Accton AS7712-32X

Switch Specification

Revision .02

Revision History

Revision	Date	Author	Description
.01	2/5/2014	Jeff Catlin	Initial Release
.02	3/5/2015	Jeff Catlin	Updated mechanical drawings, Updated Licensing text, minor editorial changes

Contents

Licenses

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Description	Manufacturer	Part Number
X86 CPU	Intel	XeonD-1548
SDRAM 4GB SO-DIMM w/ECC (x2 DDR4)	Micron	MTA18ASF1G72HZ-2G1A1
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
SPI NOR Flash 8MB	Winbound	W25Q128FVSIG
TPM	ST Microelectronics	ST33ZP24AR28PVSP
mSATA Connector	TE Connectivity	1775838-2
M.2 connector	Concraft	213BAAA42FA
BMC Connector	FOXCONN	AS0A626-H2S6-7H
Ethernet Controller	Intel	WGI210AT
CPLD	Altera	5M1270ZF256C5N
10GeB SPI Flash	Winbond	W25Q32FVSSIG
I210 SPI flash	Winbond	W25Q16DVSSIG
T2080 CPU	Freescale	T2080NSN8TTB
SDRAM (8GB per channel)	UNIGEN	UG10U7211P8UU-BDE *2
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
NOR Flash 128MB	MICRON	JS28F00AM29EWHA
Trusted Platform Module (TPM)	ST	ST33ZP24AR28PVSK
mSATA Connector	TE	1775838-2
M.2 connector	CONCRAFT	213BAAA32FA
SD Connector	CVILUX	CSD-09A001D
CPLD	Altera	EP4CGX15BF14C8N
AC Power Supply	3Y	YM-2651YBR Front to back airflow 4011-
AC Power Supply	3Y	YM-2651YCR Back to front airflow
DC Power Supply	3Y	YM-2651VBR Front to back airflow
DC Power Supply	3Y	YM-2651VCR Back to Front airflow
12V DC Power Module	Edge-Core	PSU 12V-60
Switching Silicon	Broadcom	BCM56960

10/100/1000 PHY	Broadcom	BCM54616S
Fans	Sunon	PF40561BX-Q020-S99 (Front to Back airflow)
Fans	Sunon	PF40561BX-Q010-S99 (Back to front airflow
Cage/Connector QSFP28	TE Connectivity	2170790-2, 2170790-3
Connector RJ45 2x1 (x1)	UDE	FS2G6

Scope

This document outlines the technical specifications for the Accton AS7712-32X Open Switch Platform submitted to the Open Compute Foundation.

Overview

This document describes the technical specifications of the AS7712-32X Top of Rack/Leaf switch designed by Accton Technology Corporation. The AS7712-32X is a cost optimized switch design focused on Leaf/Top of Rack deployments which support 10G/25G/40G/50G server connectivity and providing 100Gb uplinks to the distribution/Spine layer of the network. The AS7712-32x switch supports thirty two QSFP28 ports that each can operate at 4x10Gb/4x25G with break out cables, 2x50G with break out cables, 40G with standard QSFP+ optics/DAC cables, and 100G with QSFP28 optics/DAC cables.

The AS7712-32X is a PHY-Less design with the QSFP28 connections directly attaching to the Serdes interfaces of the Broadcom BCM56960 switching silicon providing the lowest cost, latency, and power. AS7712-32X supports traditional features found in Top of Rack / Spine switches such as:

- Redundant field replaceable power supply and fan units
- Support for "Front to Back" or "Back to Front" air flow direction
- Supports a modular CPU card that allows flexibility in the CPU and/or memory configurations that can be offered.
- The AS7712-32X is a 1RU design that supports standard 19" rack deployments as well as standard 21" Open Rack deployments

Physical Overview

Dimensions

	Inches	Millimeters
Length	20.27	515
Width	17.26	438.4
Height	1.71	43.5
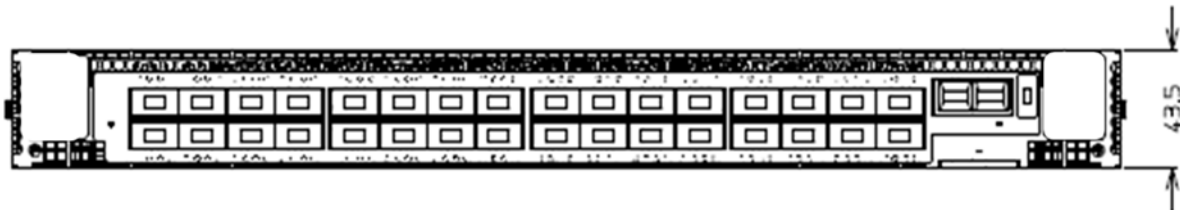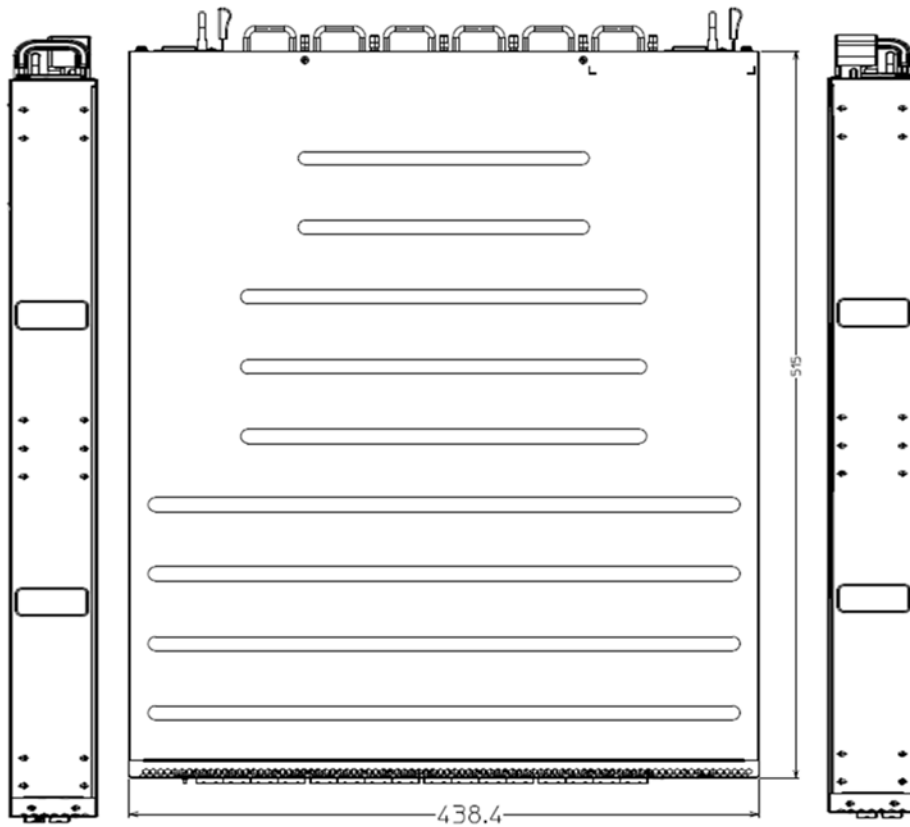
Top View

The top view of the AS7712-32X shows the PCBs and associated components in the AS7712-32X system
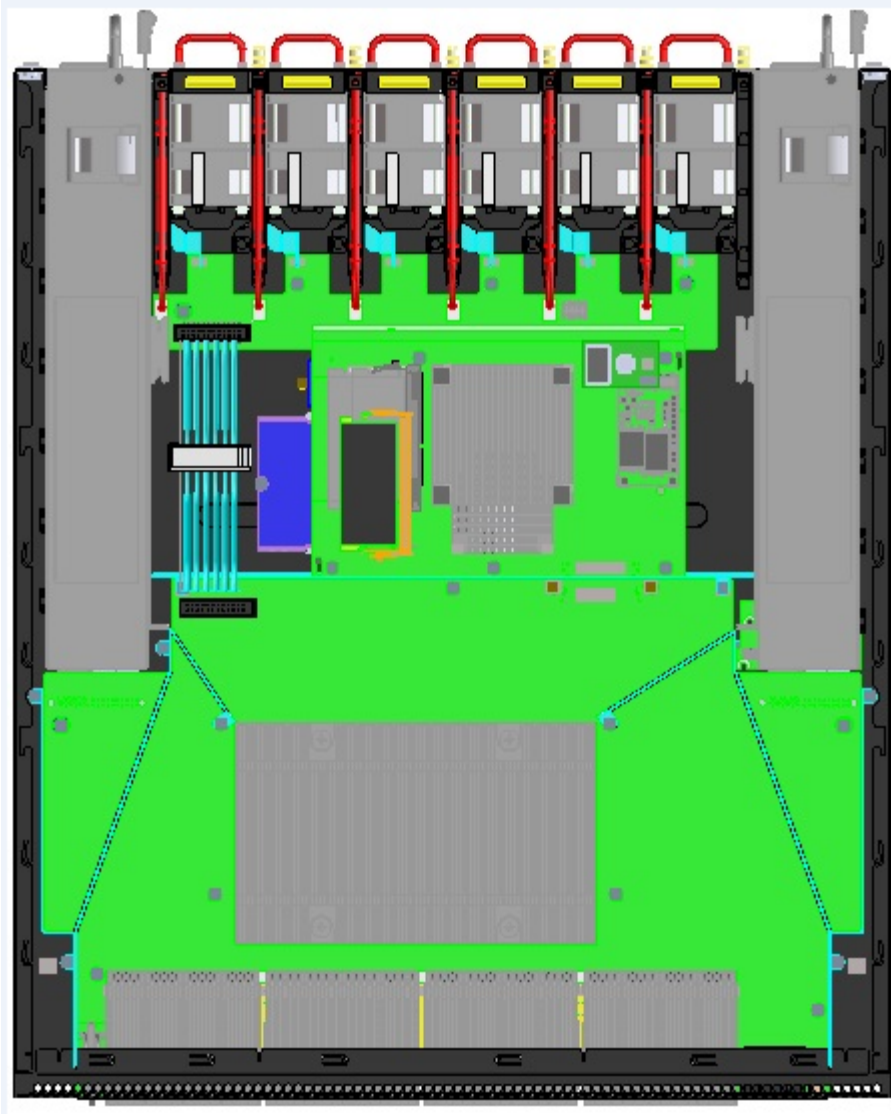
Front View

