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Compute Project

Goose Lake 2OU JOB System Specification V0.1

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Goose Lake team

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Page 1 of 1

2: Scope

This document describes the technical specifications used in the design of the storage unit for the Open Compute Project, known as the Goose Lake.

3: Overview

The Goose Lake is a 2OU 21-inch rack-mount 34-drive JBOD designed for high-density, high-reliability storage applications JBOD implements a tool-free maintenance drive design that allows the drive to be installed or removed while the system is running

and simplifies maintenance and maintenance. The system is divided into 2 trays, each tray can be installed with 17HDD drives, and contains its own cable management arm, each tray does not affect each other independently, when you pull out the drive tray into the drive will expand, when you push the drive skateboard Fold it back when you return. The fan is mounted on the rear of the JBOD chassis and features a dual-rotor fan for easy fan maintenance and system reliability. The chassis is powered by a shared 12 VDC power system. All data cables can be operated from the front of the chassis and There are bus bar clips to the Open Rack bus bars so that the 12.5V main power from the Open Rack can feed into the Goose Lake enclosure.

Figure 1 and Figure 2 show an overview of the Goose Lake storage unit.

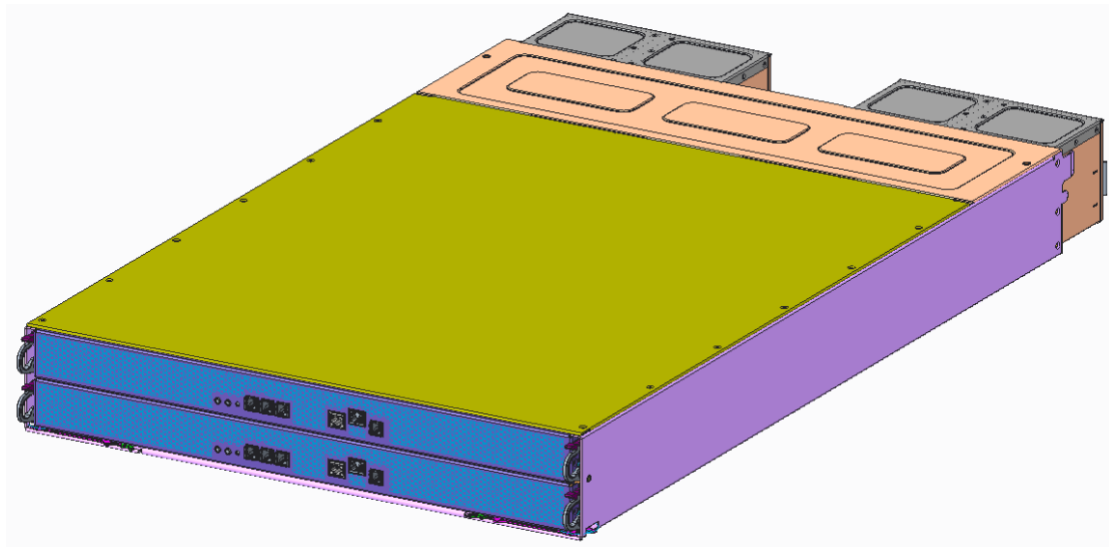


Figure 1 Goose Lake Storage Unit Overview

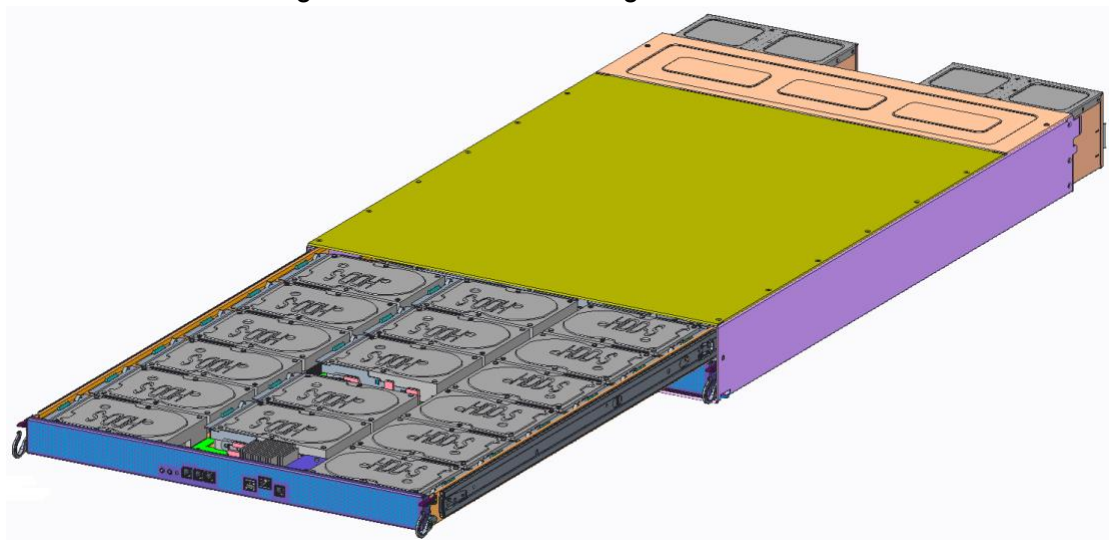


Figure 2 Goose Lake Detail Showing the Hinged Disk Drive Tray

3.1 Goose Lake Front View

The equipment accessible from the front of the Goose Lake, as shown in Figure 3,

includes:

- ✓ Two HDD trays
- ✓ Two SAS expander boards, one for each tray
- ✓ Up to four external mini-SAS connectors
- ✓ One power button/LED
- ✓ One system health LED
- ✓ One UID LED
- ✓ One RJ45 port for expander management, one on each tray
- ✓ One RJ45 port for UART, one on each tray



Figure 3 Goose Lake Front View

3.2 Goose Lake Rear View

The equipment accessible from the rear of the Goose Lake, as shown in Figure 4, includes:

- ✓ One pair of bus bar clips
- ✓ four fan modules
- ✓ One RJ45 for BMC management

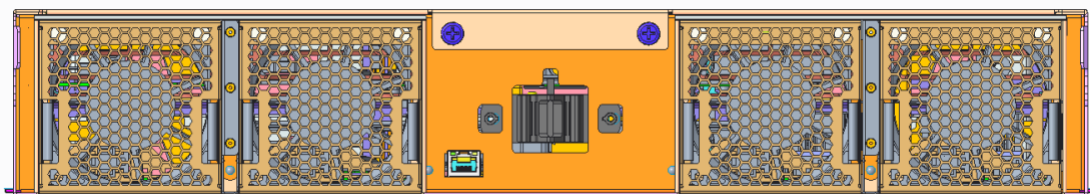


Figure 4 Goose Lake Rear View

3.3 System Component Layout

Figure 5 shows the layout from overhead of the Open Vault's major system components.

