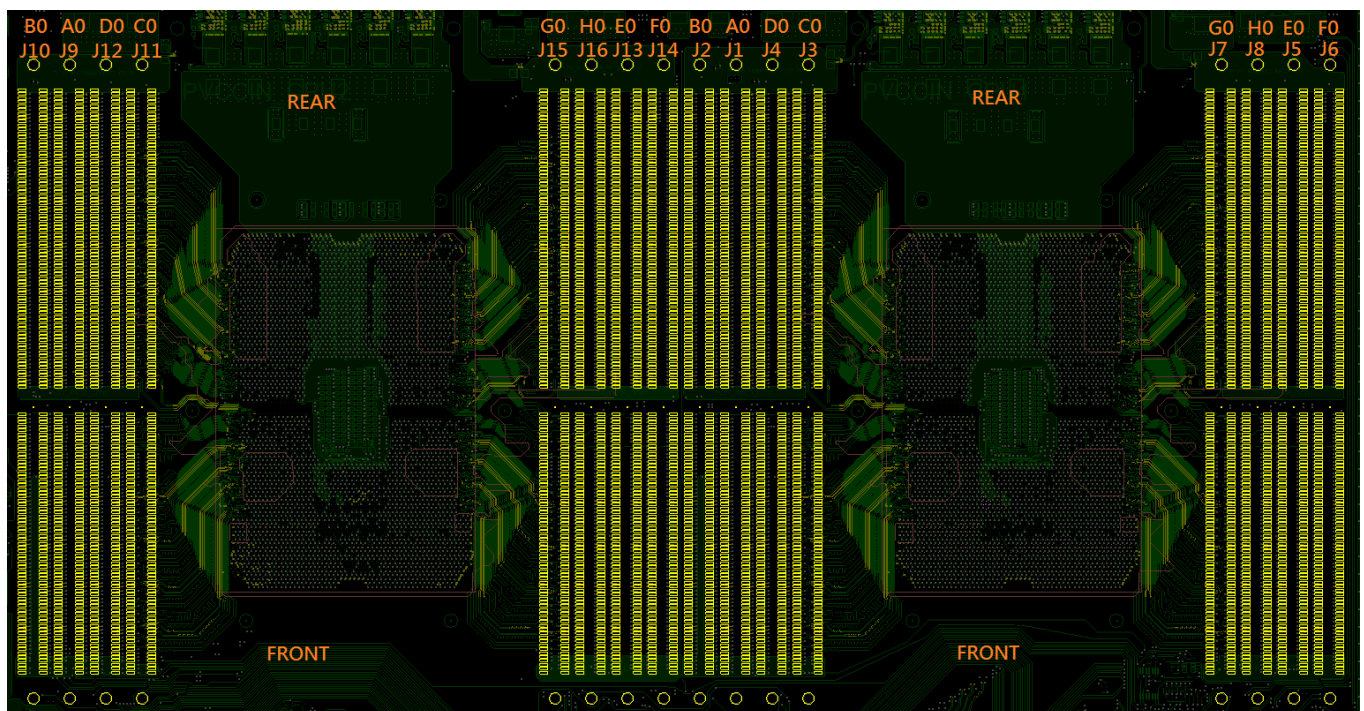


Figure 4: Server Board DDR Physical Slots

3.2.6 PCIE Lanes

CPU1 PCIE Port0

CPU1 PCIE P0 ABCD PCIE x 16 lanes are connecting to 140-pin riser slot

CPU1 PCIE Port1

CPU1 PCIE P1 AB PCIE x 8 lanes are connecting to 84-pin riser slot.

CPU1 PCIE Port2

CPU1 PCIE P2 ABCD PCIE x 16 lanes are connecting to OCP 3.0 connector.

CPU1 PCIE Port3

CPU1 PCIE P3 AB PCIE x 8 lanes are connecting to 84-pin sliver connector.

CPU2 PCIE Port0

CPU2 PCIE P0 ABCD PCIE x 16 lanes are connecting to OCP 3.0 connector.

