

ACCTON TECHNOLOGY CORPORATION

# Accton AS5712-54X /AS5812-54X

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Leaf Switch Specification

Revision .1.0



**OPEN**  
Compute Project

## Revision History

Revision	Date	Author	Description
.01	4/1/2014	Jeff Catlin	Initial Release
.02	4/10/2014	Jeff Catlin	Product model number change, Addition of 48V DC PSUs, Misc. Edits
.03	4/16/2014	Jeff Catlin	Added block diagrams
.04	5/7/2014	Jeff Catlin	Update pictures, add connector part numbers, add 12V DC power module part number
.05	5/12/2014	Jeff Catlin	Clean up model number inconsistencies
.06	6/7/2014	Jeff Catlin	Add P2041 CPU Module, Add Fan Cables, Add PSU pin out
.07	6/27/2014	Jeff Catlin	Addition of mSATA connection to x86 CPU module
.08	9/9/2014	Jeff Catlin	Addressed minor comments from IC review
1.0	8/4/2017	Jeff Catlin	Minor edit to license text, added support for AS5812-54X

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<b>Description</b>	<b>Manufacturer</b>	<b>Part Number</b>
X86 CPU	Intel	C2538 – 2.4GHz 3.0V
SDRAM 4GB SO-DIMM w/ECC (x2)	Innodisk	M3D0-4GHS2LPC 4GB 1.35V
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC1
SPI NOR Flash 8MB	Winbound	W25Q64FVSSIG
TPM	STMicroelectronics	ST33ZP24AR28PVSP ST
FPGA	Microsemi	A2F200M3F-FGG256
mSATA Connector	TE Connectivity	1775838-2
P2041 CPU	Freescale	P2041NSN7PNC 1.5GHz 1.0V FCPBG780 FREESCALE
SDRAM: DDRIII 2GB with ECC SO-DIMM	UNIGEN	UG25U7200N8UU-ACD
NOR Flash (Boot): 128MB	NUMONYX	JS28F00AM29EWHA
CPLD	Altera	EPM570 (TQFP144 package)
SD CARD: 8GB	Transcend	TS8GSDHC10M
AC Power Supply	Compuware	CPR-4011-4M11 Front to back airflow CPR-4011-4M21 Back to front airflow
DC Power Supply	Universal Microelectronics	UM400D01- Front to back airflow UM400D01-01- Back to front airflow
12V DC Power Module	Edge-Core	PSU-12V-400
Switching Silicon	Broadcom	BCM56854
10/100/1000 PHY	Broadcom	BCM54616S
CPLD	Altera	CPM570 (3 pieces)
Fans	Sunon	PF40561BX-Q020-S99 (Front to Back airflow) PF40561BX-Q010-S99 (Back to Front airflow)
Cage/Connector SFP+ 2x8 (x3)	All Best	R-OP-008320-7-B-N-42-F5
Cage/Connector QSFP+ 2x2 (x1)	All Best	R-TR-Q2-4CMA-OU
Cage QSFP+ 1x2 (x1)	All Best	H-OR-Q2-4CX1-F5F
Connector QSFP+ 1x1 (x2)	All Best	R-CT-Q1-9CX2
Connector RJ45 2x1 (x1)	UDE	M1-C2100CK13-1

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## Scope

This document outlines the technical specifications for the Accton AS5712-54X and AS5812-54X Open Switch Platform submitted to the Open Compute Foundation.

## Overview

This document describes the technical specifications of the AS5712-54X Top of Rack/Leaf switch designed by Accton Technology Corporation. The AS5712-54X is a cost optimized switch design focused on Leaf/Top of Rack deployments which support 10Gb server connectivity and providing 40Gb uplinks to the distribution/Spine layer of the network. The switch supports forty eight SFP+ ports that each operate at 1Gb or 10Gb and six QSFP+ ports that operate at 40Gb each or can be broken out into four 10Gb (or 1Gb) ports each.

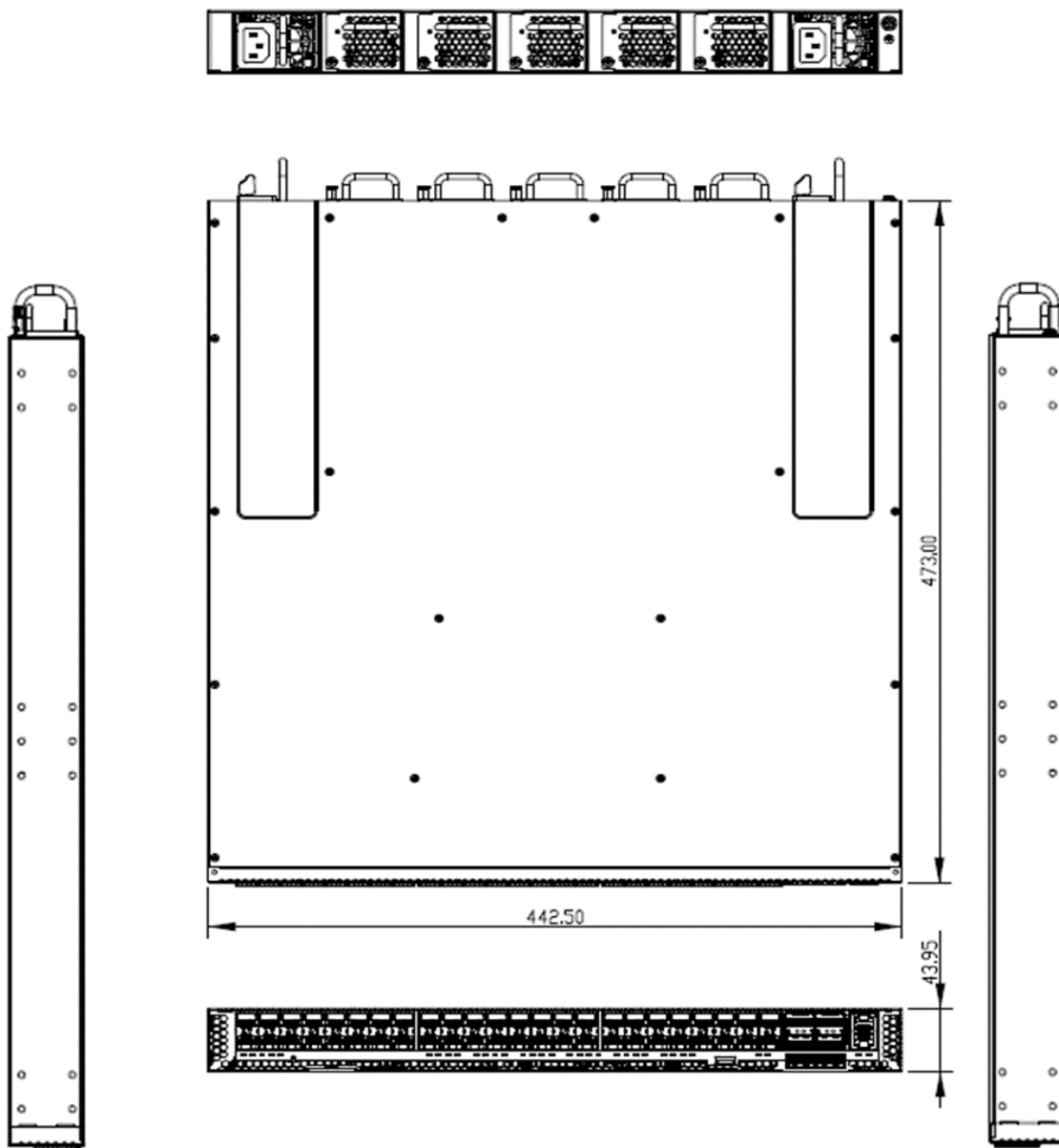
The AS5712-54X is a PHY-Less design with the SFP+ and QSFP+ connections directly attaching to the Serdes interfaces of the Broadcom BCM56854 720G Trident 2 switching silicon providing the lowest cost, latency, and power. The AS5812-54X SKU is made from the exact components referenced in this specification with the one exception being substituting the Broadcom BCM56854 Trident 2 silicon with the BCM56864 Trident 2+ silicon. The Trident 2 and Trident 2+ silicon are pin compatible and that is the only difference between the two SKUs (AS5712-54X, AS5812-54X). All references to the AS5712-54X in this specification are applicable to the AS5812-54X. The AS5712-54X supports traditional features found in Top of Rack 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 AS5712-54X is a 1RU design that supports standard 19” rack deployments as well as standard 21” Open Rack deployments.