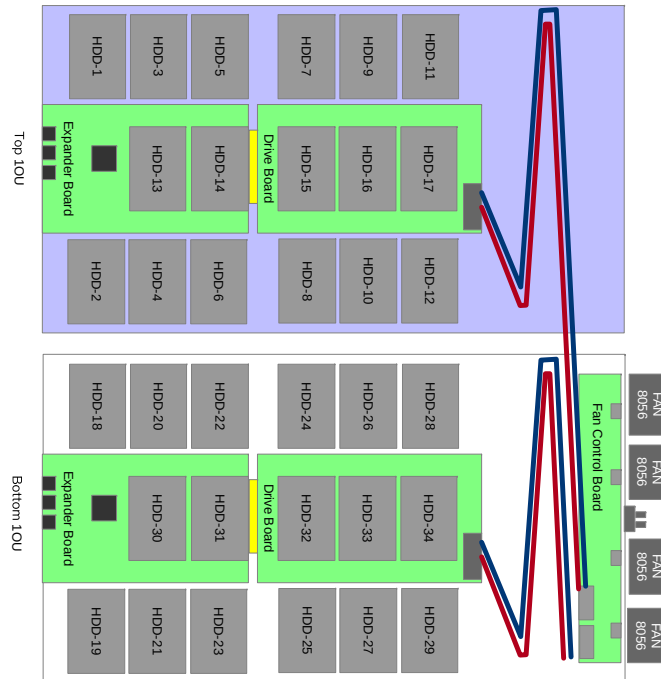


Figure 5 shows the System Component Layout

3.4 System Block Diagram

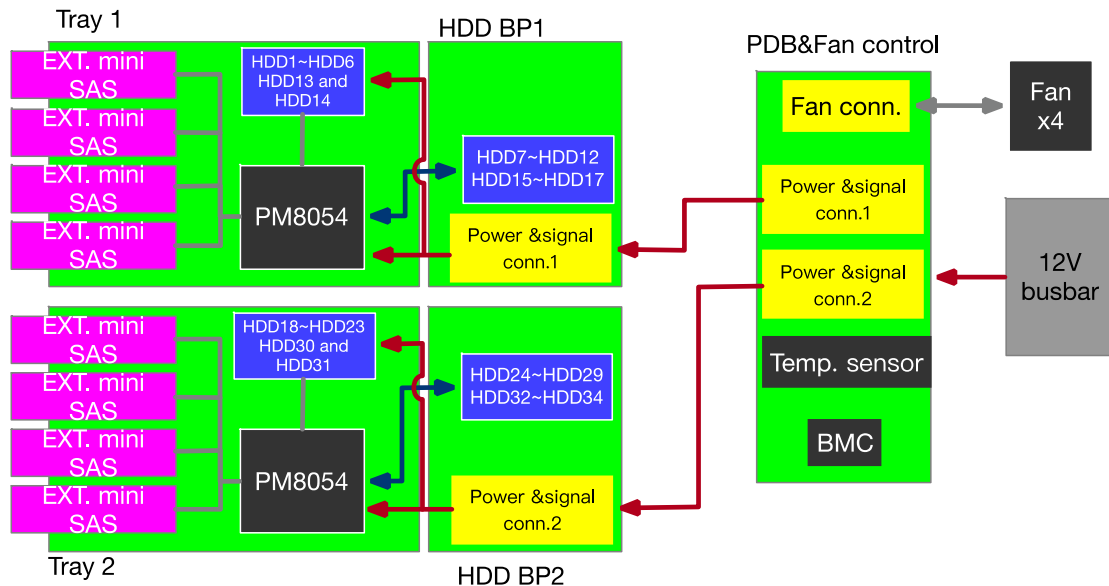


Figure 6 System Block Diagram

Figure 6 shows the system block diagram for the Goose Lake, mainly addressing SAS data paths. Each SAS expander board has: Four external mini-SAS port to the host RAID or HBA card Using external mini-SAS cable.

3.5 System I2C Topology

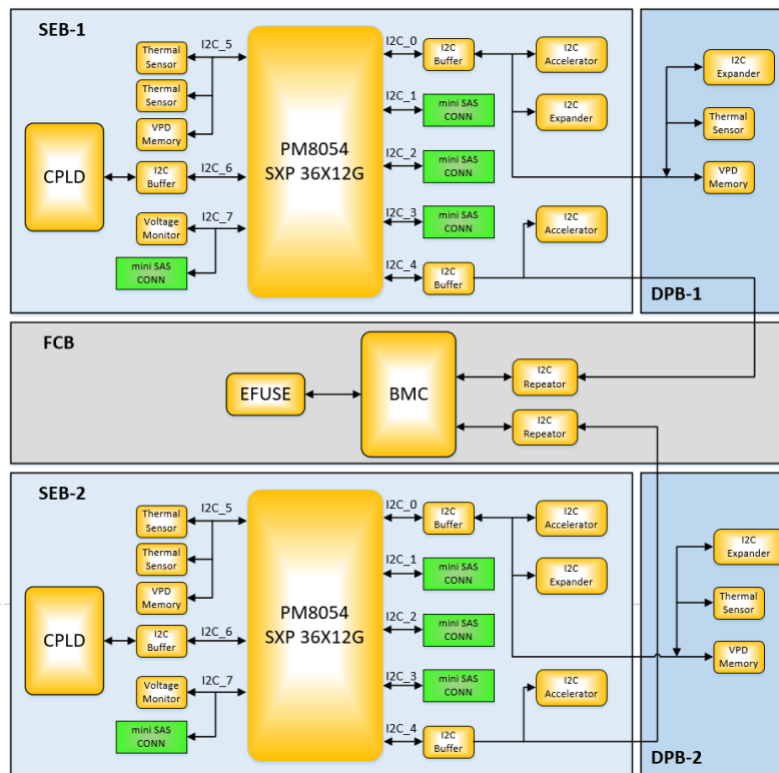


Figure 7 System I2C Topology

4: Goose Lake SAS Expander Board

4.1 Functionals Block Diagram

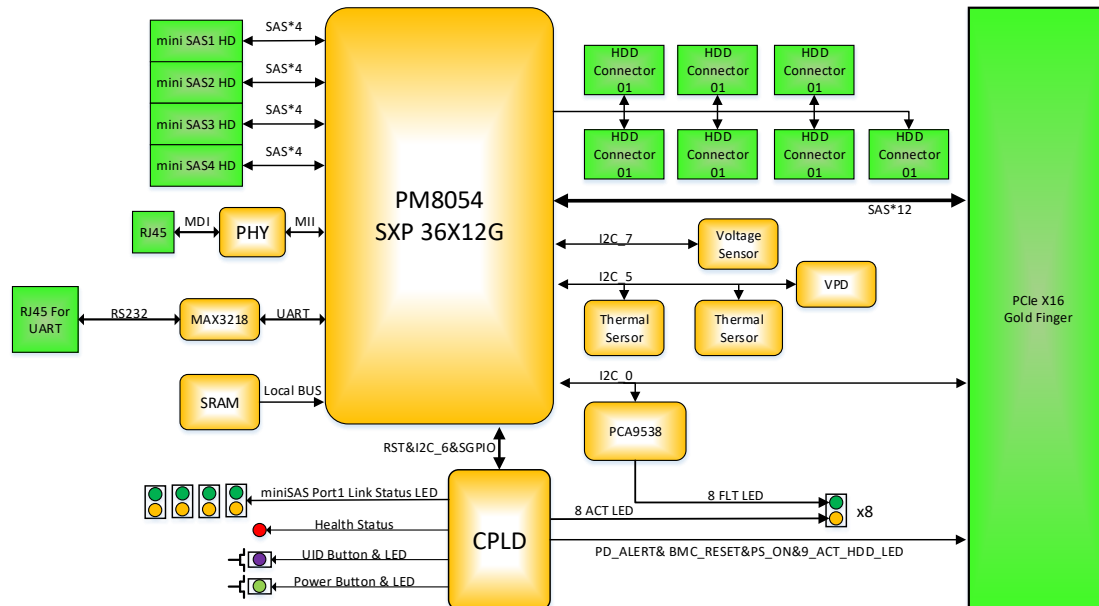


Figure 8 Expander Board Block Diagram

4.2: Tray Placement and Form Factor

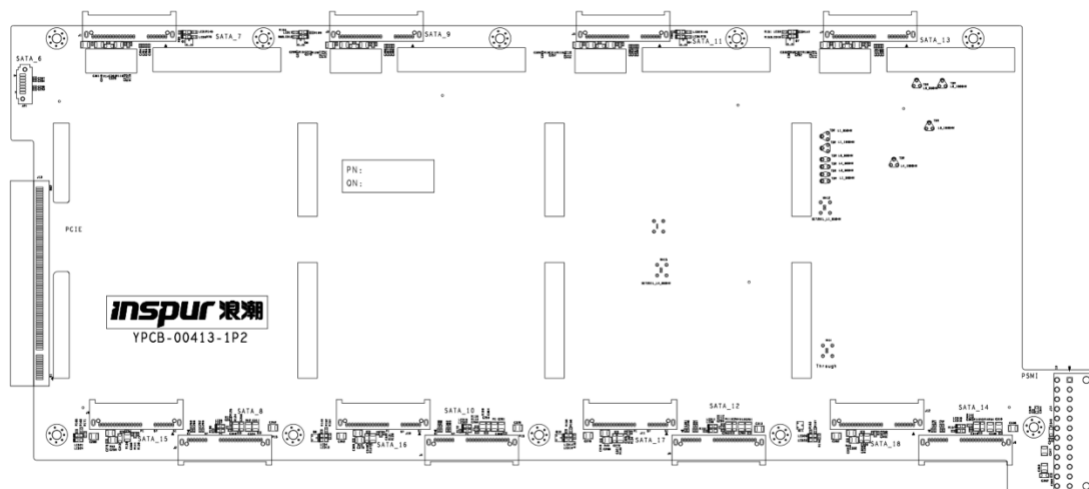


Figure 9 HDD BP Placement

4.3: SAS Expander IC

The Goose Lake SAS expander board contains a single 12G SAS expander IC, part number PM8054B-F3GI. In normal mode of operation, it operates as a 36-port SAS3 expander.