The front panel view of the AS7712-32X includes the following key components:

- Thirty two QSFP28 ports
  - Capable of operating at 100G/50G/40G/10G Ethernet with standard QSFP28/QSFP+ modules and/or appropriate break out cables.
- System LEDS
- Mini USB 2.0 type "A" port
  - Used for optional external storage
- RJ45 RS232 management port
  - Supports asynchronous mode with the default being eight data bits, one stop bit, no parity
- RJ45 10/100/1000 Ethernet management port
  - Connected directly to the system CPU
- Reset switch
- Pull out "Luggage tag" to show model number, serial number, and base MAC address

Front Panel LED Definitions

LED Name	Description	State	
PSU1	Led to indicate status of Power Supply 1	Green - Normal Amber - Fault Off – No Power	
PSU2	Led to indicate status of Power Supply 1	Green - Normal Amber - Fault Off – No Power	
Diag	LED to indicate system diagnostic test results	Green – Normal Amber – Fault detected	
FAN	LED to indicate the status of the system fans	Green – All fans operational Amber – One or more fan fault	
LOC	LED to indicate Location of switch in Data Center	Amber Flashing – Set by management to locate switch Off – Function not active	
QSFP28 Port LED	LED 1	Blue	100G (4 x 25G)
		Orange	40G (4 x 10G)
		White	25G
		Yellow	50G
		Green	10G
		off	not present
	LED 2-4	Yellow	50G
		White	25G
		Green	10G
		off	not present
OOB LED	LED to indicate link status of 10/100/1000 management port	On - Green 1G Link On - Yellow 10/100 Link Flashing – Indicates activity	

QSFP28 Interface Module Support

40Gb QSFP+ Optical Modules	Standard 40Gb QSFP+ modules including but not limited to: 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER, AOC Cables
40Gb Direct Attach Copper (DAC)	Standard DAC cables including but not limited to: Passive cables up to 7m, QSFP<> QSFP DAC, QSFP<>SFP+ DAC Breakout
QSFP28 Optics	Support for all standards complaint QSFP28 XCVRS including but not limited to 100GBASE-SR4, 100GBASE-LR4
QSFP28 Direct Attach Copper (DAC)	Standard DAC cables including but not limited to: Passive cables up to 3m, QSFP28<> QSFP28 DAC, QSFP28<>SFP28 DAC Breakout

Rear View

The rear view of the AS7712-32X includes the following key components:
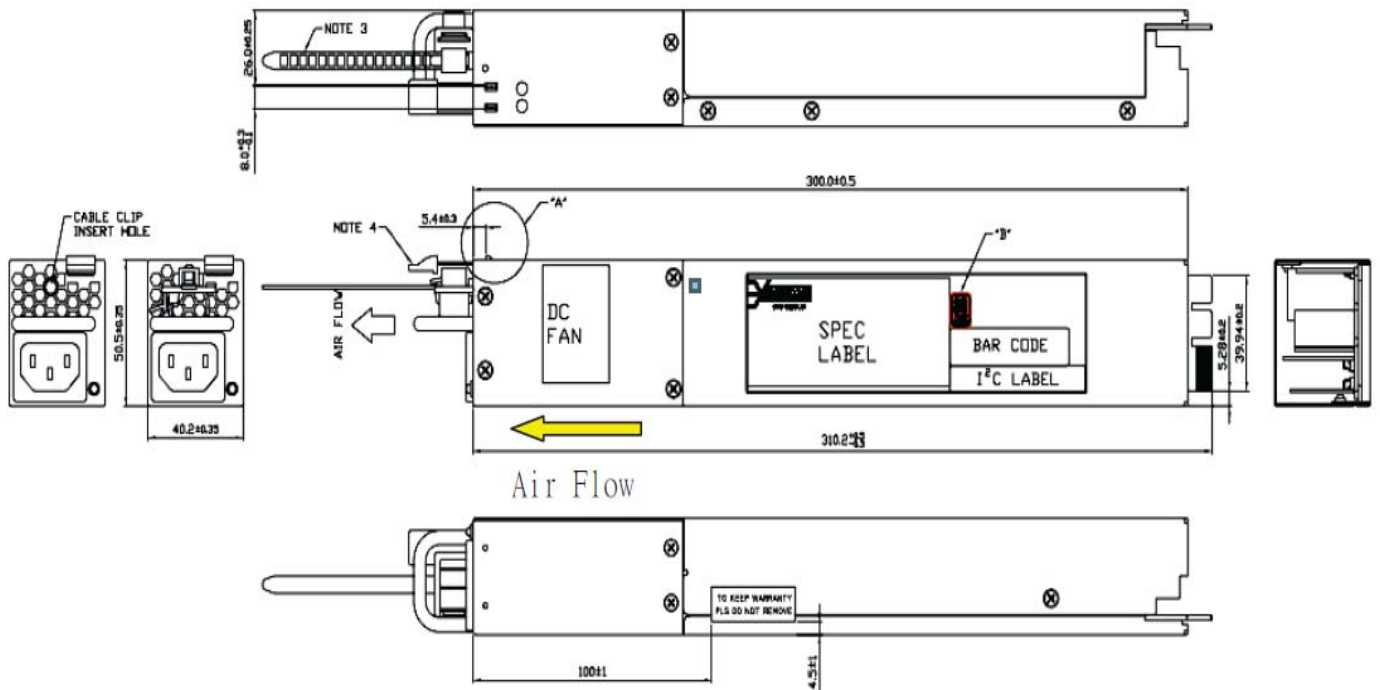
- Six (5+1) redundant hot swappable fan modules
  - LED per fan module to indicate status
  - Color coding to indicate airflow direction
- Two redundant hot swappable power supply modules
  - LED per power supply to indicate status
  - Color coding to indicate airflow direction

Field Replaceable Units

Power Supply Modules

The AS7712-32X supports two redundant power supply modules as listed below

3Y 650 Watt PSU: AC Input Range 90-264VAC / 47-63Hz		
• YM-2651YBR Front to back airflow		
• YM-2651YCR Back to front airflow		
3Y 650W PSU: 48V DC Input range 36-75Vdc		
• YM-2651VBR -Front to back airflow		
• YM-2651VCR -Back to front airflow		
Edge-Core 600 Watt 12V DC Module		
• PSU-12V-600		
	Inches	Millimeters
Length	12.21	310.2
Width	1.58	50.5
Height	2.15	40

PSU Pin-Out

3.3. Pin assianment for DC output gold fingers

```
      TOP              BOTTOM

       ┌TP2            ┌ BP2

       ┌TP1            ┌ BP1
       ┌TS12           ┌ BS24


       └TS1              BS13
```
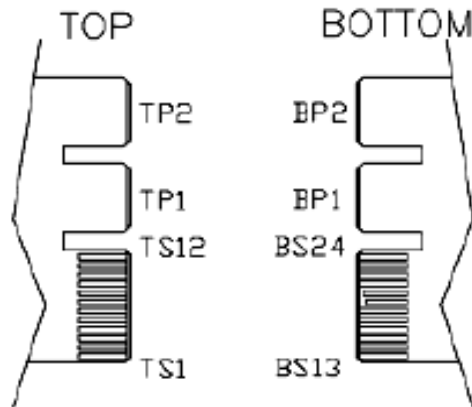
PIN NO.	CONDITION	PIN NO.	CONDITION
TS1	PDB_FAULT	BS13	+12VS+
TS2	PRESENT	BS14	+12VRS-
TS3	A0	BS15	12LS
TS4	PDB_ALERT	BS16	SMB_ALERT
TS5	AC-OK	BS17	SDA
TS6	Reserved	BS18	SCL
TS7	Reserved	BS19	PS-KILL
TS8	Reserved	BS20	PS ON
TS9	Reserved	BS21	PW OK
TS10	A2	BS22	A1
TS11	+5VSB	BS23	+5VSB
TS12	+5VSB	BS24	+5VSB
TP1	GND	BP1	+12V
TP2	GND	BP2	+12V
TOP		BOTTOM	

Figure 3: signal descriptions

Fan Modules

The AS7712-32X supports five individual fan modules. Each fan module supports two 40mmx40mmx56mm fans shown below.