## Physical Overview

### Dimensions

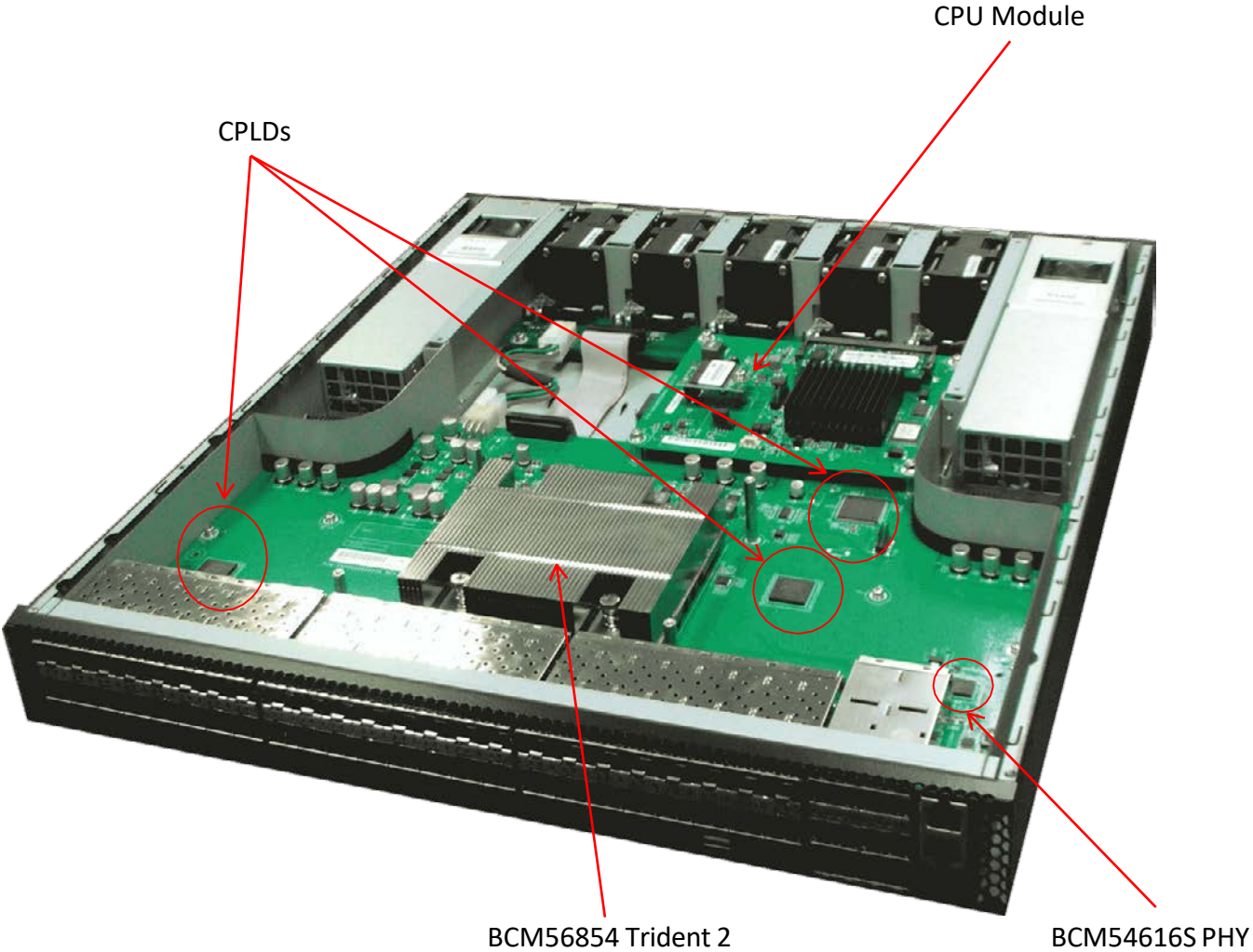
	Inches	Millimeters
Length	18.622	473
Width	17.42	442.5
Height	1.73	43.95



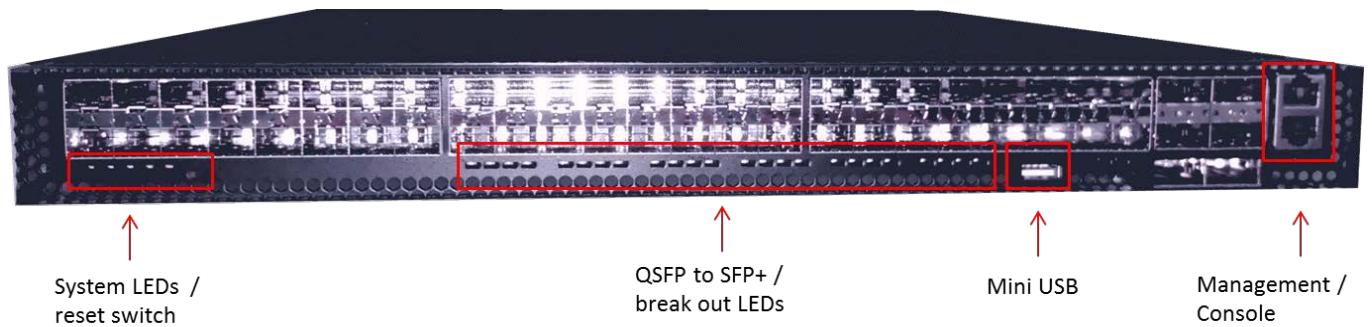


# Top View

The top view of the AS5712-54X shows the PCBs and associated components in the AS5712-54X system



## Front View



The front panel view of the AS5712-54X includes the following key components:

- Forty Eight SFP+ Ports
  - Capable of operating at 10Gb Ethernet speeds with standard SFP+ modules or 1Gb Ethernet speeds with SFP modules
- Six QSFP+ ports
  - Capable of operating at 40Gb Ethernet with standard QSFP+ modules or 10Gb Ethernet via QSFP to SFP+ break out cables (4x10Gb)
- 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

## 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
SFP+ LEDS	LED built into SFP+ cage ( one per SFP+ port) to indicate port status	On Green/Flashing – Port has link at 10G flashing indicates activity On Amber/Flashing Port has link at 1G flashing indicates activity Off – No Link
QSFP+ Port LED	Each QSFP+ Port has one LED to indicate status	On Green/Flashing – Port has link at 40G flashing indicates activity Off - No link
QSFP Break out LEDS	Each QSFP+ has four LEDs to indicate status of the individual 10G ports	On Green/Flashing – Individual 10G port has link at 10G flashing indicates activity Off – No Link
OOB LED	LED to indicate link status of 10/100/1000 management port	On Green - port has link Off – No link