CPU2 PCIE Port1

CPU2 PCIE P1 CD PCIE x 8 lanes are connecting to 84-pin sliver connector.

CPU2 PCIE Port2

CPU2 PCIE P2 AB PCIE x 8 lanes are connecting to 84-pin sliver connector.

CPU2 PCIE Port2

CPU2 PCIE P2 CD PCIE x 8 lanes are connecting to 84-pin sliver connector.

CPU2 PCIE Port3

CPU1 PCIE P3 AB PCIE x 8 lanes are connecting to 84-pin sliver connector.

3.2.7 SATA

There is no SATA port support in ES200 edge server.

3.2.8 USB

The ES200 Edge Server USB port distribution is as follows:

- ASPEED BMC AST2500 consumes two USB 2.0 ports (one 1.1 and one 2.0)
- Two USB3.0 ports in front side
- One USB 2.0 port in the front IO board

The USB ports on the products are not required to be powered from STBY.

3.2.9 AST2500

The Server's Board Management Controller (**AST2500**) is a highly integrated single-chip solution, integrating several devices typically found on servers.

VGA Display Controller

- Fully IBM VGA compliant
- Maximum Display resolution: 1920x1200 32bpp@60Hz (reduced blanking)
- Support widescreen resolutions:
 - WXGA : 1280x800 32/16bpp @60Hz
 - WXGA+ : 1440x900 32/16bpp @60Hz
 - WSXGA+ : 1680x1050 32/16bpp @60Hz
 - FullHD+ : 1920x1080 32/16bpp @60Hz

DDR3L/DDR4 SDRAM Controller

- Support external 16-bit DDR3L/DDR4 SDRAM data bus width
- Maximum memory clock frequency
 - DDR3L: 800MHz (DDR3-1600)
 - DDR4: 800MHz (DDR4-1600)

GPIO Controller

- Directly connected to APB bus
- Support up to 228 GPIO pins, which are 29 sets
- Each GPIO set can be programmed to accept command from ARM, LPC(SIO), or Coprocessor.
- Programmable output mode: Push-Pull or Open-Drain
- Some GPIOs support Schmitt type input buffer for noise immunity
- 4 out of the 228 GPIO pins are with 16mA driving strength, others are 8mA driving strength
- 16 out of the 228 GPIO pins can support 1.8V mode.
- Support 8 sets of GPIO pass through (1 GPIO IN -- > 1 GPIO OUT) pin with internal switch control that is useful for some button function control.

3.2.10 TPM

In ES200 Edge Server the PCH supports TPM specification 2.0 implemented with a TPM header on the server board. It supports SPI interface TPM 2.0 module.

3.2.11 UART

ES200 Edge Server provides Host and BMC UART interfaces for development purpose.

3.2.12 Power connector for Accelerator Card

ES200 Edge Server can support two FHFL DW accelerator cards. The accelerator card needs external 12V power feed via cable. There is an 8-pin power connector on the PDB (power distribution board) that offers 12V power feed for the accelerator. The power feed capacity of the power connector is 336W (max. current is 28A).

3.2.13 Thermal Design

3.2.13.1 Thermal Solution for 2U System

CPU Heat Sink

- Dimension= $113*78*24.7\text{mm}^3$ (1U) for Full-Length PCIe AIC application,
 $113*78*64\text{mm}^3$ (2U) or Half-Length PCIe AIC application
- Material=Al base + Cu block + Al Fin+ Heat pipe