4.4: Voltage Monitor

4.5: Connectors

4.5.1: Signal and Power Connector to Drive Plan Board

The Goose Lake SAS expander board is designed as a field replaceable unit that interfaces to the drive plane board through an OCP-defined pin-out. The drive plane board-side connector is a standard straddle-type PCI-e connector which mated with 1mm pitch gold finger on the SAS expander board side. The design is capable for 12G SAS signals.

4.5.2: External Mini-SAS Connector

Pin	Assignment	Pin	Assignment
A1	NC	C1	I2C_SCL
A2	INT_HDS1_R_L	C2	I2C_SDA
A3	GND	C3	GND
A4	RX1P	C4	TX1P
A5	RX1N	C5	TX1N
A6	GND	C6	GND
A7	RX3P	C7	TX3P
A8	RX3N	C8	TX3N
A9	GND	C9	GND
B1	P3V3_HDS_ACT	D1	P3V3_HDS_ACT
B2	MODPRS_HDS1_R_L	D2	P3V3_HDS1_MAN
B3	GND	D3	GND
B4	RX0P	D4	TX0P
B5	RX0N	D5	TX0N
B6	GND	D6	GND
B7	RX4P	D7	TX4P
B8	RX4N	D8	TX4N
B9	GND	D9	GND

4.5.3: Debug Connector

The SAS expander board includes a debug header on the front side. It's a RJ45 connector but transmitting RS232 signals. Its part number is 4405-00003 from MOLEX.

Pin	Description	Pin	Description
1	TX1	6	RX1
2	NC	7	NC
3	TX2	8	RX2
4	GND	9	GND
5	GND	10	GND

4.5.4: PHY Card Connector

There is a high speed connector to transmitting standard MII signals on SAS expander board. It interfaces with a PHY card. Its part number is QTE-020-05-L-D-A-K from SAMTEC INC.

Pin	Description	Pin	Description
1	1.8VDC	21	NC
2	PHY MI CLK	22	FHY_INTRP_OUT_L
3	1.8VDC	23	NC
4	MII TXD3	24	MII RXD0
5	1.8VDC	25	GND
6	MII TXD2	26	MII RXD1
7	1.8VDC	27	GND
8	MII TXD1	28	MII RXD2
9	NC	29	GND
10	MII TXD0	30	MII RXD3
11	NC	31	GND
12	TX CLK	32	RX_DV
13	3.3VDC	33	GND
14	TX ENABLE	34	RX CLK
15	3.3VDC	35	GND
16	PHY CRS	36	RESET
17	3.3VDC	37	GND
18	NC	38	COL
19	3.3VDC	39	GND
20	RX ERROR	40	MI DATA

4.6: LEDs

LED	COLO	LOCATION	STATUS
-----	------	----------	--------

	R		
Power BTN LED,	GREEN	SW3	After press, Power on OK, Turn on
UID BTN LED	BLUE	SW2	After press, Turn on Double press, Turn off
System FAULT LED	RED	LED3	When system error occur, turn on
MIPS Ready LED	Green	LED5	When PM8504 is Ready, blinking.
CPLD Status LED	Green	LED13	When CPLD configuration is done, turn on
MINISAS HD CONN ACT LED	Green,	LED30,LED31,LED32, LED34	When upstream SAS/SATA plug in, Turn ON. When SAS/SATA Active, Blinking
MINISAS HD CONN FAULT LED	Yellow	LED27,LED28,LED29, LED33	When Upstream SAS/SATA error occur, Turn ON
HDD ACT LED	Green	LED4,LED6,LED10, LED12,LED18, LED21,LED23,LED25	When SAS/SATA plug in, Turn ON. When SAS/SATA Active, blinking.
HDD FAULT LED:	Yellow	LED11,LED16,LED17, LED19,LED20,LED22,LED24, LED26,	When HDD error occur, Turn ON.

4.7: PCB Stack-up

Material: NP-175FM (High Tg)

Layer name	Plane Description	Material	Layer Thickness (mil)		copper weight(oz)	Dielectric Er
			On pp	On trace		
smask	solder mask	Solder Mask	0.8	0.5	NA	3.8
signal	signal	Copper	1.9		0.5+plating	NA
	PP	NP-175FM	5.5		NA	4.00
gnd/power	gnd	Copper	1.3		1.0	NA
	core	NP-175FM	6		NA	4.10
signal	signal/gnd/pwr	Copper	1.3		1.0	NA
	PP	NP-175FM	30		NA	4.00
signal	signal/gnd/pwr	Copper	1.3		1.0	NA
	core	NP-175FM	6		NA	4.10
gnd/power	gnd	Copper	1.3		1.0	NA
	PP	NP-175FM	5.5		NA	4.00
signal	signal	Copper	1.9		0.5+plating	NA
smask	solder mask	Solder Mask	0.8	0.5	NA	3.8

Trace Impedance (Outer layer)					NetName
Target	Line(mils)	Space(mils)	Line pair Space(mils)	Simulation(ohms)	
50Ω+/-10% -single	10.5	NA	15	49.90	Misc IO/Flash
50Ω+/-10% -single	10.5	NA	20	49.90	I2C
87Ω+/-10%- diff	7.5	4.5	39(7h)	87.40	PCIE Breakout
85Ω+/-10%- diff	9.6	6.9	50(9h)	84.78	PCIE Normal
100Ω+/-10%- diff	6.5	5.5	60(11h)	99.87	SATA/SAS

Trace Impedance (Inner layer L3/L4)					NetName
Target	Line(mils)	Space(mils)	Line pair Space(mils)	Simulation(ohms)	
50Ω+/-10% -single	8.0	NA	15	50.20	Misc IO/Flash
50Ω+/-10% -single	8.0	NA	20	50.20	I2C
85Ω+/-10%- diff	6.0	5	24(4h)	83.99	PCIE Breakout
85Ω+/-10%- diff	8.0	8.5	36(6h)	84.91	PCIE Normal
100Ω+/-10%- diff	6.0	11.0	50(8h)	99.83	SATA/SAS