### SFP+ Interface Module support

1Gb SFP Modules	Standard 1Gb SFP modules including but not limited to: 1000Base-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-EX
10Gb SFP+ Optical Modules	Standard 10Gb SFP+ modules including but not limited to: 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, AOC Cables
Direct Attach Copper (DAC)	Standard DAC cables including but not limited to Passive cable up to 5m, Active cable up to 10m

### QSFP+ Interface Module Support

40Gb SFP+ Optical Modules	Standard 40Gb QSFP+ modules including but not limited to: 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER, AOC Cables
Direct Attach Copper (DAC)	Standard DAC cables including but not limited to: Passive cable up to 5m, Active cable up to 10m

### Rear View



The rear view of the AS5712-54X includes the following key components:

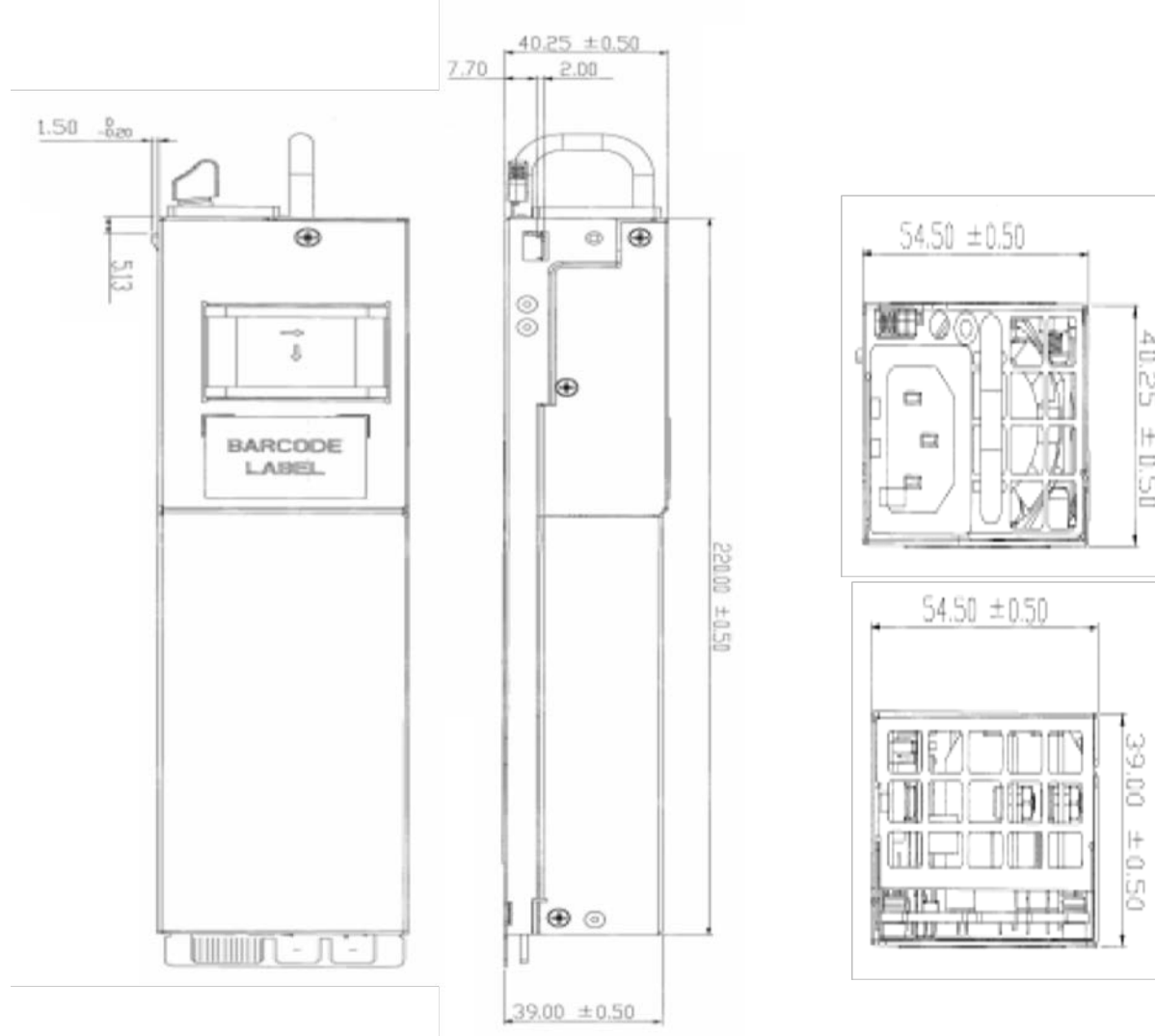
- Five (4+1) redundant hot swappable fan modules
  - LED per fan module to indicate status
  - Color coding to indicate airflow direction
- Two redundant hot swappable power supply modules
  - LED per power supply to indicate status
  - Color coding to indicate airflow direction

## Field Replaceable Units

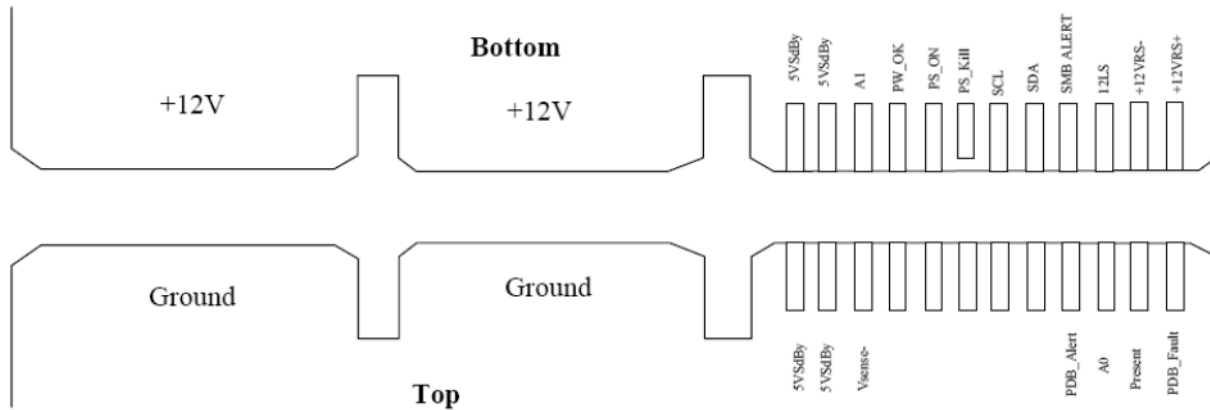
### Power Supply Modules

The AS5712-54X supports two redundant power supply modules as listed below

Compuware 400 Watt PSU: AC Input Range 90-264VAC / 47-63Hz <ul style="list-style-type: none"> <li>• CPR-4011-4M11 Front to back airflow</li> <li>• CPR-4011-4M21 Back to front airflow</li> </ul> Universal Microelectronics 400W PSU: 48V DC Input range 36-75Vdc <ul style="list-style-type: none"> <li>• UM400D01-Front to back airflow</li> <li>• UM400D01-01-Back to front airflow</li> </ul> Edge-Core 400 Watt 12V DC Module <ul style="list-style-type: none"> <li>• PSU-12V-400</li> </ul>		
	<u>Inches</u>	<u>Millimeters</u>
Length	8.66	220
Width	1.58	40.25
Height	2.15	54.5