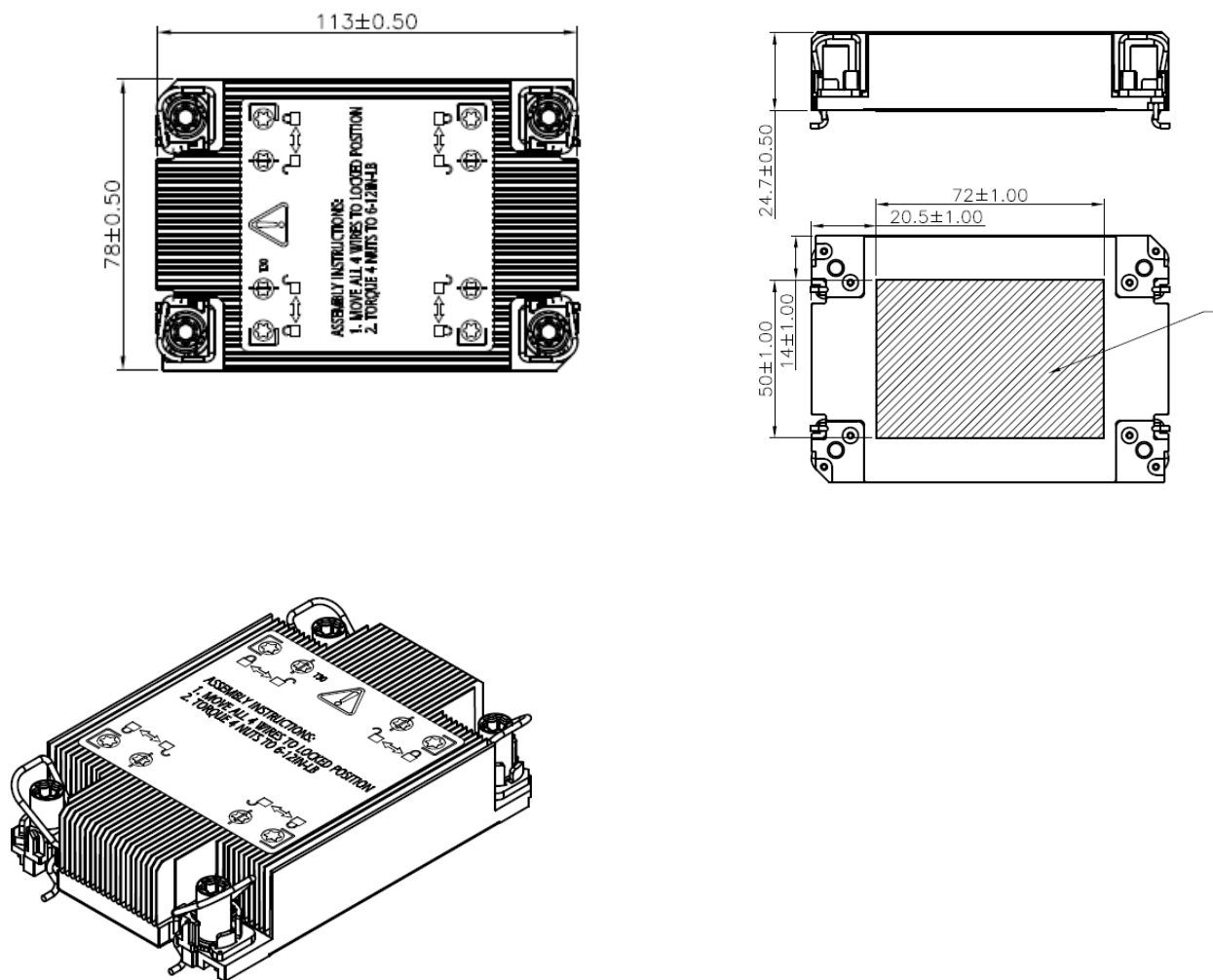


Figure 5: CPU Heat Sink Solution 1

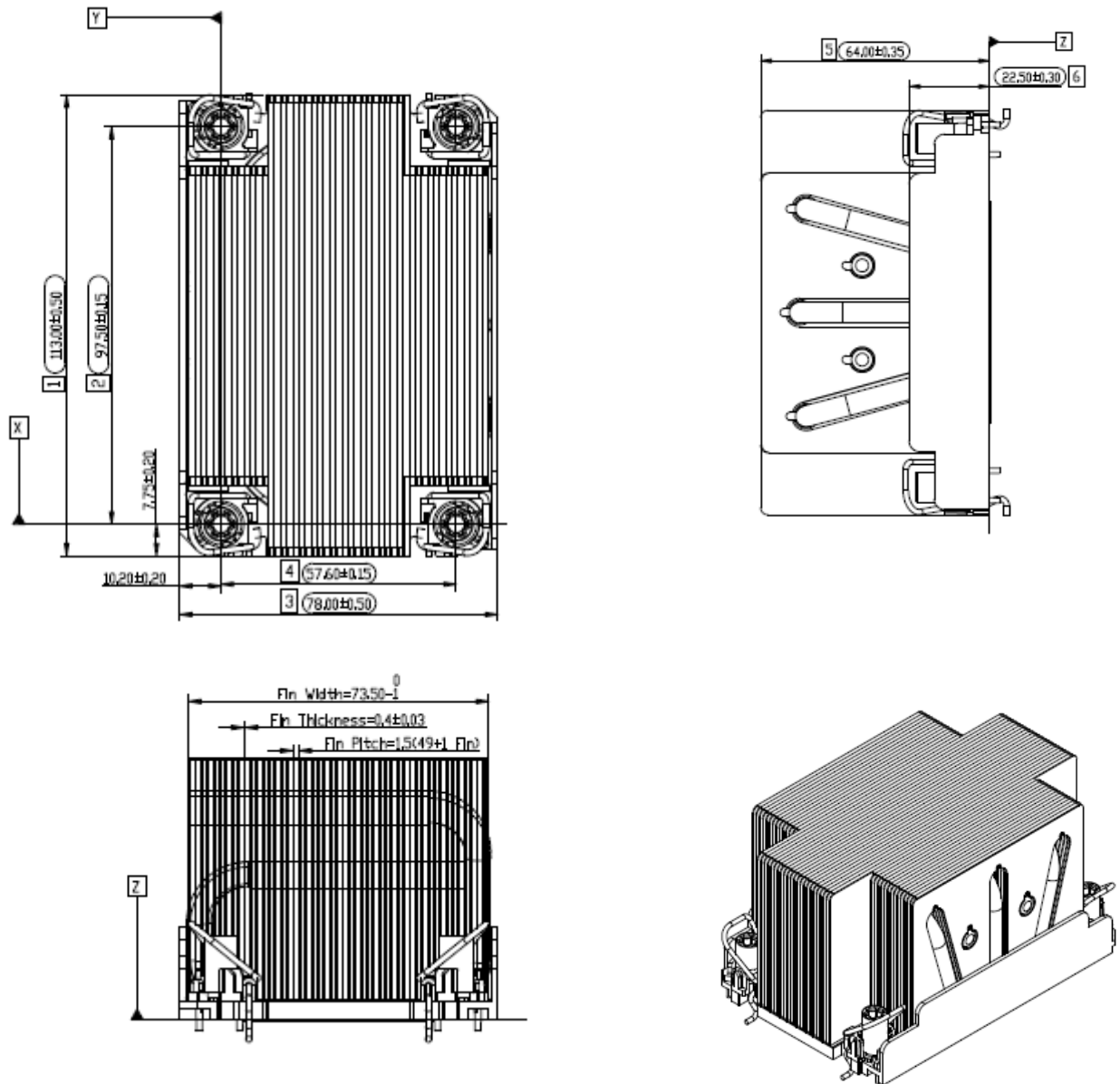


Figure 6: CPU Heat Sink Solution 2