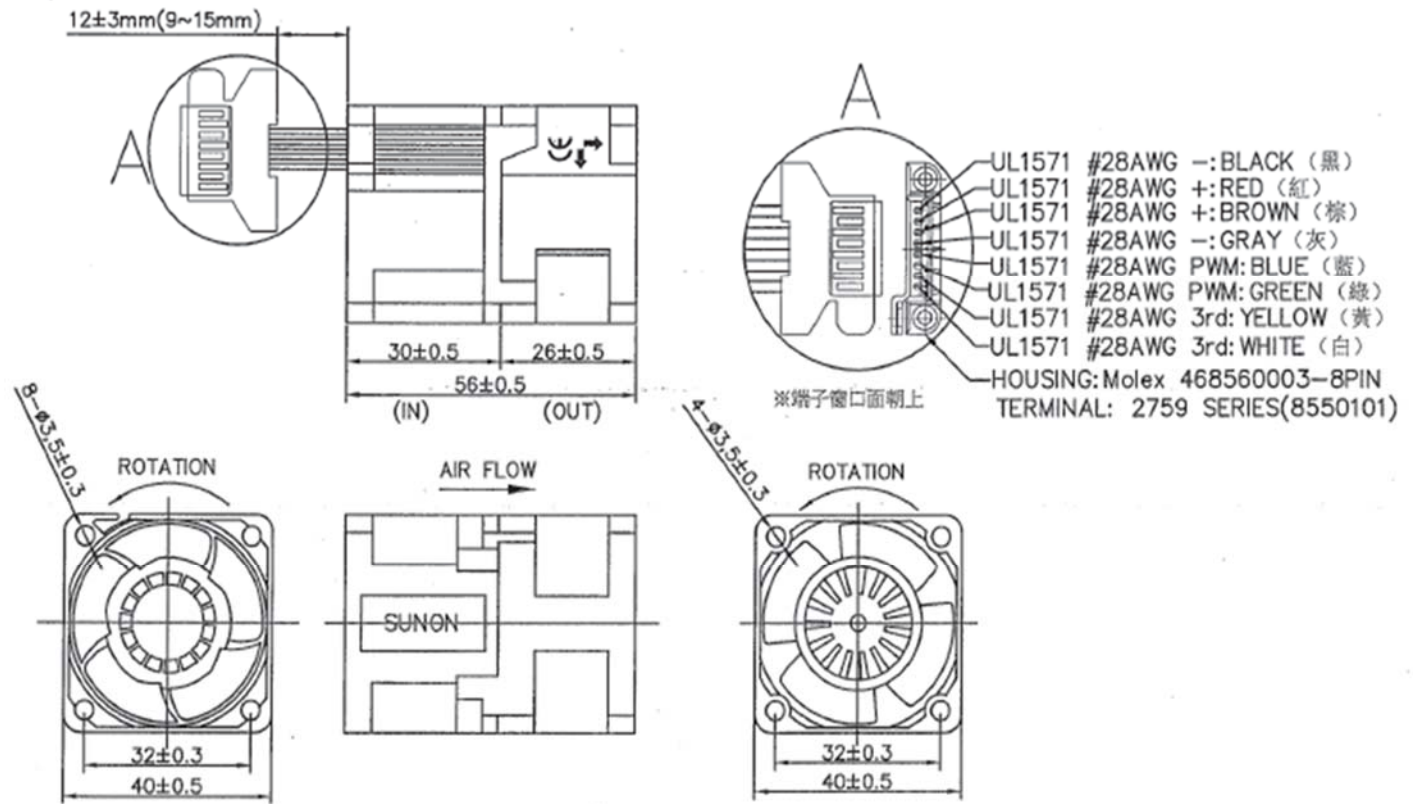| Description	Manufacturer	Part Number
Fan – Front to back airflow	Sunon	PF40561BX-Q020-S99
Fan – Back to front airflow	Sunon	PF40561BX-Q010-S99

Fan Connector pinout

12±3mm(9~15mm)

A

30±0.5   26±0.5
56±0.5
(IN)   (OUT)

A

UL1571 #28AWG −:BLACK（黑）
UL1571 #28AWG +:RED（紅）
UL1571 #28AWG +:BROWN（棕）
UL1571 #28AWG −:GRAY（灰）
UL1571 #28AWG PWM:BLUE（藍）
UL1571 #28AWG PWM:GREEN（綠）
UL1571 #28AWG 3rd:YELLOW（黃）
UL1571 #28AWG 3rd:WHITE（白）
HOUSING:Molex 468560003−8PIN
TERMINAL: 2759 SERIES(8550101)