5: Goose Lake Driver Plane Board

5.1: Functional Block Diagram

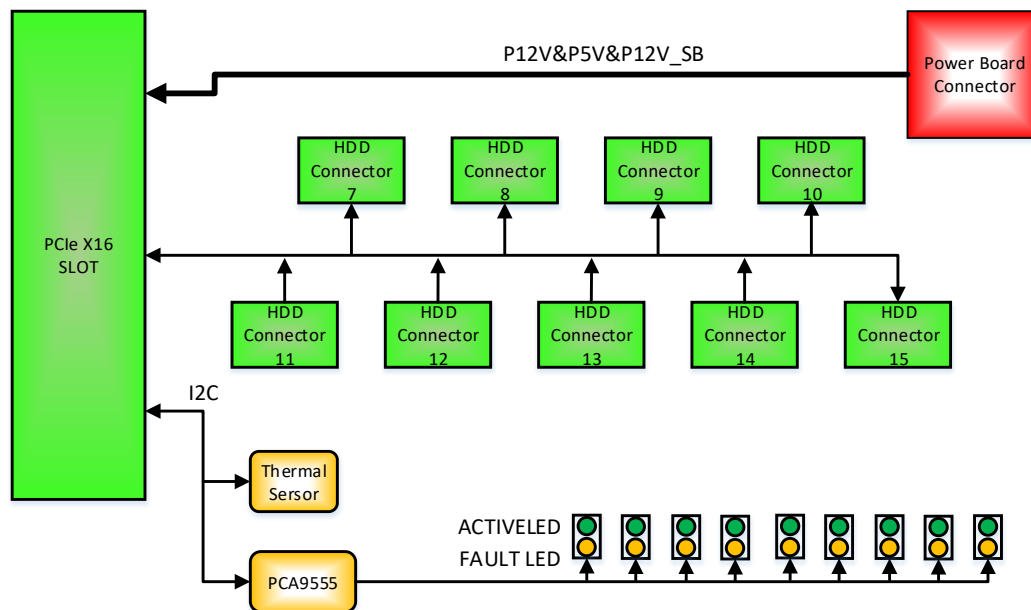


Figure 10 HDD BP Block Diagram

5.2: DPB Placement and Form Factor

The DPB form factor is 406mm x 349mm. Figure illustrates the board placement

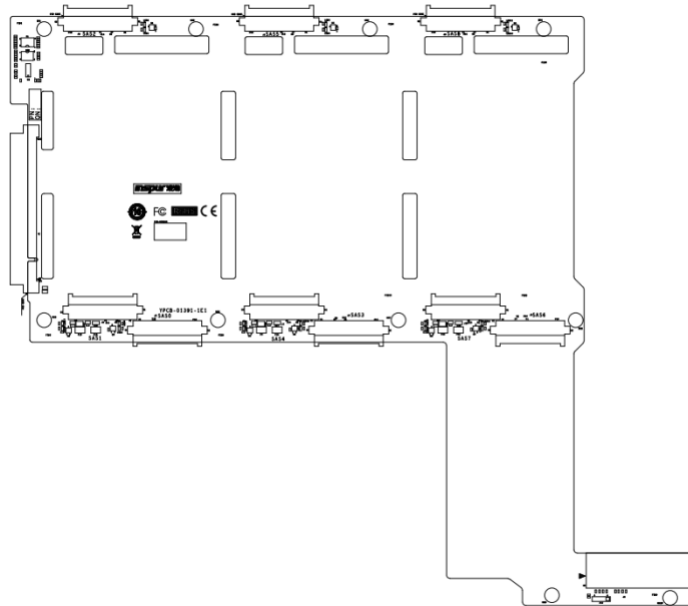


Figure 10 HDD BP Placement

5.3: DPB HDD Port Mapping

The Figure11 illustrates the Port Mapping

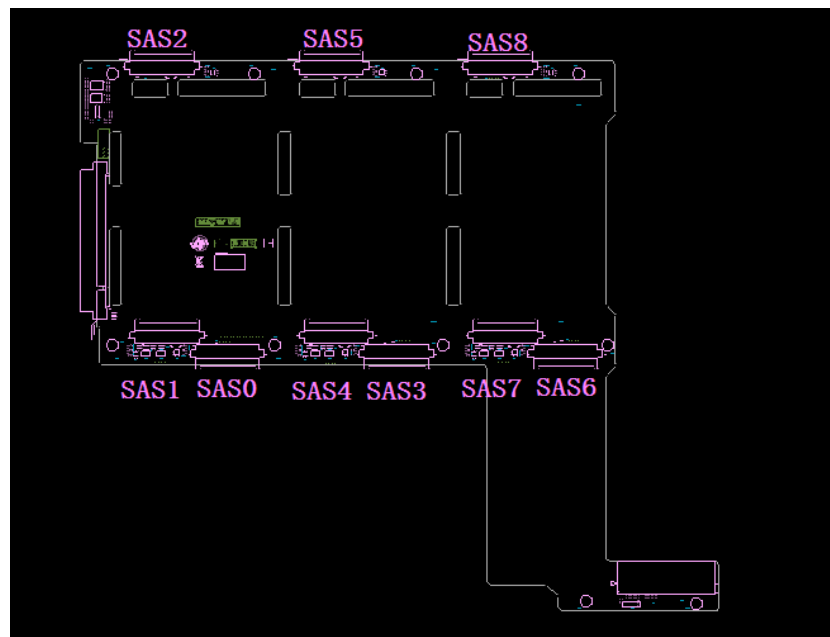
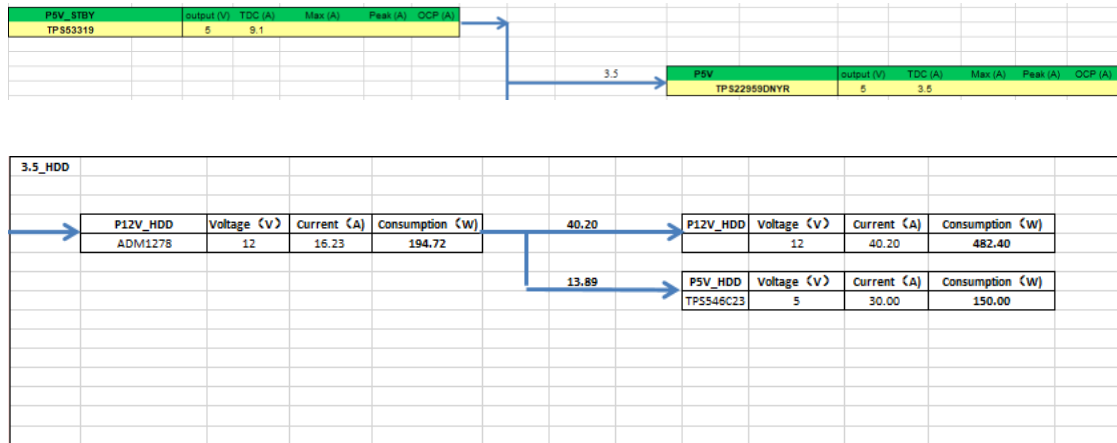


Figure 11 HDD Port Mapping

5.4: 12.5V to 5V Buck Converter

The Goose Lake separate 5V voltage to P5V and P5V_HDD, P5V use for MB and P5V_HDD use for HDD backplane, the detail convert topology as below:



5.5: Disk Drive Power Control

Both 12V and 5V power rail to each disk driver are separated from the main power rail through fuse.

1. Voltage Monitor-No Monitor.
2. Connectors and Cables

5.6: SAS HDD Connectors

The Goose Lake drive plane board supports hot plugging of hard disk drives using a blind mate, standard SAS interface, right-angle connectors (an SMT connector form MOLEX, part number 1510020001). The mating height is 6.00mm according to the Goose Lake HDD tray design.

Pin	Assignment	Pin	Assignment
P1	3.3V_Precharge	S1	GND
P2	3.3V	S2	Tx1P
P3	3.3V	S3	Tx1N
P4	GND	S4	GND
P5	GND	S5	Rx1P
P6	GND	S6	Rx1N
P7	5V_Precharge	S7	GND
P8	5V	S8	GND
P9	5V	S9	Tx2P
P10	GND	S10	Tx2N

P11	REYLED	S11	GND
P12	GND	S12	Rx2N
P13	12V_Precharge	S13	Rx2P
P14	12V	S14	GND
P15	12V		

5.7: LEDs

On the drive plane board, each hard disk drive has a pair of LEDs to indicate its active and fault status. The active LEDs are green, which are driven by SAS expander chip. The fault LEDs are yellow which are driven by PCA9555.

LED	COLOR	LOCATION	STATUS
HDD Fault LED	Yellow	LED1, LED3, LED5, LED9, LED11, LED24, LED12, LED14, LED16	When HDD error occur, Turn on
HDD Active LED	Green	LED2, LED4, LED6, LED9, LED11, LED24, LED13, LED15, LED17	When SAS/SATA active, Blinking

5.8: PCB Stack-up

Layer	Plane Description		Copper Weight (oz)	Thickness (mil)	Dielectric (er)
		Solder Mask		0.6	3.75
L1	TOP	Signal	0.5 + 1.0	1.9	
		PrePreg		3.96	3.84
L2	GND1	Ground	1.0	1.2	
		Core		4	4.23
L3	IN1	Signal	1.0	1.2	
		PrePreg		13.92	3.91
L4	VCC1	Power	1.0	1.2	
		Core		8	4.23
L5	VCC2	Power	1.0	1.2	
		PrePreg		13.92	3.91
L6	IN4	Signal	1.0	1.2	
		Core		4	4.23
L7	GND2	Ground	1.0	1.2	
		PrePreg		3.96	3.84
L8	BOT	Signal	0.5 + 1.0	1.9	
		Solder Mask		0.6	3.75
		Total		63.96	Tolerance: 63+/-6.3mil

Trace Width (mil)	Air Gap Spacing (mil)	Impedance Type	Layer	Impedance Target (ohm)	Tolerance (+/- %)
6.5		Single	1, 8	50	10.0
6.5	5.75	Differential	1, 8	85	10.0
5.0	7.5	Differential	1, 8	100	10.0
4.5		Single	3, 6	50	10.0
5.5	7.5	Differential	3, 6	85	10.0
4.0	9.0	Differential	3, 6	100	10.0