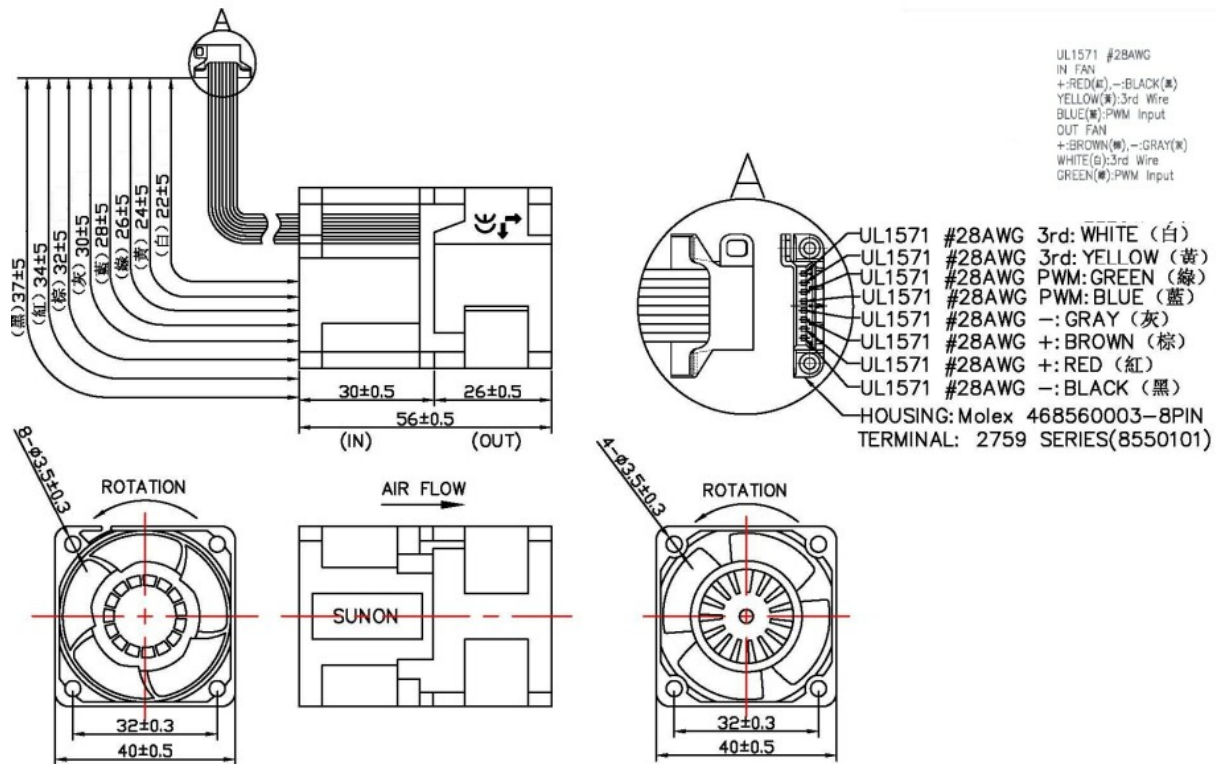
## PSU Pin-Out



## Fan Modules

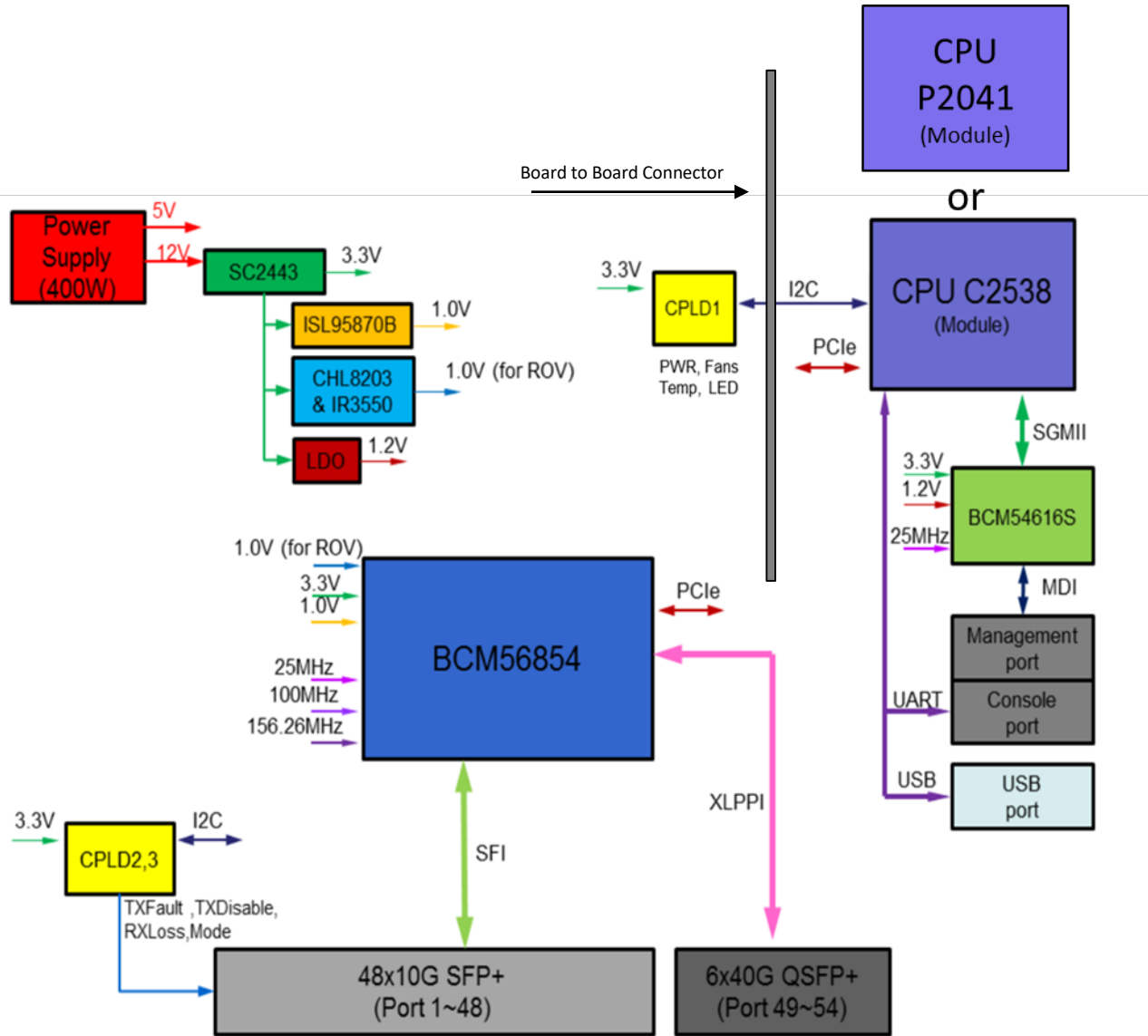
The AS5712-54X supports five individual fan modules. Each fan module supports two 40mmx40mmx54mm fans shown below.