※端子窗口面朝上

8-⌀3.5±0.3

ROTATION

AIR FLOW

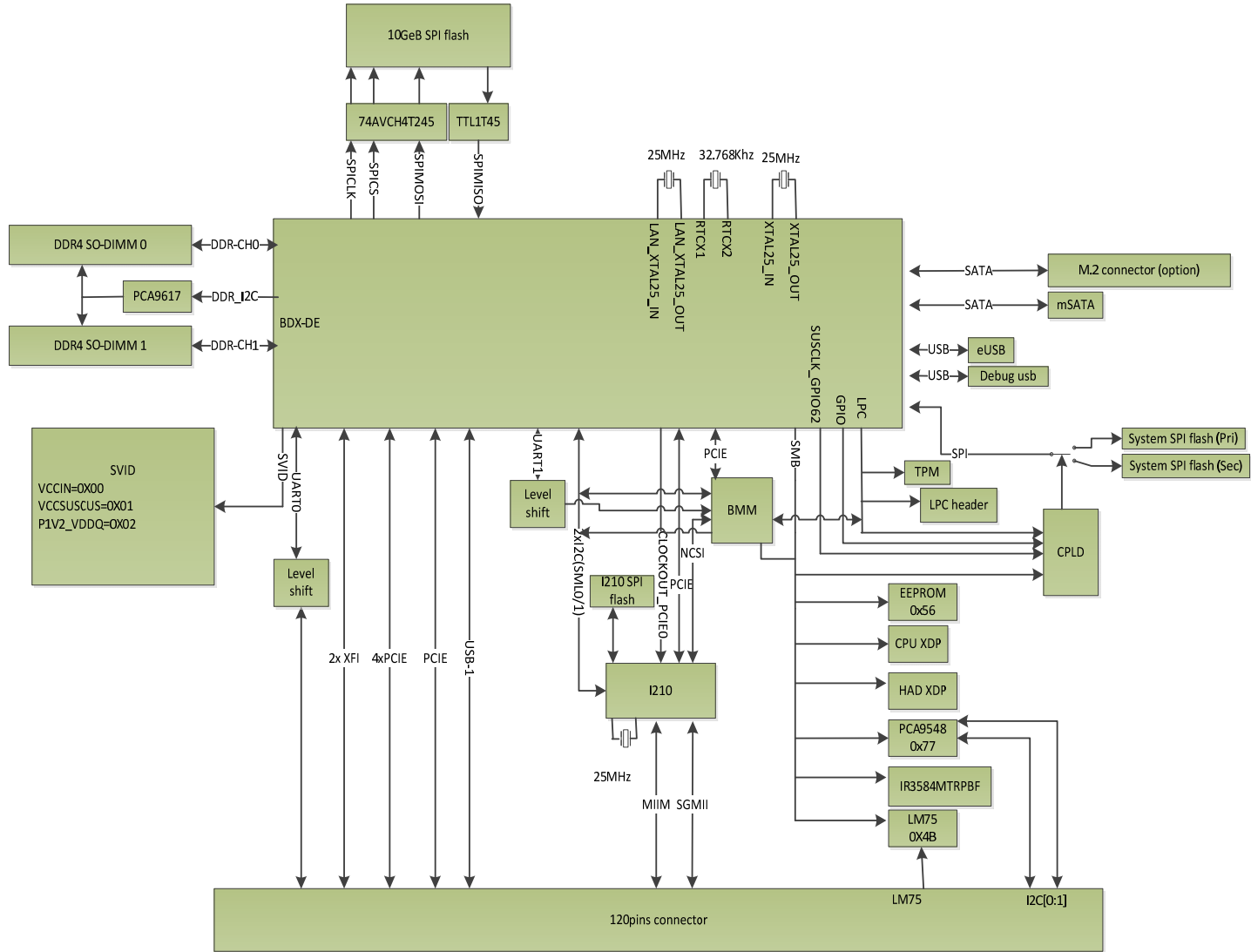SUNON

4-⌀3.5±0.3

ROTATION

32±0.3
40±0.5

32±0.3
40±0.5
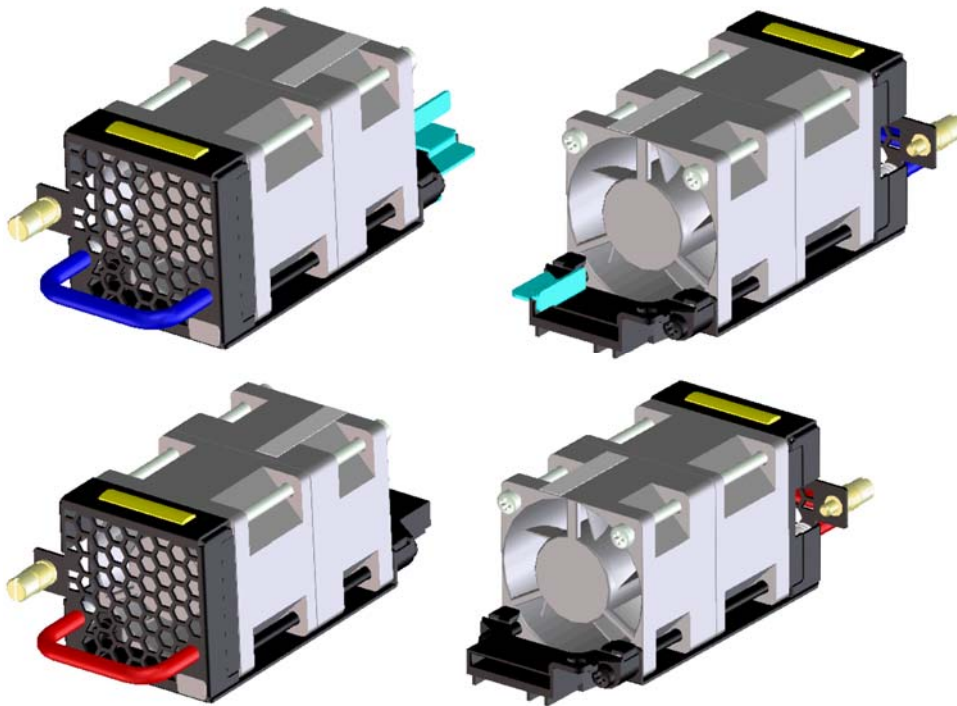
System Overview:

Main PCB Block Diagram
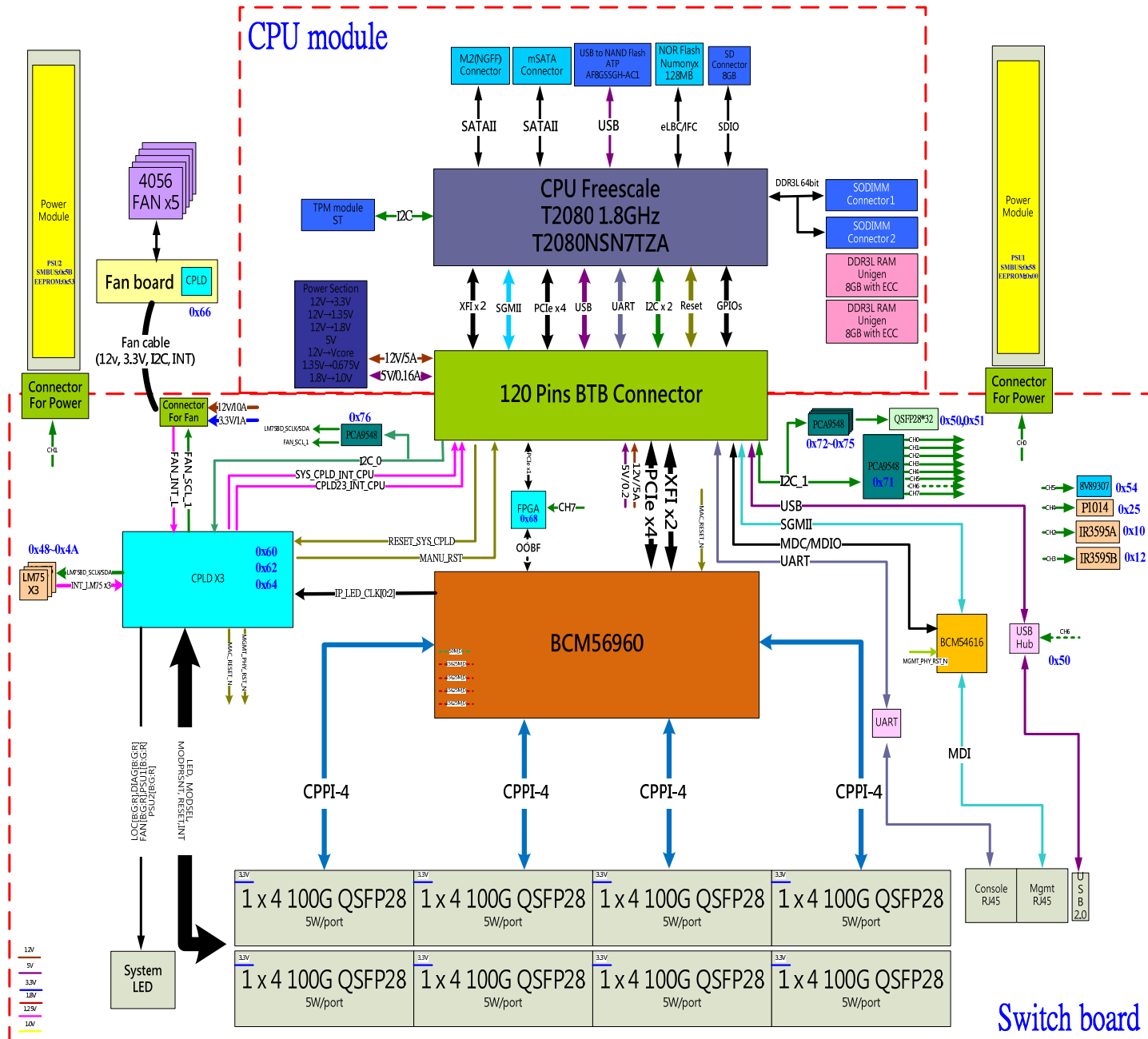
X86 CPU Module Block Diagram

T2080 CPU Module Block Diagram
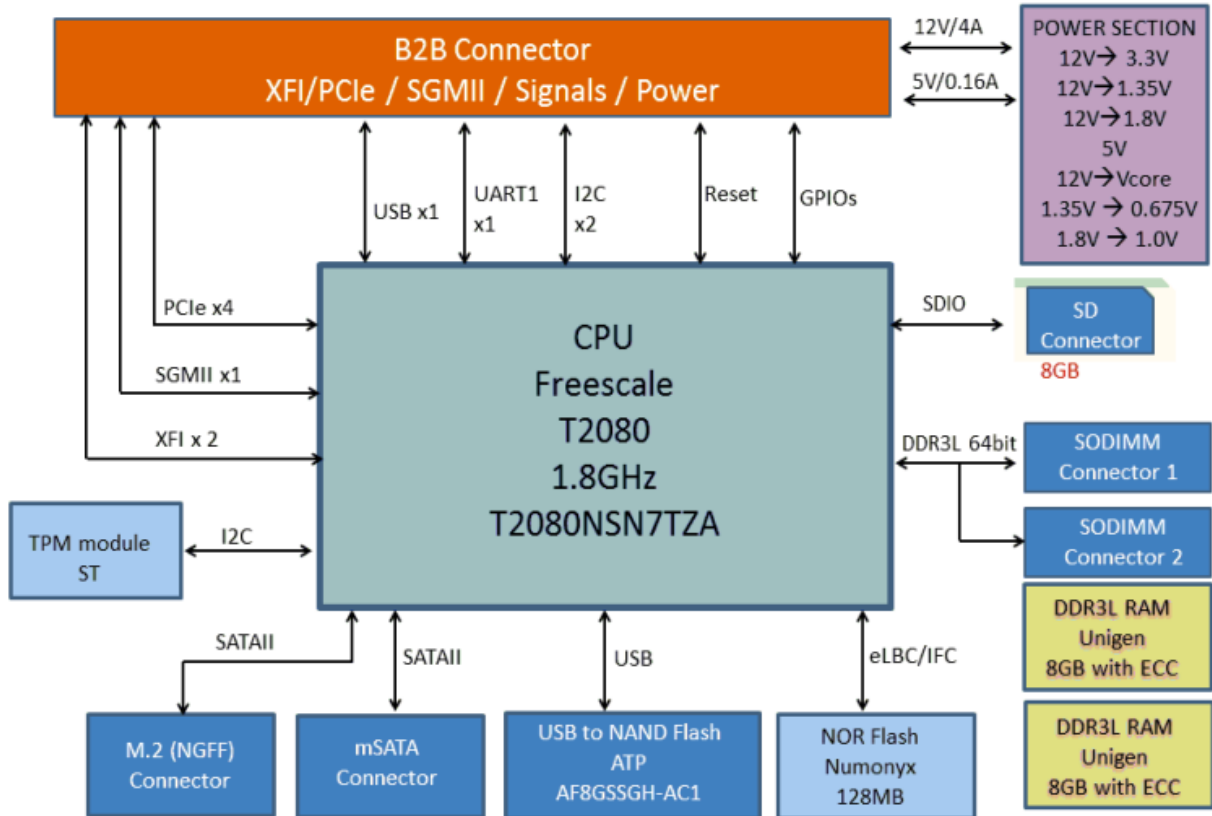
PCB Board Set

The AS7712-32X is composed of 4 unique PCB assemblies as follows:

- Main switch PCB which supports the switching silicon and all front panel connections
- X86 CPU module PCB which provides the control processor and associated components
- T2080 CPU module PCB which provides the control processor and associated components
- Fan PCB which provides connectivity for the 5 Fan modules in the system
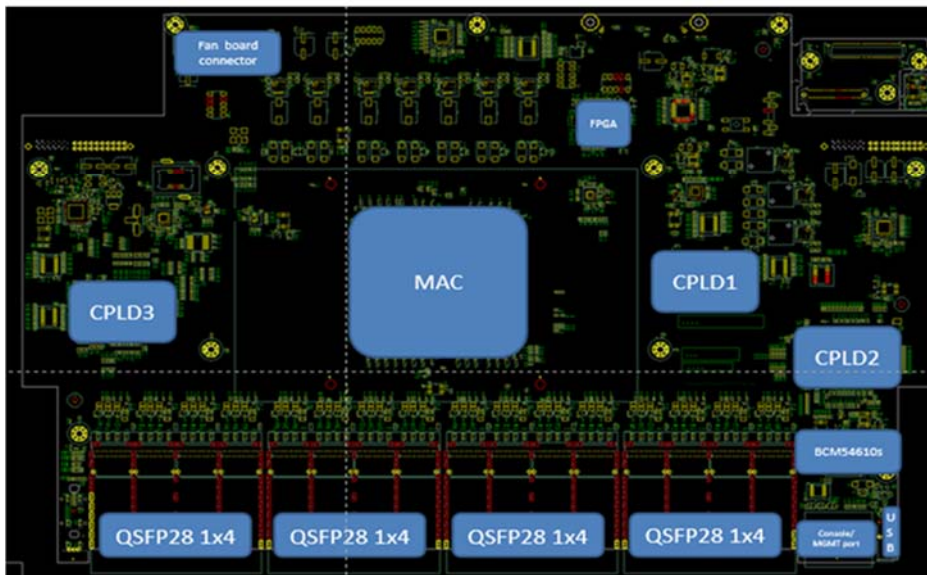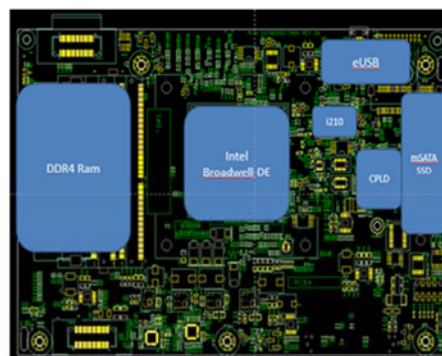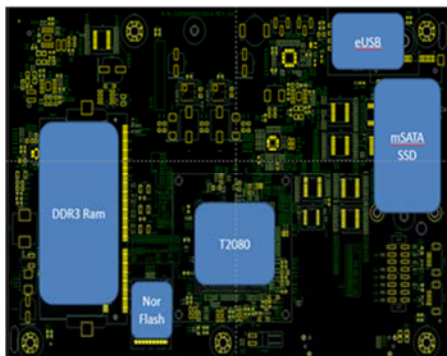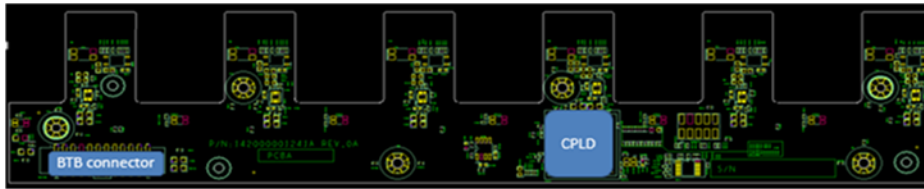
Main Switch PCB

The Main Switch PCB is a fourteen layer board supporting the switching silicon, front panel networking and management ports, LEDs, and connections to other PCBs required in building the system.

Main PCB Dimensions

	Inches	Millimeters
Length	10.17	258.5
Width	15.08	383

Main PCB major components

Description	Manufacturer	Part Number
Switching Silicon	Broadcom	BCM56960
10/100/1000 PHY	Broadcom	BCM54616S
Fans	Sunon	PF40561BX-Q020-S99 (Front to Back airflow)
Fans	Sunon	PF40561BX-Q010-S99 (Back to front airflow
Cage/Connector QSFP28	TE Connectivity	2170790-2, 2170790-3
FPGA	Altera	EP4CGX15BF14C8N
Connector RJ45 2x1 (x1)	UDE	FS2G6
CPLD	Altera	MaxV EPM120F256(3 pieces)
CPLD	Altera	EP4CGX15BF14C8N
B2B Connector Fan PCB	DONG-WEI	BHE6T0-224S4
USB Connector	CZT	USB-A1D249F-4B4N
Power Connector	Alltop	C21442-126H5-Y
Reset Button	DAWNING	TS-A15E-BP-220-S085
ID Button	HUAI YANG	PS020-L12NPBAXX-1
B2B connector CPU Module	SAMTEC	BSH-060-01-F-D-RA-WT

Main PCB Top view
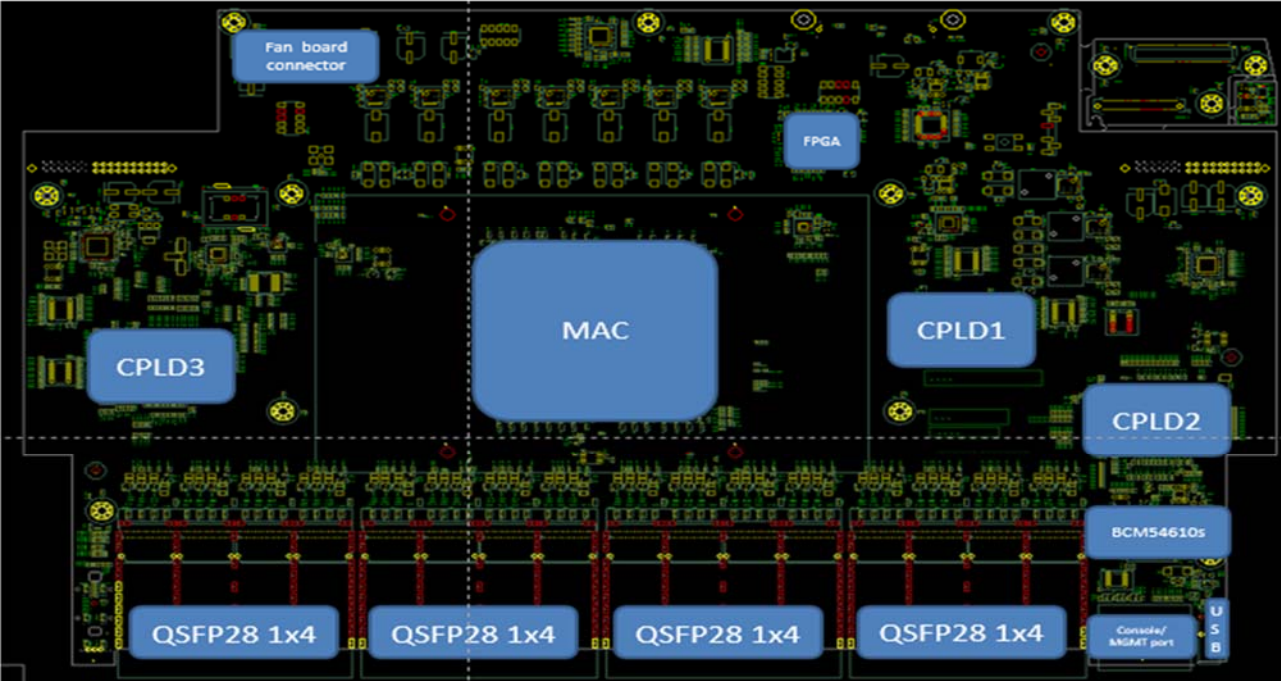
Main PCB Bottom View
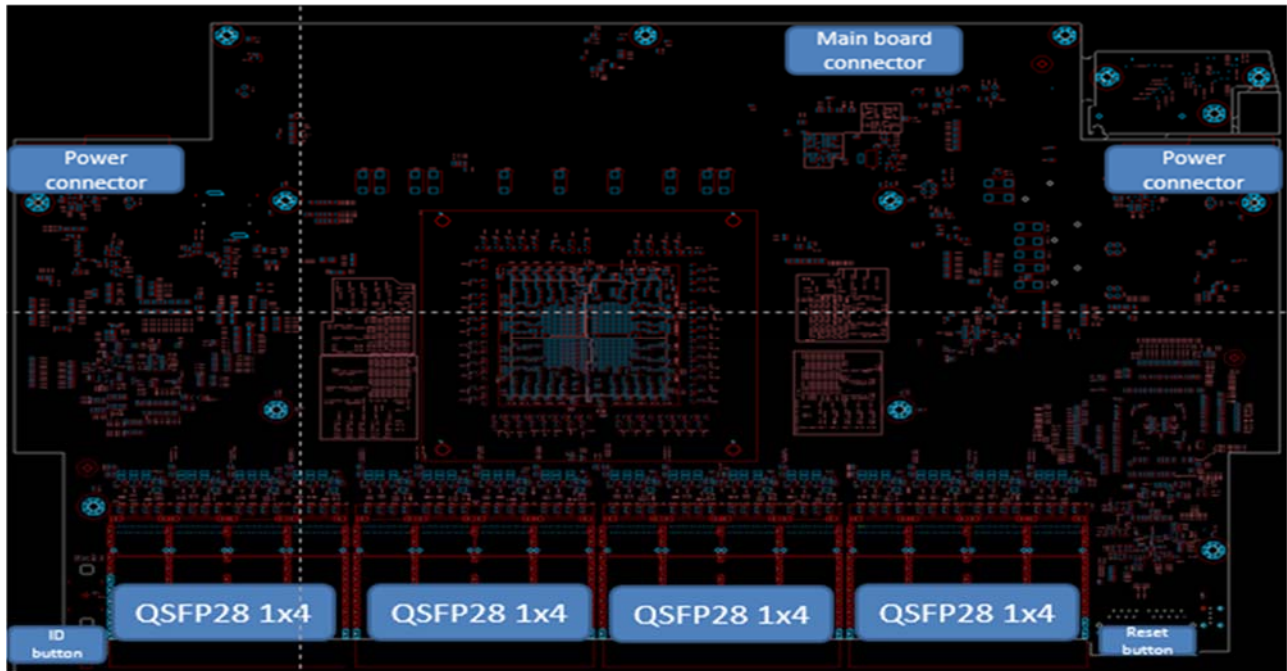
Fan PCB

The Fan PCB is four layers and provides the power, management and connectivity for the 5 system fan modules. The Fan PCB connects to the Main Switch PCB via a cable assembly.