6: Goose Lake Fan Control Board

6.1: Functional Block Diagram

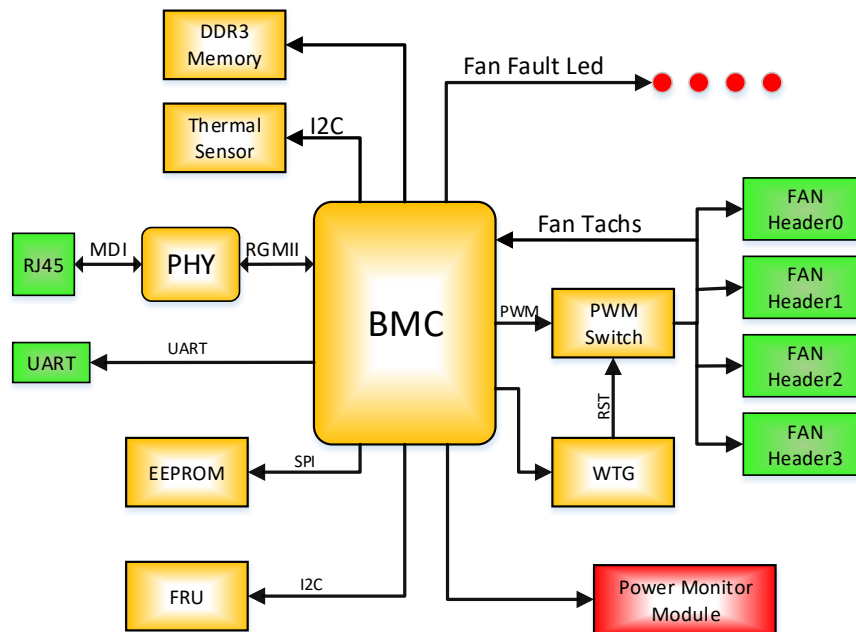


Figure 12 Fan Control Board Block Diagram

6.2: FCB Placement and Form Factor

The Fan Control Board form factor is 500mm x 50mm. Figure13 illustrates the board placement.



Figure 13 Fan Control Board Block Diagram

6.3: Embedded Fan Controller

An embedded Baseboard Management Controller (BMC) worked as fan controller is installed on the fan control board. Its part number is AST1250A1-GP from ASPEED. The main features of this fan controller board are:

- Provides management platform
- Monitors fan tachometer signals;

- Monitors the local temperature of the FCB;
- Monitors the voltage rails on FCB; as Figure 43 shows.

Power Rail	Voltage
P12V_IN	12V
P12V_AUX	12V
P12V_FAN	12V
NODE0_P12V_HDD	12V
NODE1_P12V_HDD	12V
NODE0_P5V_HDD	5V
NODE1_P5V_HDD	5V
P3V3_AUX	3V3
P2V5_AUX	2.5V
P1V5_BMC_AUX	1.5V
P1V26_AUX	1.26V

6.4: Input Power Monitor

There is a Baseboard Management Controller (BMC) supplying power monitoring function worded on the fan control board. It monitors the input current and voltage, reporting input power numbers to the SAS expander chip via I2C interface. It also protects the system from over current, over voltage and under voltage cases. The controller is part number AST1250A1-GP from ASPEED.

6.5: Connectors

6.5.1: Fan Module Connector

Each Goose Lake fan control board is connected to 4 fan modules. Each fan module contains one dual rotor fan. One hot-pluggable right angle 3.00mm pitch connector is used(the pin definition is in Figure). Its part number is 444280640 from Molex.

Pin	Description
1	Fan Present Detect
2	Tachometer 0
3	Tachometer 1
4	12VDC
5	PWM
6	GND

6.5.2: BMC Debug Header

There is a debug header for BMC on fan control board. It is from ARC, its part number is 5P1.221A4-11000.104.

Pin	Description
1	3.3VDC
2	3.3VDC
3	RX
4	TX

6.5.3: WTG Programing Header

There is a Watch Dog Chip on fan control board. When fan controller (BMC) dies, WDC outputs reset signal to a switch chip, then fan works in full speed mode. One online-programing header is used. Its part number is 5P1.221A4-1L200.105 from ARC. When GP0 and GP1 are low, set MCLR from VIL to VIH, WDC works in programing mode. GP0 works as data I/O, and GP1 works as CLK.

Pin	Description
1	GP0
2	GND
3	GP1
4	GP2
5	5VDC
6	MCLR

6.5.4: BMC Management Connector

There is a RJ45 BMC management connector on fan control board. Its part number is JFM3811F-FL01-4F from FOXCONN.

Pin	Description	Pin	Description
1	MD0P	9	MD3P
2	MD0N	10	MD3N
3	MD1P	11	GND
4	MD1N	12	Link up LED control
5	1.8VDC	13	Active LED control
6	1.8VDC	14	3.3VDC
7	MD2P	15	GND
8	MD2N	16	GND

6.5.5: Power and Signal Connector to Drive Plane Board

Pin	Description	Pin	Description
1	BMC reset signal	13	PMBUS
2	Node0 present detect	14	Power enable
3	GND	15	GND
4	BMC I2C SCL	16	PMBUS SCL
5	BMC I2C SDA	17	PMBUS SDA
6	GND	18	GND
7	Node0 P5V HDD	19	GND
8	Node0 P5V HDD	20	GND
9	Node0 P12V HDD	21	GND
10	Node0 P12V HDD	22	GND
11	12VDC	23	GND
12	12VDC	24	GND

6.6: LEDs

The fan control board has four red LEDs on its edge to display the fan module status, one for each fan module. It also has three green LEDs to display BMC module and PHY module status.

Figure

LED	COLOR	LOCATION	STATUS
FAN FAULT LEDs	RED	D10,D11,D12,D13	When FAN error occur, Turn ON.
BMC HEAT BEAT LED	GREEN	LED4	When BMC active, blinking.
LAN ACT LED	GREEN	LAN LEFT	When LAN link up, blinking.
LAN Linkup LED	GREEN	LAN RIGHT	When LAN link up, turn on.

6.7: PCB Stack-up

Layer	Plane Description		Copper Weight (oz)	Thickness (mil)	Dielectric (er)
		Solder Mask		0.6	3.75
L1	TOP	Signal	0.5 + 1.0	1.9	
		PrePreg		3.96	4
L2	GND1	Ground	1.0	1.2	
		Core		4	4
L3	IN1	Signal / Power	1.0	1.2	
		PrePreg		53	4.2
L4	IN2	Signal / Power	1.0	1.2	
		Core		4	4
L5	GND2	Ground	1.0	1.2	
		PrePreg		3.96	4
L6	BOT	Signal	0.5 + 1.0	1.9	
		Solder Mask		0.6	3.75
		Total		78.70	Tolerance: 78.7+/-7.87mil

Trace Width (mil)	Air Gap Spacing (mil)	Impedance Type	Layer	Impedance Target (ohm)	Tolerance (+/- %)
6.0		Single	1, 6	50	10.0
4.75	8.5	Differential	1, 6	100	10.0
5.1		Single	3, 4	50	10.0
4.0	9.0	Differential	3, 4	100	10.0

7: Cable

7.1: Power and Signal Cable

Power and Signal Cable from Fan Control Board (FCB) to Power Transition Board (PTB)

There are 2 power connectors on the FCB which connect to each PTB.

Between the PTB and FCB there are 12 power cables (16 AWG) and 12 signal cables (22 AWG). The cable assembly part number is RWHHW-7602 from Amphenol and LE3WH031-SD-R from Luxshare-ICT.