Fan x4

- Dimensions=8038 (single rotor)
- Voltage=12 V
- PWM Frequency= 25 KHz

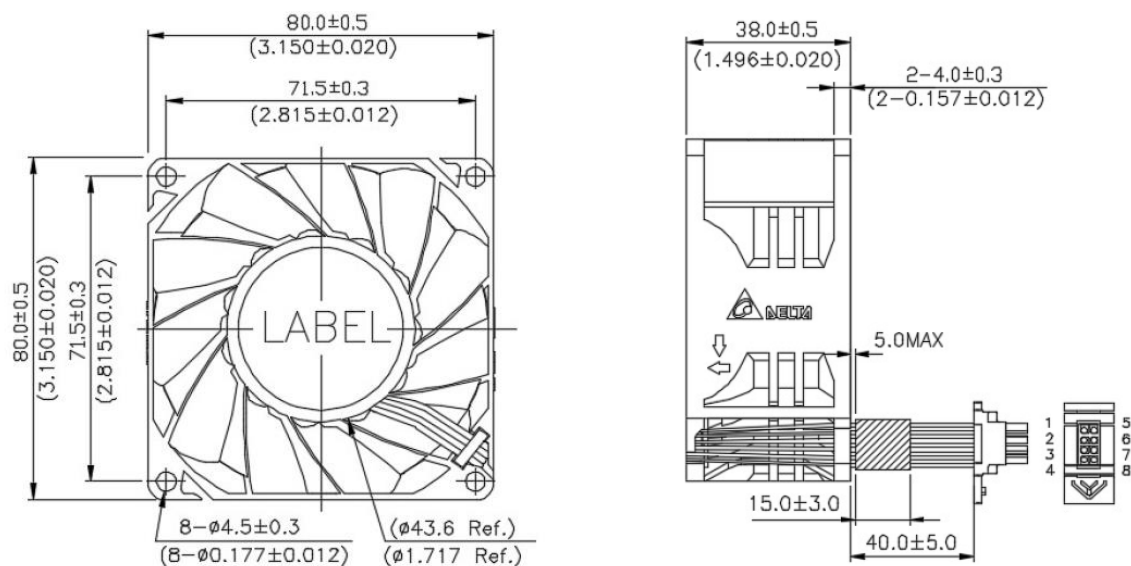


Figure 7: Fan Dimensions

4 Chassis Spec

4.1 2U System Overview

2U chassis can support the following configurations:

PSU

- 1+1 redundant PSU
- AC/DC PSU.