Fan PCB top side

Fan PCB bottom side

Fan PCB Dimensions

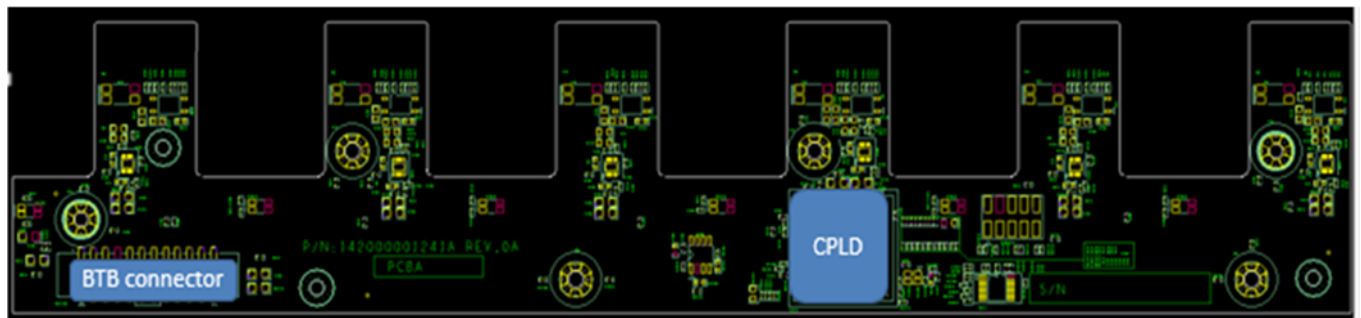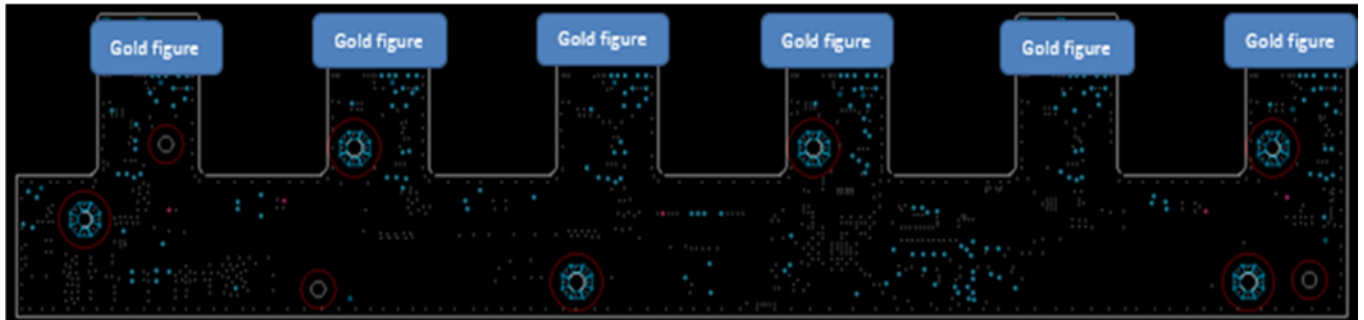|	Inches	Millimeters
Length	9.54	242.5
Width	2.40	60.9

Fan PCB major components

Description	Manufacturer	Part Number
B2B Connector	DONG-WEI	BHE6T0-224S4
CPLD	Altera	5M1270ZF256C5N 3.3V

Fan PCB connector pinout

Name	Type	Net Name	Description
1	power	VCC12	12V Power
2	power	VCC12	12V Power
3	power	VCC12	12V Power
4	power	VCC12	12V Power
5	power	GND	12V/ 3.3V return
6	power	GND	12V/ 3.3V return
7	power	GND	12V/ 3.3V return
8	power	VDD3P3	3.3V Power
9	out	FAN_IDLE	Enable/ disable the Fan baord's I2C Master
10	in	FAN_INT_L	Fan board send intrupt
11	power	GND	12V/ 3.3V return
12	power	GND	12V/ 3.3V return
13	in	FAN_SCL_2	For Fan CPLD access switch board's thermal sensor
14	inout	FAN_SDA_1	For CPU to access Fan CPLD status

| 15	inout	FAN_SDA_2	For Fan CPLD access switch board's thermal sensor
16	out	FAN_SCL_1	For CPU to access Fan CPLD status
17	power	GND	12V/ 3.3V return
18	power	GND	12V/ 3.3V return
19	power	GND	12V/ 3.3V return
20	power	GND	12V/ 3.3V return
21	power	VCC12	12V Power
22	power	VCC12	12V Power
23	power	VCC12	12V Power
24	power	VCC12	12V Power

Fan Cable Pinout
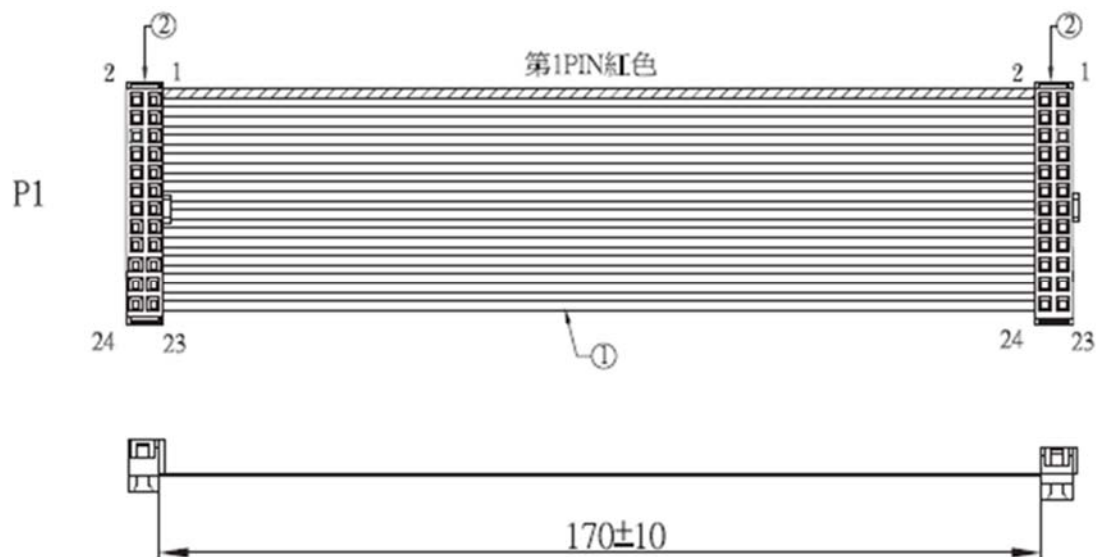
X86 CPU Module PCB

The x86 CPU module is a 12 layer PCB and supports the communication processor and associated components for the CPU subsystem. The communication processor utilized is an Intel® Xeon® processor D series communication processor. The Intel® Xeon® processor D product family is the first Intel® Xeon® SoC optimized to deliver Intel Xeon processor performance and enhanced total cost of ownership (TCO) for hyperscale workloads.

 The Intel® Xeon® processor D product family supports high levels of I/O integrations, including 10GbE. The Intel Xeon processor D product family also includes data center processor features such as error correcting code (ECC). With high levels of I/O integration and energy efficiency.