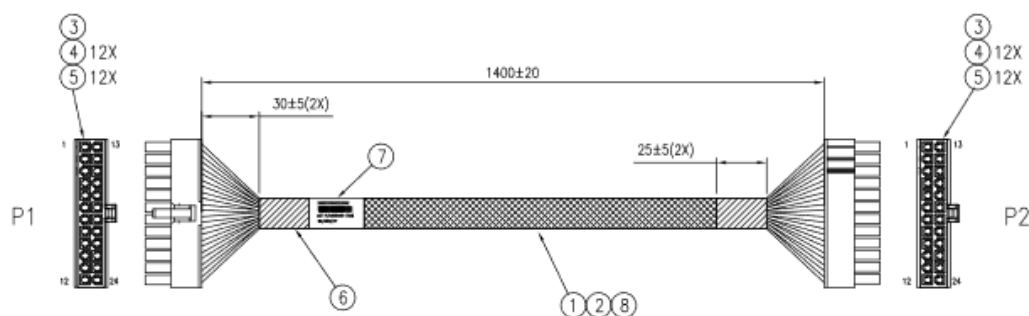


Figure 14 Power and Signal Cable

Power and Signal Cable from FCB to PTB

Pin	Signal Name	Raw Cable
1	BMC RESET	22 AWG
2	PRESENT	22 AWG
3	GND	22 AWG
4	I2C_SCL	22 AWG
5	I2C_SDA	22 AWG
6	GND	22 AWG
7	NODE0_P5V_HDD	16 AWG
8	NODE0_P5V_HDD	16 AWG
9	NODE0_P12V_HDD	16 AWG
10	NODE0_P12V_HDD	16 AWG
11	P12V_STBY	16 AWG
12	P12V_STBY	16 AWG
13	PS_ON	22 AWG
14	ALERT	22 AWG
15	GND	22 AWG
16	PMBUS_SCL	22 AWG
17	PMBUS_SDA	22 AWG
18	GND	22 AWG
19	GND	16 AWG
20	GND	16 AWG
21	GND	16 AWG
22	GND	16 AWG
23	GND	16 AWG
24	GND	16 AWG

Pin-out of Power and Signal Cable from FCB to PTB

7.2: Bus Bar Clips

Bus Bar Clips to Open Rack Bus Bar

The bus bar clip assembly comprises a floating carrier plate which allows for lateral and vertical (X and Y directions as viewed from the cold aisle) misalignment of the chassis and bus bars. This carrier plate is connected to the fan control board (FCB) by a pair of 6AWG cables. The part number of power Clip is 2337275-2 from TE.



Figure 15 Bus Bar Clip

Bus Bar Connects to Fan Control Board

Red	12.5V
Black	GND

Pin-out of Bus Bar Connects to Fan Control Board

8: Goose Lake Power System

8.1: System Power Budget

Power Rail	Vout(V)	CPU0 (A)	CPU1 (A)	MEM (A)	NVDRAM (A)	PCH (A)	BMC (A)	CLK (A)	Misc (A)	PCIe Slot 32X (A)	SATA HDD (A)	M.2 (A)	FAN (A)	ODP A (A)	ODP B (A)	ODP C (A)	USB3.0 (A)
PVCCIN_CPU0	1.8	80															
PVCSA_CPU0	0.85	15															
PVCCIO_CPU0	1	14															
PVCCMCP_CPU0	0.9	62															
PVILMCP_CPU0	1.8	8.5															
PVCCOMCP_CPU0	1.03	20															
PVCCIN_CPU1			80														
PVCSA_CPU1			15														
PVCCIO_CPU1			14														
PVCCMCP_CPU1			62														
PVILMCP_CPU1			8.5														
PVCCOMCP_CPU1			20														
PVDDO_ASC	1.2	16.9		48.98													
PVDDO_DEF	1.2	16.9		48.98													
PVPP_ASC	2.5	0.3		6.6													
PVPP_DEF	2.5	0.3		6.6													
PVTT_ASC	0.6			1.71													
PVTT_DEF	0.6			1.71													
P12V_NVDRAM_ASC	1.2				1.4												
P12V_NVDRAM_DEF	1.2				1.4												
PVDDO_GHU		16.9		48.98													
PVDDO_KUM		16.9		48.98													
PVPP_GHU		0.3		6.6													
PVPP_KUM		0.3		6.6													
PVTT_GHU				1.71													
PVTT_KUM				1.71													
P12V_NVDRAM_GHU					1.4												
P12V_NVDRAM_KUM					1.4												
P12V_STBY														2.4	1.6	2.4	
P5V_STBY									0.5					2.4			2.7
PVIN_PCH_STBY						2	0.5		1.2	1				1.6			
PVIO_PCH_STBY						18											
PVIO_PCH_STBY						12											
PVIL_PCH_STBY						0.8											
P12V_BMC_DDR4							0.5										
PVIO_AUX							1.3										
P2V3_AUX							0.4										
P12V										11	3		18				
P5V									1		2.5						
P2V3								0.7	0.8	6		3		6.4			

8.2: Power Converter Solutions

Power Rail	VOU T	VIN	VR Type	VR QTY/B RD	VR Controller IC and FET	Smbus Address
PVCCIN_CPU0 PVCCIN_CPU1	sVID	P12V_STBY	Switcher	2	Infineon PXM1610C+6Phase TDA21470;5Phase for PVCCIN_CPU;1Phase for PVCCSA	CPU0:0X90 CPU1:0XB0
PVCCSA_CPU0 PVCCSA_CPU1	sVID	P12V_STBY	Switcher	2		
PVCCIO_CPU0 PVCCIO_CPU1	sVID	P12V_STBY	Switcher	2	Infineon PXE110C+1PhaseTDA21470	PVCCIO_CPU0:94 PVCCIO_CPU1:B4

PVMCP_CPU(VRM)	sVID	P12V_STBY	Switcher	1	Infineon PXM1310C+3Phase TDA21470	PVMCP_CPU0:98 PVMCP_CPU1:B8
P1V8_MCP_CPU(VRM)	1.8V	P12V_STBY	Switcher	1	Infineon PXE110C+2 PhaseTDA21470;1Phase for P1V8_MCP,1Phase for PVCCMCP	PXX_MCP_CPU0:C4 PXX_MCP_CPU0:C8
PVCCMCP_CPU(VRM)	sVID	P12V_STBY				
PVDDQ_ABC PVDDQ_DEF PVDDQ_GHJ PVDDQ_KLM	1.2V	P12V_STBY	Switcher	4	Infineon PXM1310C+2Phase TDA21470	PVDDQ_ABC:0X50 PVDDQ_DEF:0X54 PVDDQ_GHJ:0X70 PVDDQ_KLM:0X74
PVTT_DDR_ABC PVTT_DDR_DEF PVTT_DDR_GHJ PVTT_DDR_KLM	1/2* PVD DQ_ xx	PVTT_DDR_ABC PVTT_DDR_DEF PVTT_DDR_GHJ PVTT_DDR_KLM	LDO	4	TPS51200DRCR	
PVPP_DDR_ABC PVPP_DDR_DEF PVPP_DDR_GHJ PVPP_DDR_KLM	2.5V	P12V_STBY	POL	4	TPS53319DQPR	
P12V_STBY	12.5V	P12V_IN	HOT SWAP	1	ADM1278	
P5V_STBY	5V	P12V_STBY	POL	1	TPS53319DQPR	
P3V3_STBY	3.3V	P12V_STBY	POL	1	TPS53319DQPR	
PVNN_PCH_STBY	0.85V , 0.9V, 0.95V or 1.0V	P12V_STBY	Switcher	1	PXE1110C+2Phase TDA21470; 1Phase for PVNN_PCH_STBY,1Phase for P1V05_PCH_STBY	0XD0
P1V05_PCH_STBY	1.05V	P12V_STBY				
P1V8_PCH_STBY	1.8V	P3V3_STBY	LDO	1	TPS7A7200RGTT	

8.3: Hard Drive 5V Power Design

8.3.1: Hard Drive 5V Power Requirements

The Goose Lake convert 5V for hard drive in HDD backplane.

Power Rail	Vout(V)	HDD	CPLD	CLK	Etc.
P12V_HDD	12	40.2			
P5V_HDD	5	30			
P3V3_AUX	3.3		0.8		1
P3V3	3.3			0.5	

8.3.2: 5V Output Protection

The Goose Lake use VRD internal OCP function to protect P5V power rail, for every HDD side, Gosse Lake use current protection IC to protect every HDD.