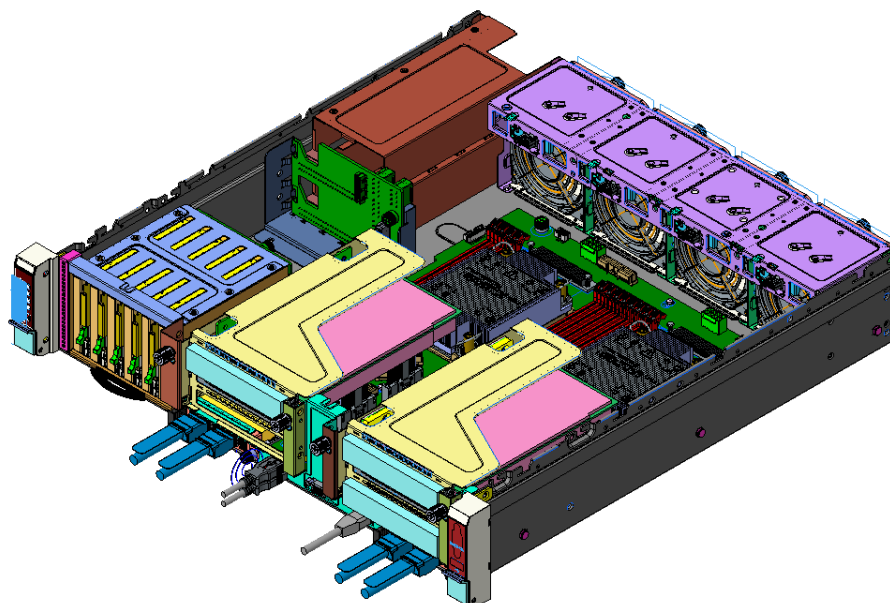


Figure 8: 2U System Overview

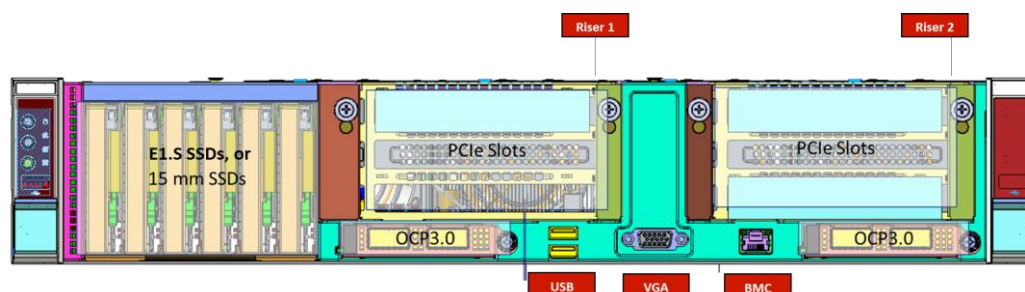


Figure 9: System Front View

4.1.1 2U Chassis Dimensions

2U chassis dimensions are 438mm (W) x 451.1mm (D) x 87 mm (H).

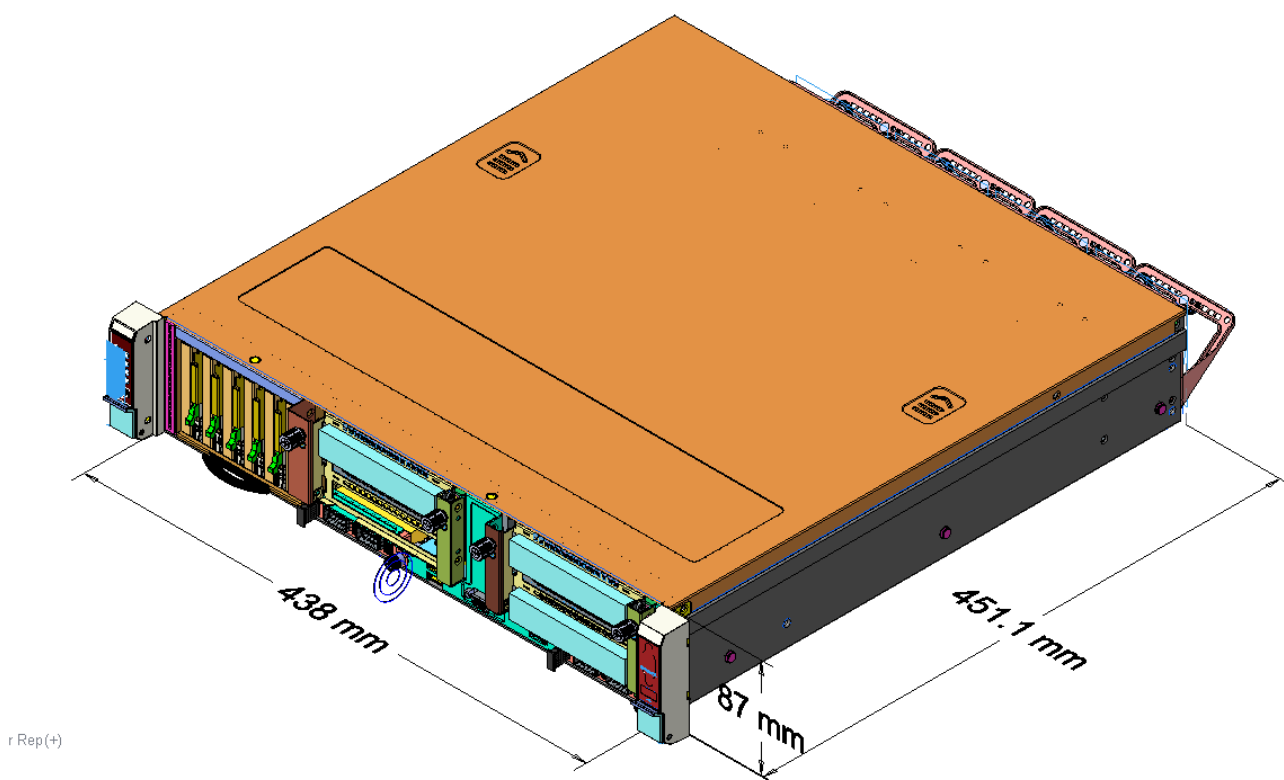


Figure 10: 2U Chassis Dimensions