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



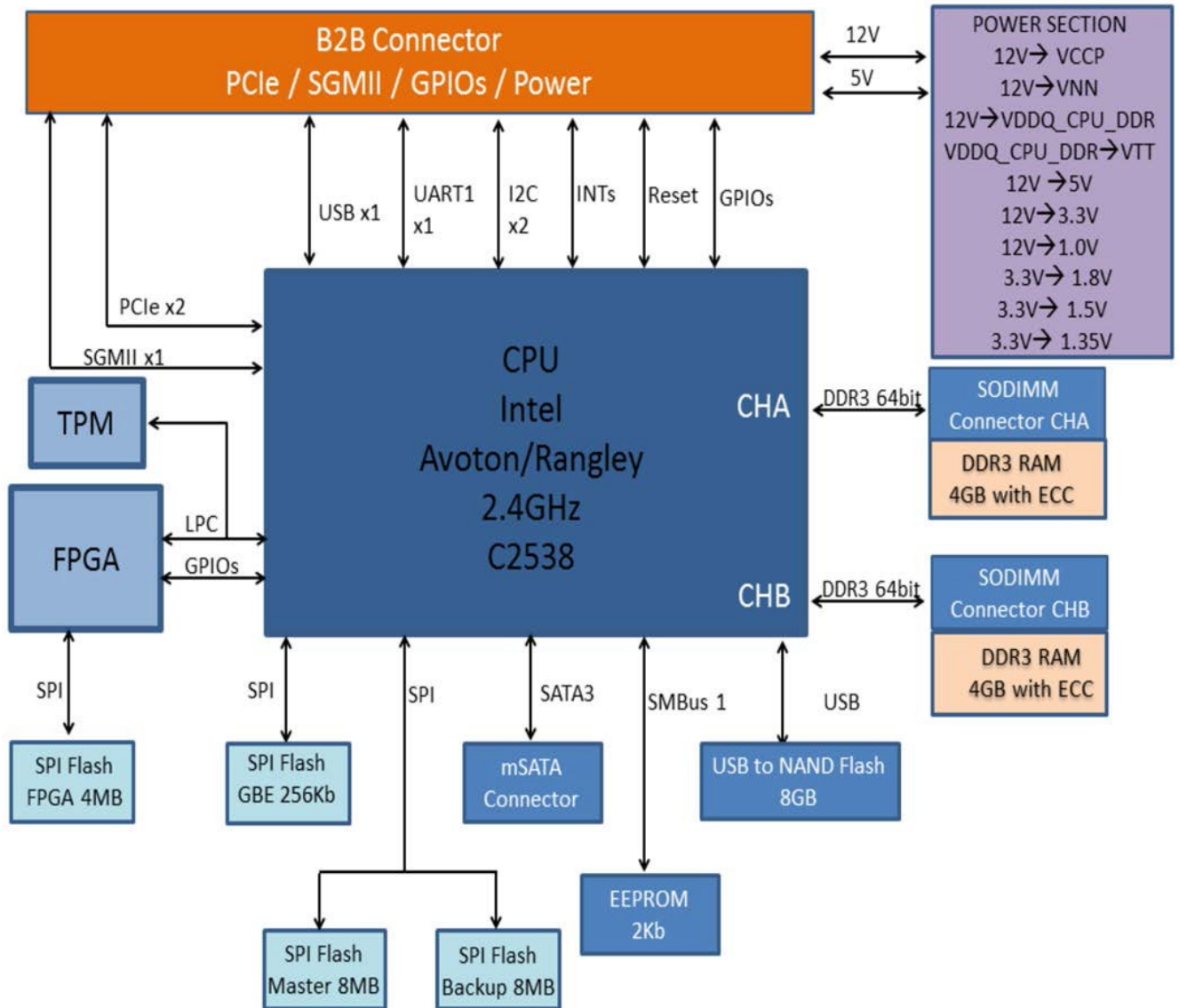
# System Overview:

## Main PCB Block Diagram



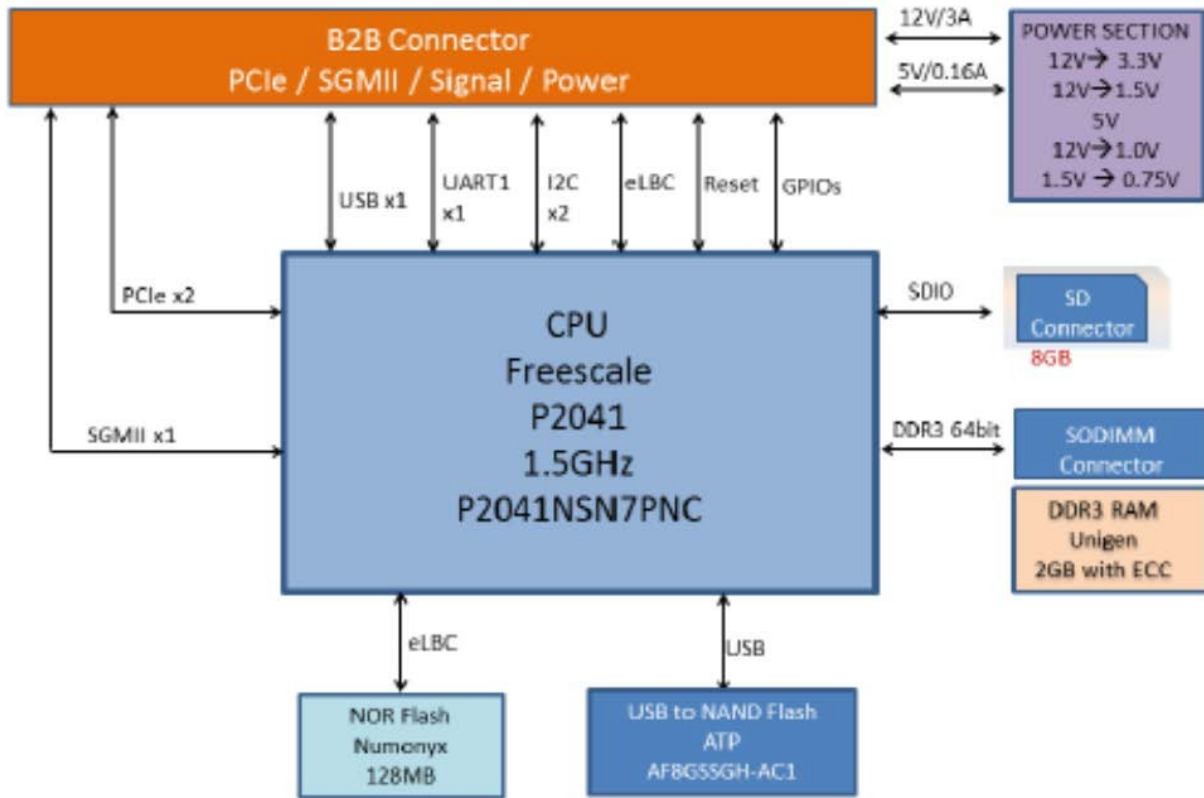


## X86 CPU Module Block Diagram





## P2041 CPU Module Block Diagram



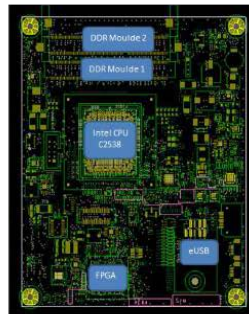
## PCB Board Set

The AS5712-54X is composed of 4 unique PCB assemblies as follows:

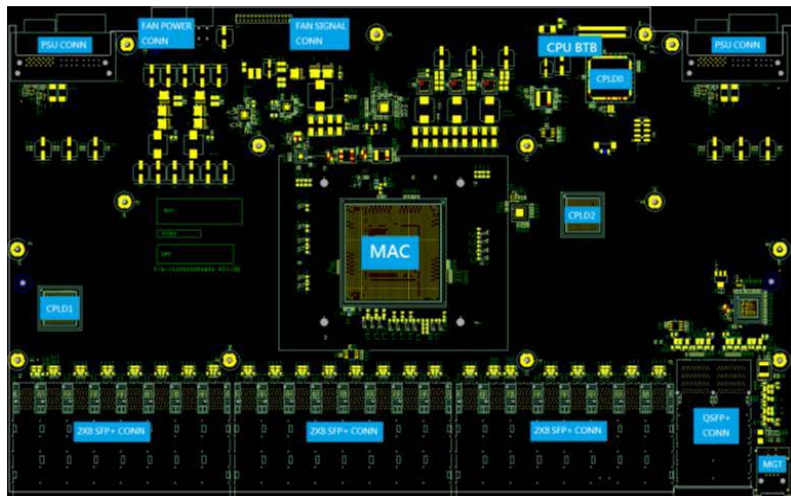
- Main switch PCB which supports the switching silicon and all front panel connections
- X86 CPU module PCB which provides the control processor and associated components
- P2041 CPU module PCB which provides the control processor and associated components
- Fan PCB which provides connectivity for the 5 Fan modules in the system