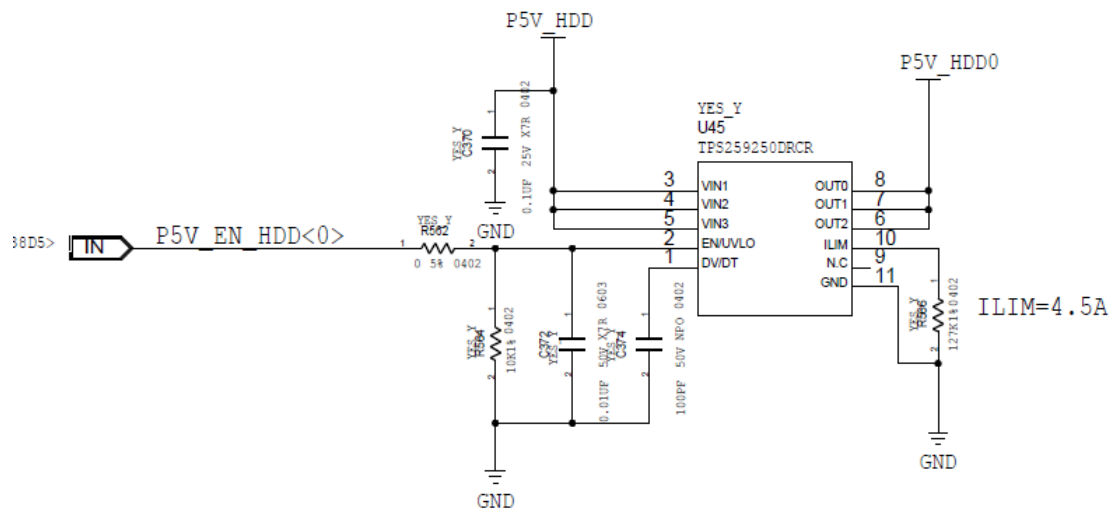


Figure 16 5V Output Protection

8.3.3: 12V to 5V Bulk Converter

The Goose Lake use a integrate VRD to converter 5V, it has remote sense function to avoid IR drop to impact HDD power supply.

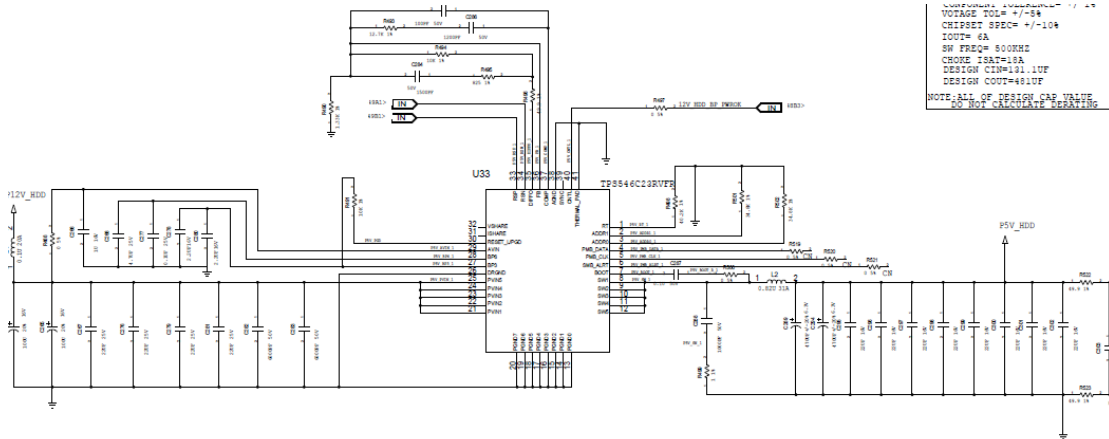


Figure 17 12V to 5V Bulk Converter

9: Fan Speed Control

The Goose Lake enclosure thermal management system supports one scheme: The BMC chip in the fan control board calculates the suitable PWM and controls fan speed. The BMC chip obtains temperature of HDDS/expander chip/ambient temperature/inlet of HDD, BMC calculate the suitable PWM for every temperature sensor, then selects the maximum PWM value to control fan speed. Figure 18 shows the temperature sensors' location within the PCB.

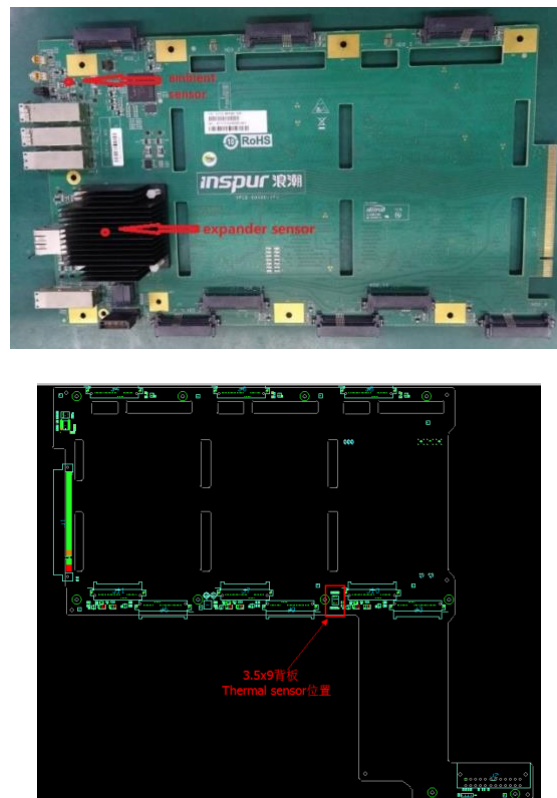


Figure 18 Goose Lake System Thermal Sensor Locations

The ODM provides a detailed implementation of the fan speed control requirements. Figure 19 shows the fan speed control strategy in BMC chip.

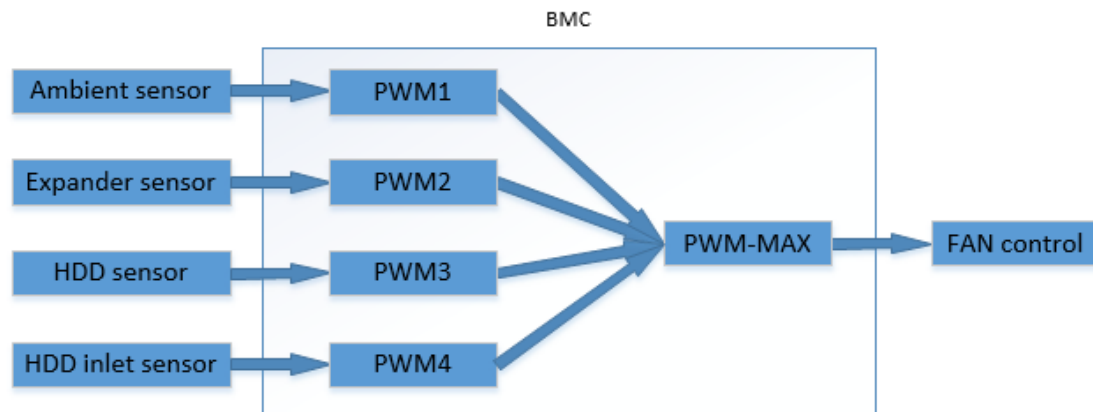


Figure 19 Fan Speed Control Strategy

10: Thermal Protection

There are different levels of consideration of system / hardware thermal protection for the Goose Lake system. They include:

- Setting a Warning level for each monitored parameter (including all temperatures). When any one of the temperatures reaches its warning value, the firmware should report an ALARM status.
- Setting a CRITICAL level for each monitored parameter. any one of the temperatures reaches its CRITICAL value, the BMC should report a CRITICAL status and set the maximum fan speed to protect hardware.
- When fan fail, BMC setting higher fan speed to avoid components overheat.
- When BMC fail, fan will working in maximum speed to avoid components overheat.

11: Mechanical

11.1: External Chassis

The overall dimensions of the chassis are: 537mm wide x 94.7mm tall x 889.6mm deep.

The individual HDD trays may be carried fully loaded. The chassis may be carried with 2 fully loaded HDD trays.

11.1.1: Rack Interface/Slides

The rack upon which the chassis is mounted is the Open Rack design as published at <http://opencompute.org>.

The main chassis is mounted in the rack by sliding it onto the rack's horizontal rails and engaging the cam levers mounted to the front of the HDD trays. The levers engage holes in the rack to hold the chassis and HDD trays in place (Figure 20 and 21).