X86 CPU PCB Top side
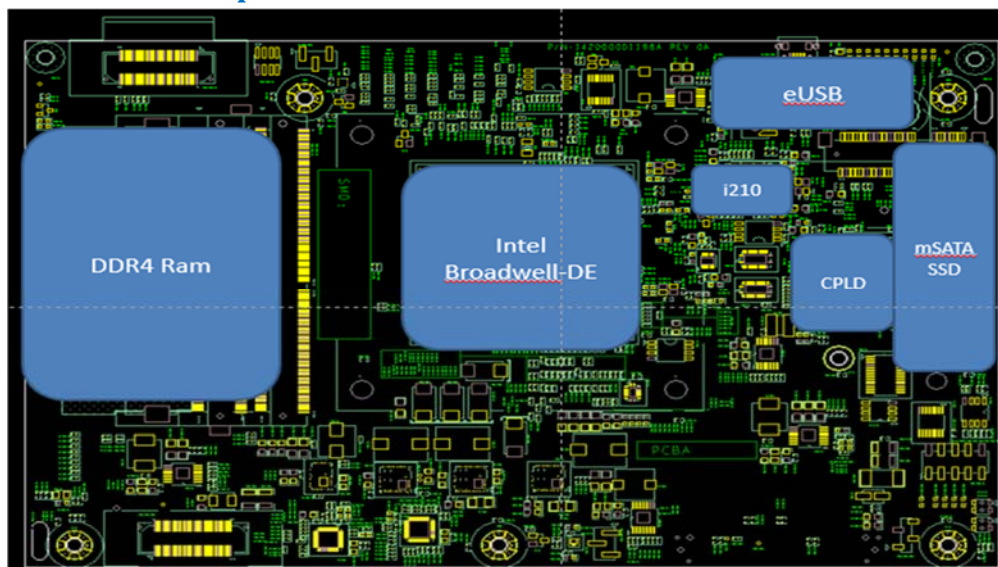
X86 CPU PCB Bottom side
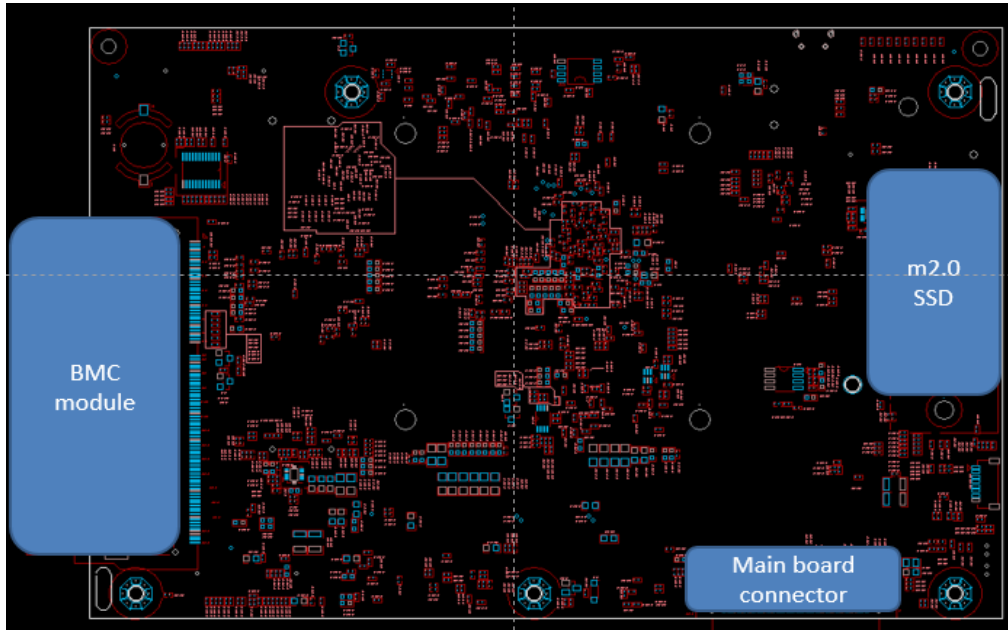
X86 CPU PCB Dimensions

	Inches	Millimeters
Length	7.32	186.02
Width	4.86	123.5

X86 CPU PCB major components

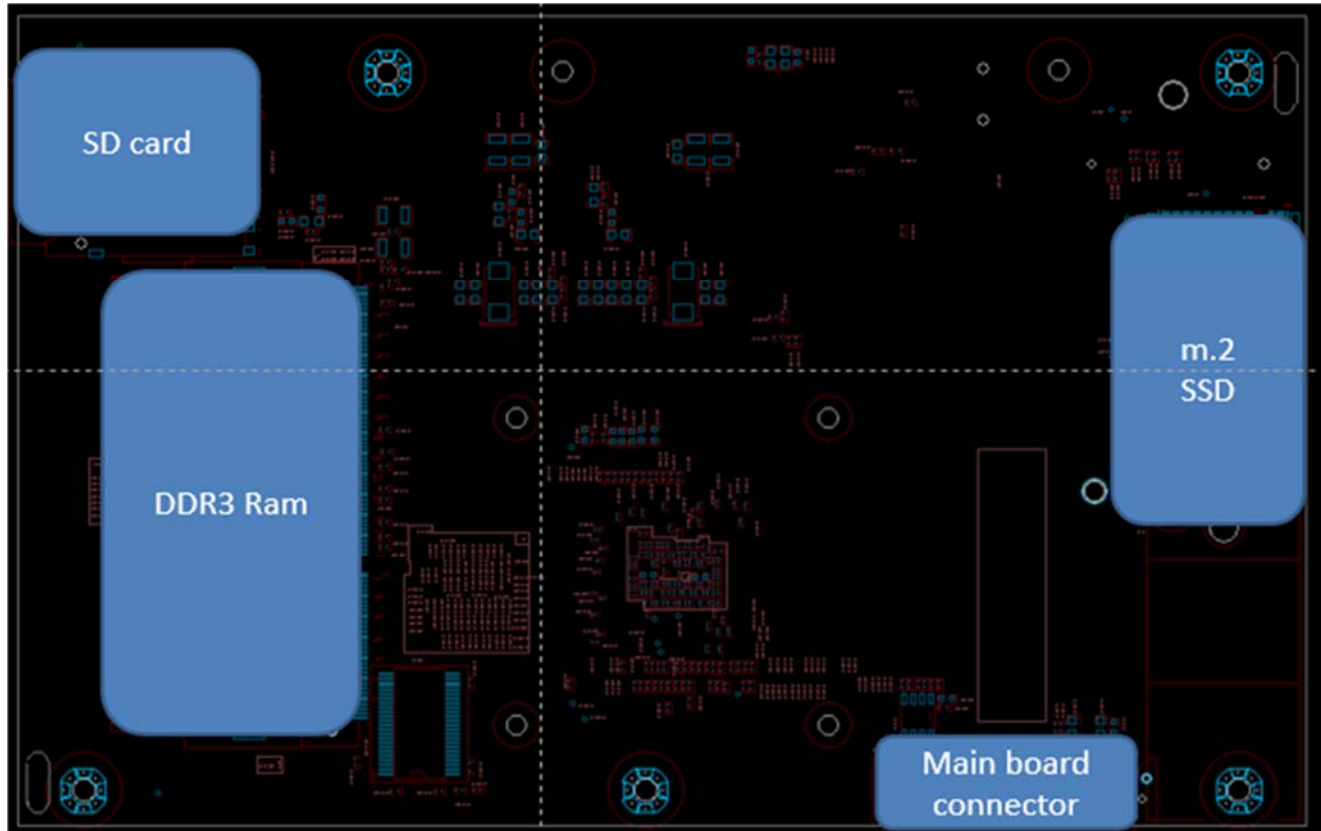| Description	Manufacturer	Part Number
CPU	Intel	XeonD-1548
SDRAM 8GB per channel	Micron	MTA18ASF1G72HZ-2G1A1
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
SPI NOR Flash	Winbond	W25Q128FVSIG
Trusted Platform Module (TPM)	ST	ST33ZP24AR28PVSP
mSATA Connector	TE	1775838-2
M.2 connector	Concraft	213BAAA42FA
BMC Connector	FOXCONN	AS0A626-H2S6-7H
B2B Connector	SAMTEC	BTH-060-01-F-D-RA-WT-K
Ethernet Controller	Intel	WGI210AT
CPLD	Altera	5M1270ZF256C5N
10GeB SPI Flash	Winbond	W25Q32FVSSIG
I210 SPI flash	Winbond	W25Q16DVSSIG

T2080 CPU Module PCB

The T2080 CPU module is an 8 layer PCB and supports the communication processor and associated components for the CPU subsystem. The communication processor utilized is the Freescale Semiconductor T2080 QorIQ processor. The T2080 QorIQ integrated multicore communications processor combines 4 dualthreaded cores built on Power Architecture® technology with high-performance data path acceleration and network and peripheral bus interfaces required for networking, telecom/ datacom, wireless infrastructure, and military/aerospace applications.