Fan PCB



CPU PCB



Switch PCB

## 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.

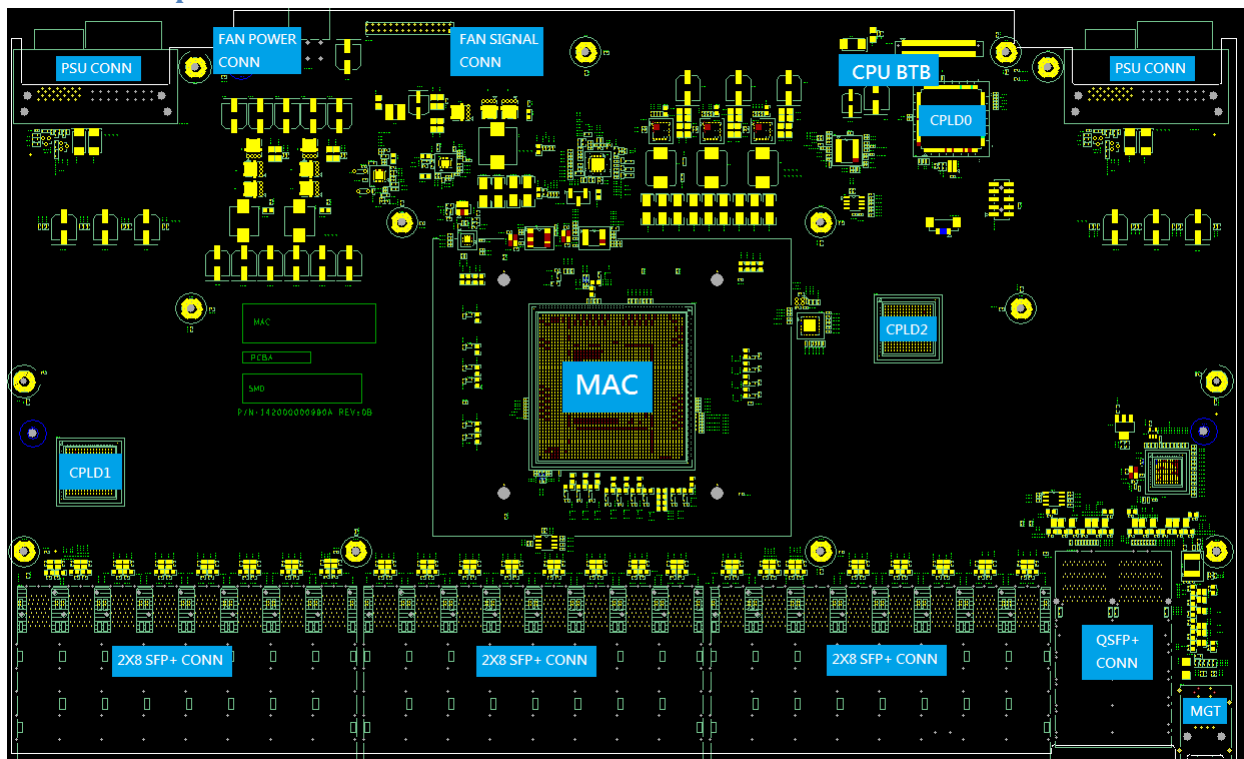
## Main PCB Dimensions

	Inches	Millimeters
Length	9.95	252.70
Width	16.28	413.50

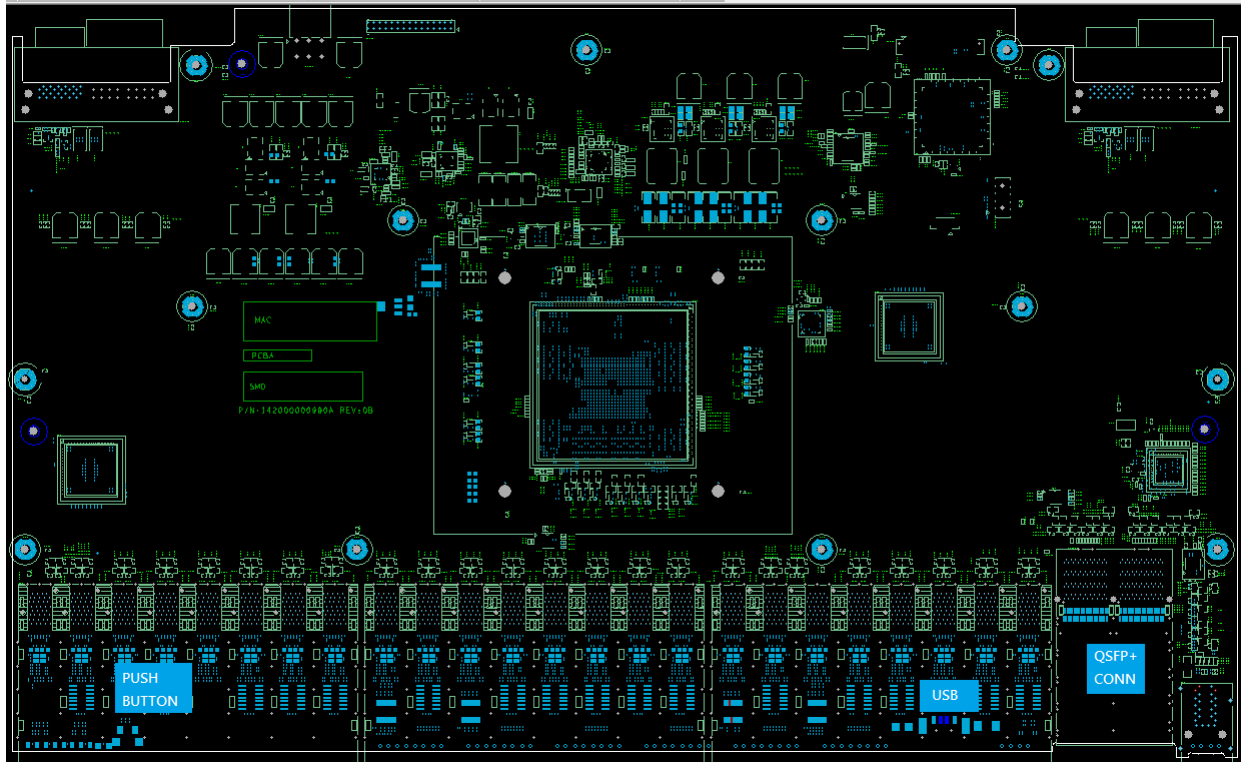
## Main PCB major components

Description	Manufacturer	Part Number
Switching Silicon	Broadcom	BCM56854
10/100/1000 PHY	Broadcom	BCM54616S
CPLD	Altera	CPM570 (3 pieces)
Cage/Connector SFP+ 2x8 (x3)	All Best	R-OP-008320-7-B-N-42-F5
Cage/Connector QSFP+ 2x2 (x1)	All Best	R-TR-Q2-4CMA-OU
Cage QSFP+ 1x2 (x1)	All Best	H-OR-Q2-4CX1-F5F
Connector QSFP+ 1x1 (x2)	All Best	R-CT-Q1-9CX2
Connector RJ45 2x1 (x1)	UDE	M1-C2100CK13-1

## Main PCB Top view

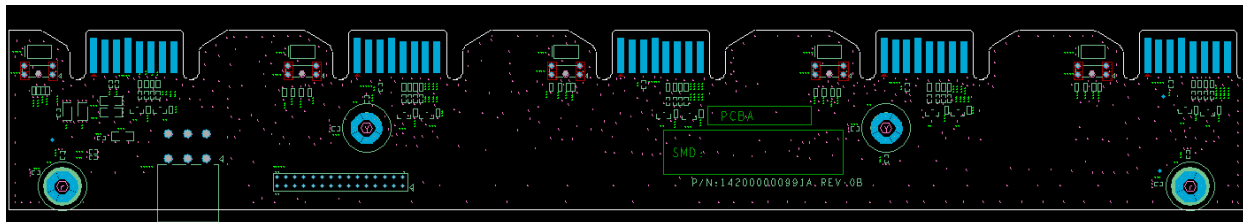


## Main PCB Bottom View



## Fan PCB

The Fan PCB is 4 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 small cable assembly for power and a small cable assembly for management signals.



## Fan PCB Dimensions

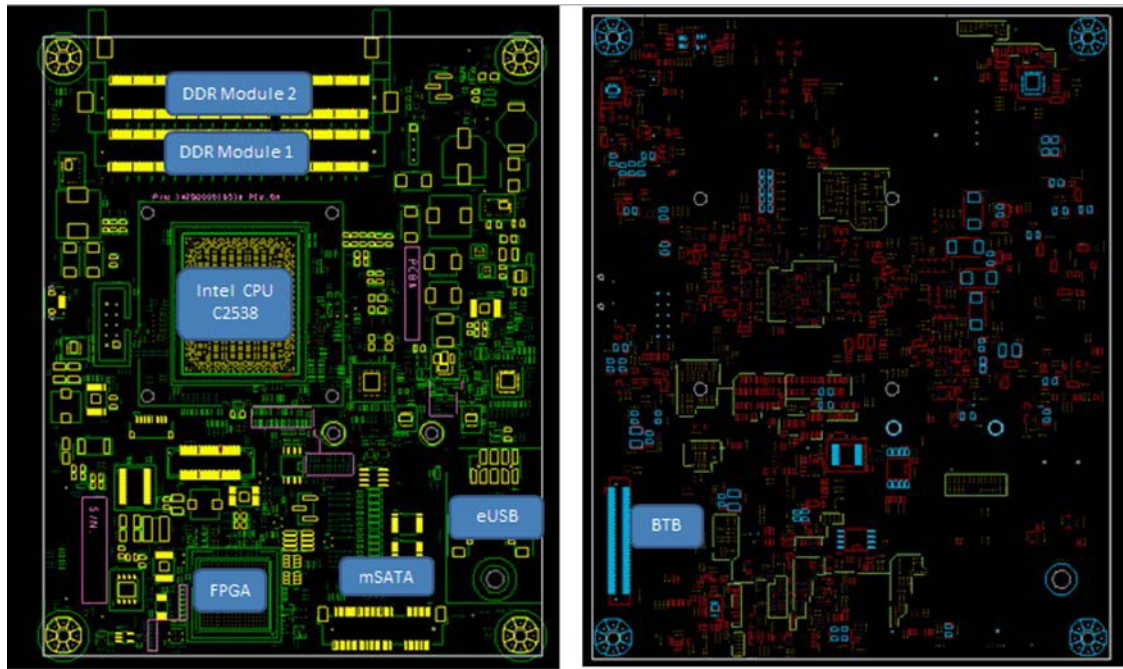
	<u>Inches</u>	<u>Millimeters</u>
Length	10.86	275.75
Width	1.57	40



## 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 Atom C2000 series communication processor. This family of Intel SoCs offers a wide range of pin compatible options scaling from two to eight cores, a thermal design power (TDP) of 7W to 20W, integrated HW acceleration, and Intel Xeon Instruction Set Architecture compatibility.

### CPU PCB Top and Bottom side



### CPU PCB Dimensions

	Inches	Millimeters
Length	5.98	151.9
Width	4.83	122

### CPU PCB major components

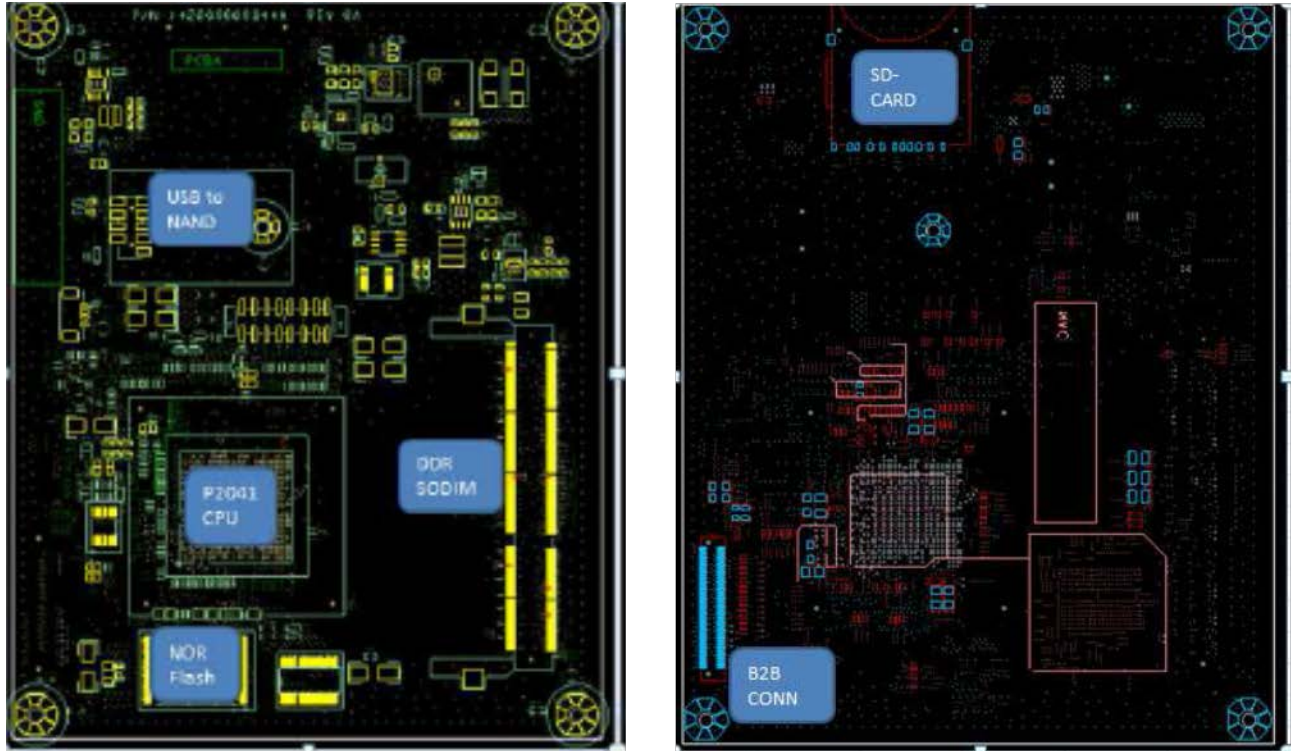
Description	Manufacturer	Part Number
CPU	Intel	C2538 – 2.4GHz 3.0V
SDRAM 4GB SO-DIMM w/ECC (x2)	Innodisk	M3D0-4GHS2LPC 4GB 1.35V
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC1
SPI NOR Flash 8MB (x2)	Winbound	W25Q64FVSSIG
Trusted Platform Module (TPM)	STMicroelectronics	ST33ZP24AR28PVSP ST
FPGA	Microsemi	A2F200M3F-FGG256
mSATA Connector	TE Connectivity	1775838-2