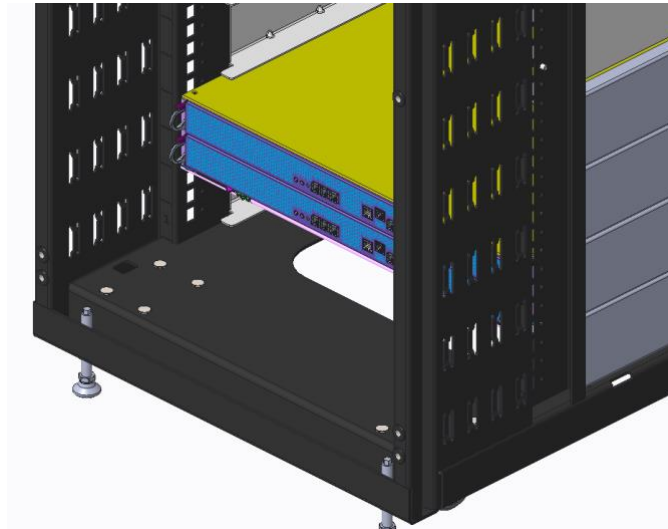


Figure 20 Main chassis mounted in the rack



Figure 21 Lever engage hole in the rack

11.2: HDD Tray

The HDD tray comprises a primary tray, drive plane, expander boards and driver board, which are mounted to the underside of the tray. The expander boards and driver board are removable from the tray. Each tray holds 17x HDDs horizontally.

The entire HDD tray may be removed for service or replacement. Un lift left and right latches (red) of HDD tray (Figure 22 and 23) and pull out left and right holders(gray) of HDD tray from chassis with both hands (Figure 24).

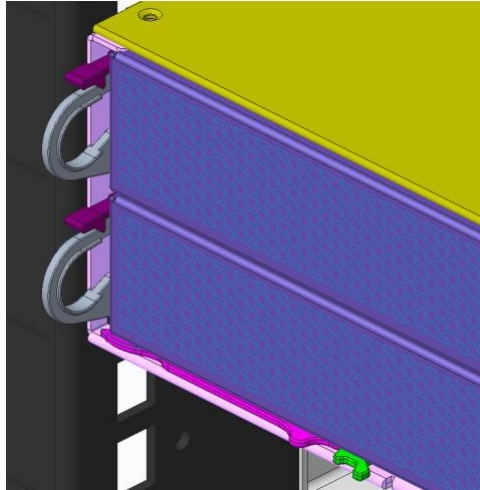


Figure 22 Left latch

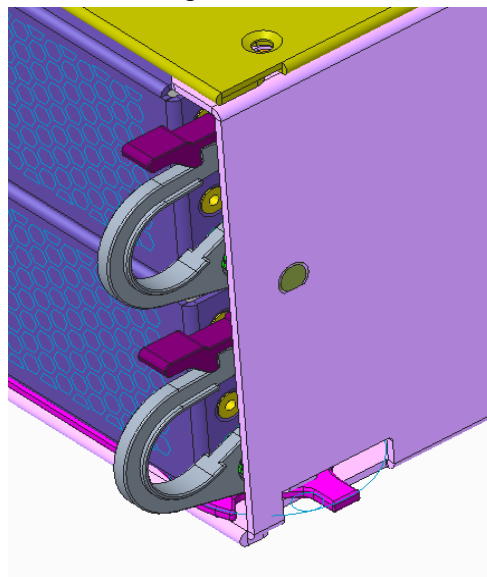


Figure 23 Left latch

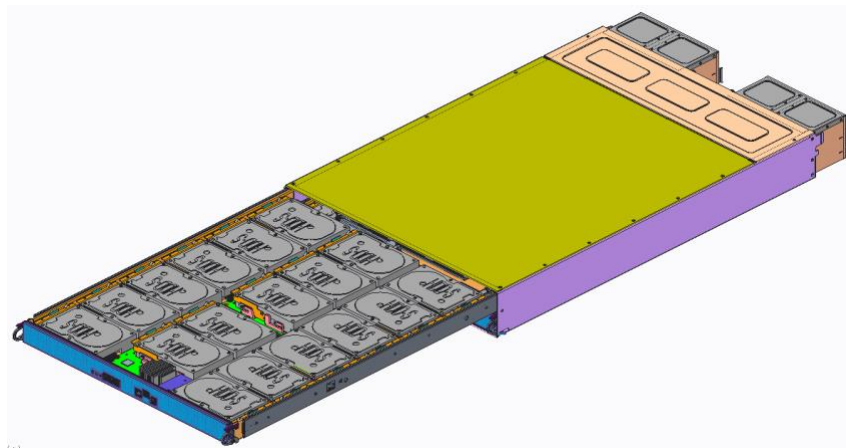


Figure 24 Front View of HDD Tray

11.2.1: Removing HDDs for Service

1. Press the HDD latch release (green).
2. Lift the latch upwards, slide the HDD forward, then lift the HDD out of the bay.

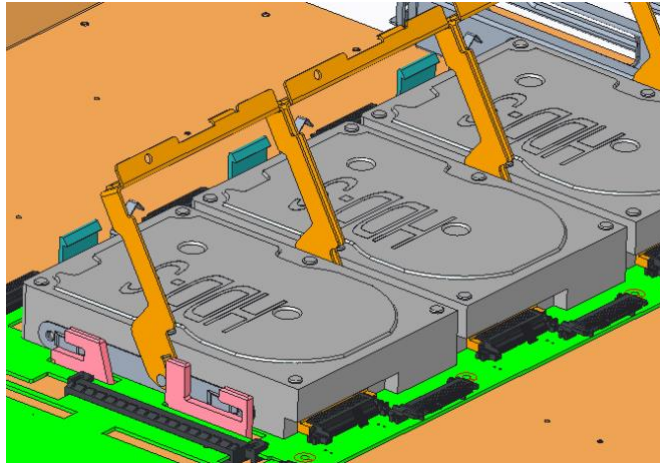
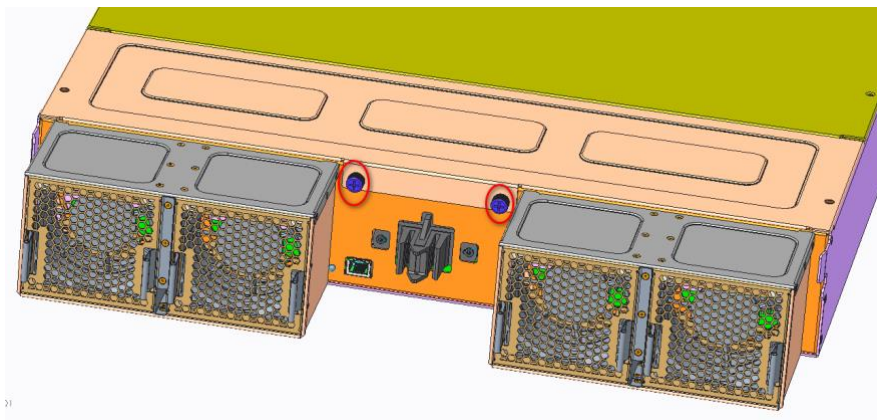


Figure 25 HDD Carrier

11.3 Fan Module

There are four fan modules mounted to the hot aisle end of the chassis. Each fan module carries one dual-rotor fan, 80mm x 56mm size or equivalent, mounted to individual fan carriers via elastomeric isolators in order to minimize vibration transmitted to the main chassis.

Installing the fan module involves simply pushing the fan carrier directly into the rear of the chassis. Removing the fan is done by reversing these steps (Figure 26).



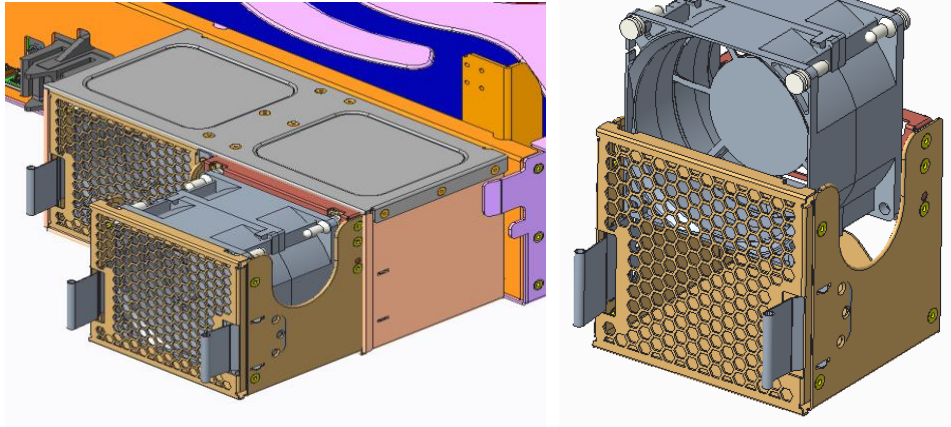


Figure 26 Fan Module Removal