T2080 CPU PCB Top side
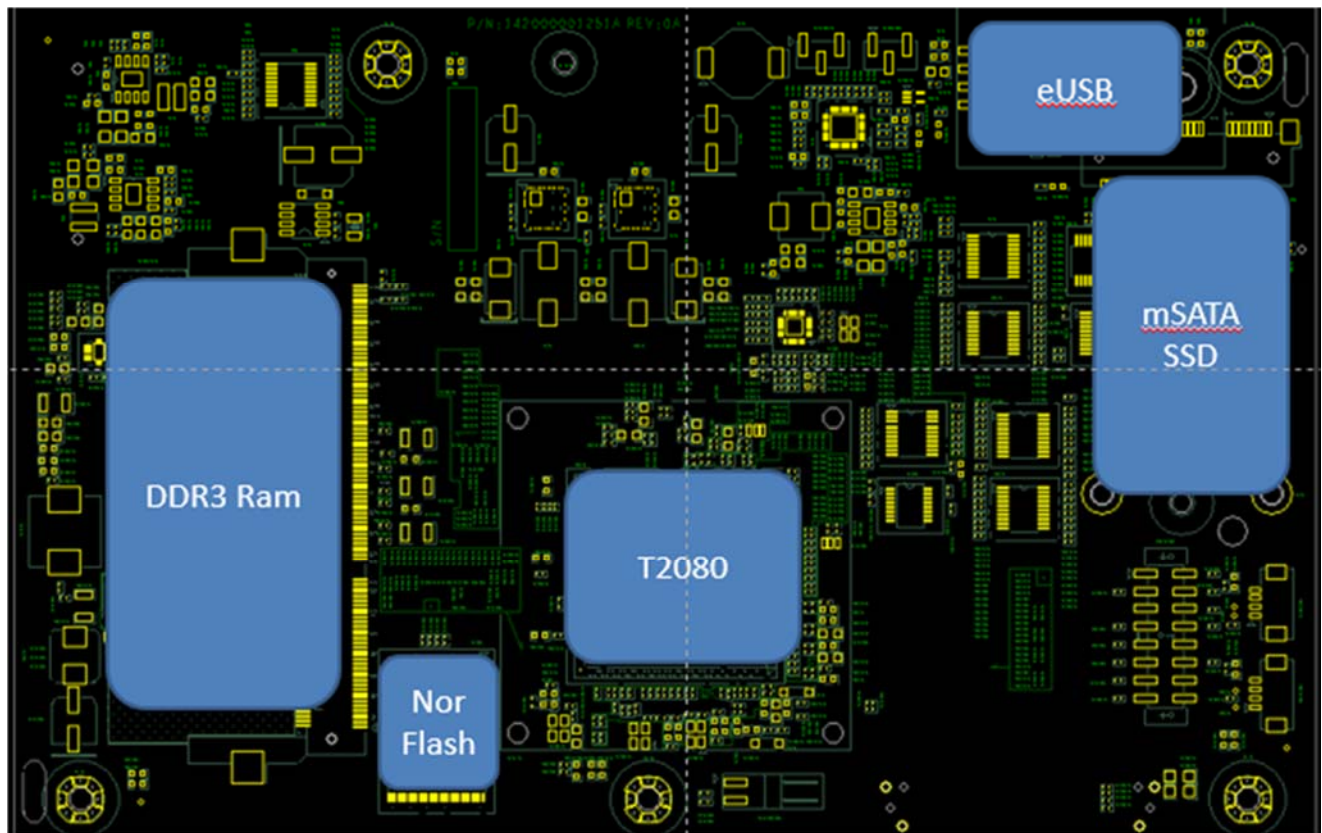
T2080 CPU PCB Bottom side

CPU PCB Dimensions

	Inches	Millimeters
Length	5.98	151.9
Width	4.83	122

CPU PCB major components

| Description	Manufacturer	Part Number
CPU	Freescale	T2080NSN7PNC 1.5GHz 1.0V FCPBGA780 FREESCALE
CPU	FREESCALE	T2080NSN8TTB
SDRAM (8GB per channel)	UNIGEN	UG10U7211P8UU-BDE
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
NOR Flash (128MB)	MICRON	JS28F00AM29EWHA
Trusted Platform Module (TPM)	ST	ST33ZP24AR28PVSK
mSATA Connector	TE	1775838-2
M.2 connector	CONCRAFT	213BAAA32FA
SD Connector	CVILUX	CSD-09A001D

Thermal Monitoring

The AS7712-32X contains 5 system fans used to cool device. The system is also designed with several temperature sensors to detect temperature at several locations within the system. The system supports three temperature sensors on the main PCB board and one temperature sensor on the CPU board.
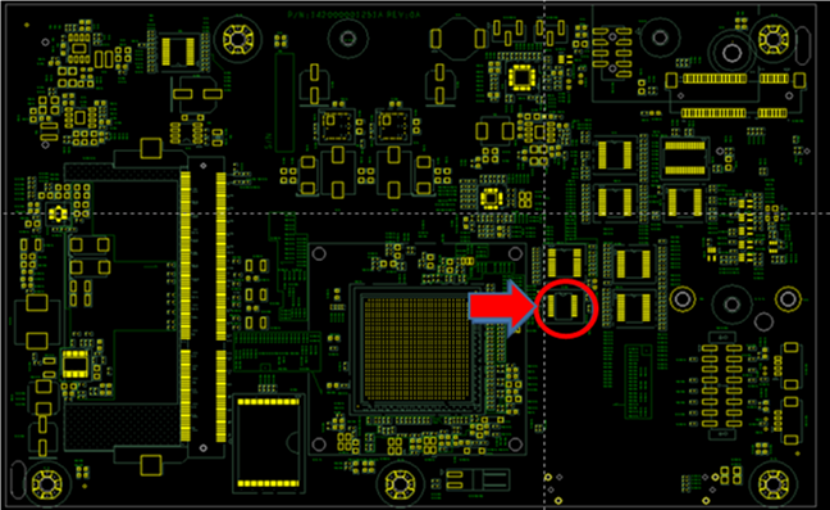
Main PCB Thermal sensor locations
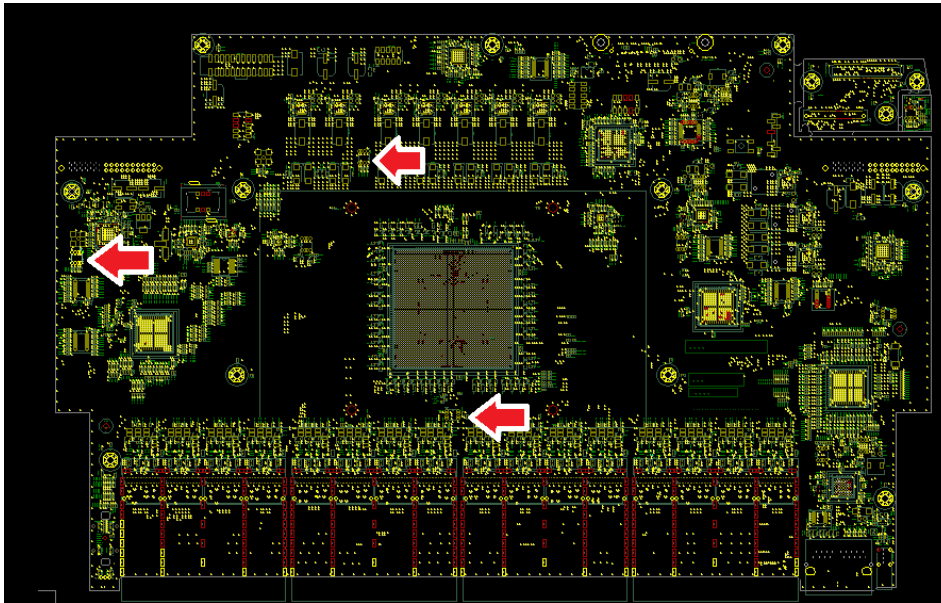
X86 CPU Module thermal sensor location
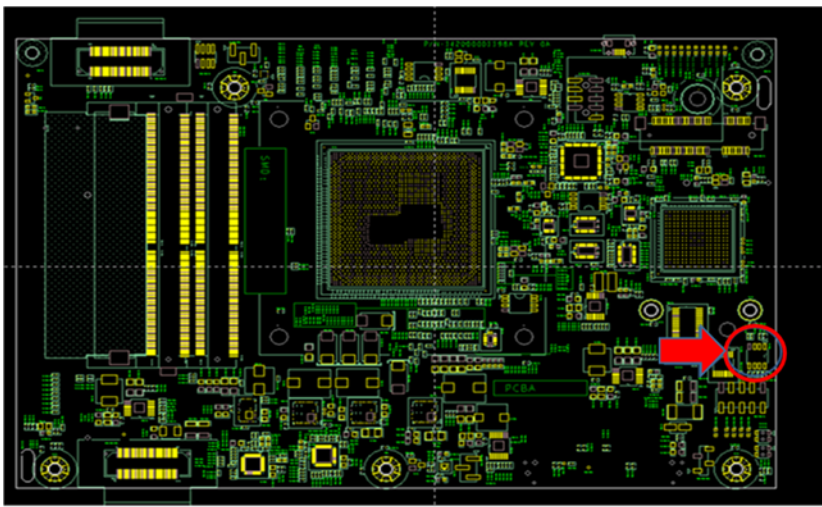
T2080 CPU Module thermal sensor location

Software Support

The AS7712-32X supports a base software package composed of the following components:

BIOS support

The AS7712-32X Supports AMI AptioV BIOS version A01 or greater with the x86 CPU module

U-Boot

The AS7712-32X Supports U-Boot version 1.4.0.2 or greater with the T2080 CPU module

ONIE

The AS7712-32X supports ONIE version 2014.08 or greater with the T2080 CPU Module

Open Network Linux

See http://opennetlinux.org/ for latest supported version

Specifications

Power Consumption

The total estimated system power consumption of the AS7712-32x is ~600 Watts. This is based upon worst case power assumptions for traffic, optics used (5W per port), and environmental conditions. Typical power consumption will be less.

Environmental

- Weight 19.56lbs / 8.8kg
- 0 to 40 Degrees C operating range
- -40 to 40 Degrees C storage temperate range
- Humidity 5% to 95% non-condensing (operational and storage)
- Vibration – IEC 68-2-36, IEC 68-2-6
- Shock – IEC 68-2-29
- Acoustic Noise Level – Under 60dB in 40 degree C
- Altitude - 15,000 (4572 meters) tested operational altitude

Safety
- UL/ Canada
- CB (Issued by TUV/RH)
- China CCC

Electromagnetic Compatibility
- CE
- EN55022 Class A
- EN55024
- EN61000-3-2
- EN61000-3-3
- FCC Title 47, Part 15, Subpart B Class A
- VCCI Class A
- CCC

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