## P2041 CPU Module PCB

The P2041 CPU module is an 8 layer PCB and supports the communication processor and associated components for the CPU subsystem. The communication processor utilized The P2041 QorIQ integrated communication processor which combines four PowerArchitecture® processor cores with high performance data path acceleration logic with network and peripheral bus interfaces required for networking, telecom/datacom, wireless infrastructure, and aerospace applications.

### CPU PCB Top and Bottom side



### CPU PCB Dimensions

	<u>Inches</u>	<u>Millimeters</u>
Length	5.98	151.9
Width	4.83	122

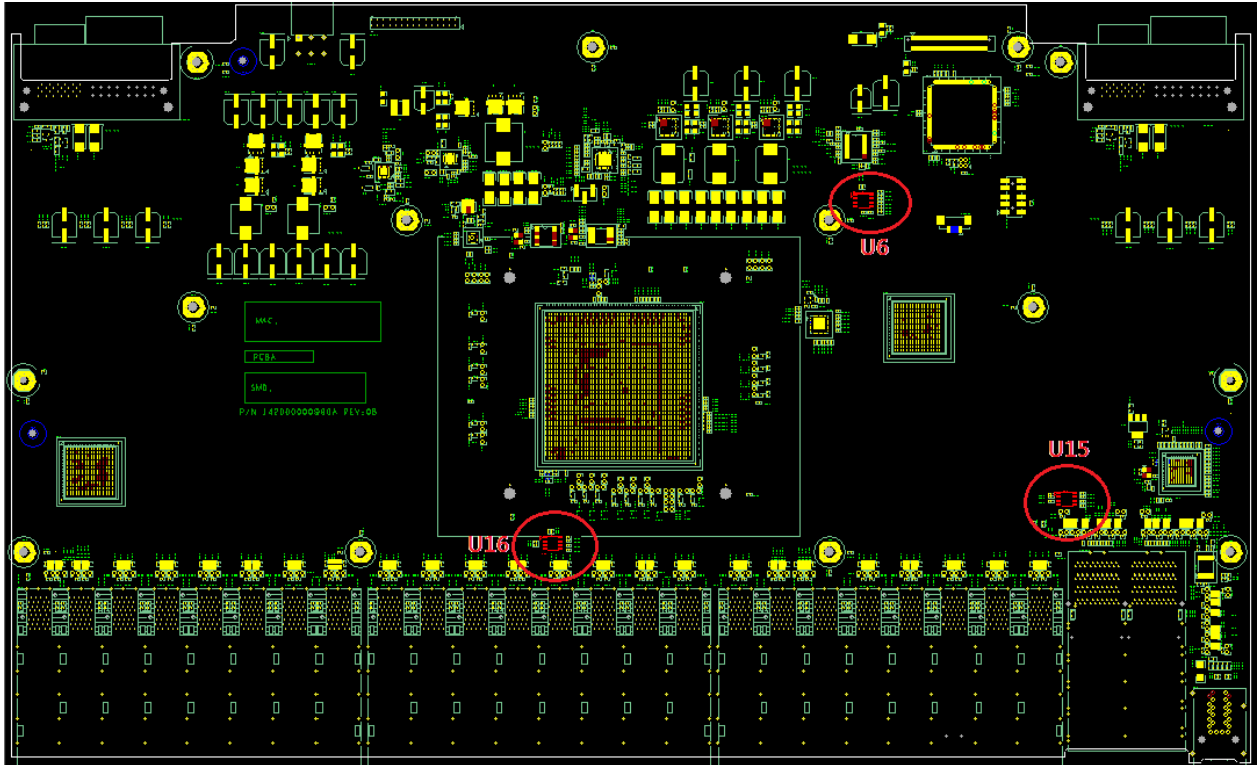
### CPU PCB major components

<u>Description</u>	<u>Manufacturer</u>	<u>Part Number</u>
CPU	Freescle	P2041NSN7PNC 1.5GHz 1.0V FCPBGA780 FREESCALE
SDRAM: DDRIII 2GB with ECC SO-DIMM	UNIGEN	UG25U7200N8UU-ACD
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC1
NOR Flash (Boot): 128MB	NUMONYX	JS28F00AM29EWHA
CPLD	Altera	EPM570 (1 pcs, TQFP144 package)
SD CARD: 8GB	Transcend	TS8GSDHC10M

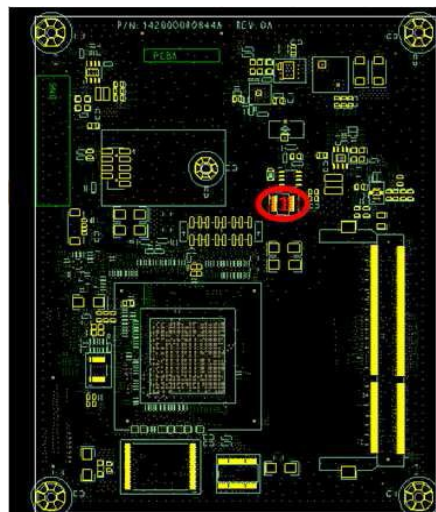
## Thermal Monitoring

The AS5712-54X 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



### CPU Module thermal sensor locations





## **Software Support**

The AS5712-54X supports a base software package composed of the following components:

### **BIOS support**

The AS5712-54x Supports AMI AptioV BIOS version A01 or greater with the x86 CPU module

### **U-Boot**

The AS5712-54x Supports U-Boot version 1.4.0.2 or greater with the P2041 CPU module

### **ONIE**

The AS5712-54x supports ONIE version 2014.08 or greater with the P2041 CPU Module

### **Open Network Linux**

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

## Specifications

### Power Consumption

The total estimated system power consumption of the AS5410-54X is ~360 Watts. This is based upon worst case power assumptions for traffic, optics used, and environmental conditions. Typical power consumption is ~282 Watts

### 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 Directive 2002/96/EC)