

Edgecore AS4610-xxx

Switch Specification

Revision .01



OPEN
Compute Project

Revision History

Revision	Date	Author	Description
.01	1/28/2016	Jeff Catlin	Initial Release

Contents

Revision History.....	2
Licenses	5
Scope.....	7
Overview	7
System Overview.....	8
Physical Overview	9
Dimensions.....	9
Mechanical Overview.....	10
AS4610-54P/54T Front Panel.....	10
AS4610-30P/30T Front Panel.....	10
AS4610-30P/54P Rear Panel	11
AS4610-30T/54T Rear Panel	11
Top View.....	12
Front View	13
Rear View	14
LED Definitions.....	14
Front panel system LEDs.....	14
Front Panel RJ-45 port LED	16
Front Panel SFP+ port LEDs.....	16
Front Panel QSFP+ Stacking port LEDs.....	16
Field Replaceable Units	17
Power Supply Modules.....	17
Power Supply LEDs.....	17
150W Power Supply Mechanical Overview	18
600W/920W Power Supply Mechanical Overview	19
150W PSU Connector.....	20
150W PSU Pinout.....	20
600W/900W PSU Connector.....	21

600W/920W PSU Pinout.....	21
Micro USB serial cable	22
System Fan	22
System Overview:	23
System Block Diagram	23
Power Over Ethernet	23
Universal Power Over Ethernet Support UPOE	25
CPU Subsystem:	25
Memory.....	25
SPI FLASH.....	25
eUSB NAND FLASH	25
DDR3 SDRAM	25
PCB Board.....	25
Main Switch PCB	26
Main PCB Dimensions.....	26
Main PCB major components.....	27
Main PCB Top view	28
Main PCB Bottom View	29
Thermal Monitoring	29
Main PCB Thermal sensor locations.....	30
Software Support	30
ONIE	30
Open Network Linux.....	30
Open Compute SAI support	30
Specifications	31
Power Consumption	31
Environmental.....	31
Safety	31
Electromagnetic Compatibility	31
ROHS	31

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Component	Vendor	MFG P/N	Quantity	Remark
Switch Controller integrated CPU	Broadcom	BCM56340	1	For 54/54P
Switch Controller integrated CPU	Broadcom	BCM56342	1	For 30/30P
1G Non-MACsec PHY	Broadcom	BCM54282	3 for 30/30P 6 for 54/54P	
10G MACsec PHY	Broadcom	BCM84758	1	
PSE	Broadcom	BCM59121	4 for 30/30P 7 for 54/54P	PoE
SPI FLASH	MXIC	MX25L6435EM2I-10G	1	8MBytes
eUSB NAND	ATP	AF8GSSGH-AC3	1	8GBytes
DDR3	Samsung	K4B4G0846B-HCK0	5	512M x 8
CPLD	Lattice	LCMXO2-1200UHC-4FTG256C	1	
I2C Switch	NXP	PCA9548APW	1	
RTC	ST	M41T11M6F	1	
Thermal Sensor	NS	LM77CIMX-3/NOPB	1	
Board ID EEPROM	ATMEL	AT24C16C-SSHM-T	1	
10G PHY Initial EEPROM	ATMEL	AT25256B-XHL-T	1	
USB HUB IC	Genesys	GL850G-OHY31	1	
PSU	3Y	YM-1151DA03R	2	150W AC
PSU	3Y	YM-1601AA01R	2	600W AC
PSU	3Y	1921AA01R	2	920W AC
Connector 2x1 QSFP	Allbest	R-TR-Q1-4CMA-5C	1	
Connector 2x2 SFP	Allbest	R-OP-008080-6-B-N-08	1	
Connector 2x6 RJ-45	Kinsun	30226B5625	4	

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Scope

This document outlines the technical specifications for the Edgecore AS4610-xxx Open Switch Platform submitted to the Open Compute Foundation.

Overview

This document describes the technical specifications of the AS4610-xxx Top of Rack/Access Switch contributed by Edgecore Networks. The AS4610-xxx is a cost optimized switch design focused on Top of Rack Data Center deployments and/or Access Layer deployments and support 1Gb Ethernet connectivity providing, 10Gb Ethernet uplinks, and optional Power over Ethernet (PoE) support.

The AS4610-xxx is a flexible design that can be built as one of four configurations at time of manufacturing offering the following functionality:

- AS4610-30T - This SKU supports 24 x RJ-45 ports of 1Gb Ethernet with 4 x 10Gb SFP+ uplinks and 2 x 20G QSFP+ stacking ports.
 - AS4610-30P - This SKU supports 48 x RJ-45 ports of 1Gb Ethernet with 4 x 10Gb SFP+ uplinks and 2x 20G QSFP stacking ports.
 - AS4610-54T - This SKU supports 24 x RJ-45 ports of 1Gb Ethernet with 802.3af/at Power over Ethernet support with 4 x 10G SFP+ uplinks and 2 x 20G QSFP stacking ports.
 - AS4610-54P - This SKU supports 48 x RJ-45 ports of 1Gb Ethernet with 802.3af/at Power over Ethernet support with 4 x 10G SFP+ uplinks and 2 x 20G QSFP stacking ports.
- The AS4610-xxx is a 1RU design that supports standard 19" rack deployments as well as standard 21" Open Rack deployments with the ORSA-1RU.

System Overview

	AS4610-30T	AS4610-30P	AS4610-54T	AS4610-54P
CPU	Dual-core ARM Cortex A9 1GHz			
FLASH	SPI FLASH 8MB Eusb 8GB			
RAM	DDR3 2GB (512M x 8 x 4, with ECC)			
CPLD	Lattice LCMXO2-1200U x 1			
Management	Micro USB to D-sub (console)			
USB	One type-A USB port, support USB 2.0 (480Mbps)			
Ethernet Port	24 x 10/100/1G RJ45 port 4 x 10G SFP+ Fixed Fiber port		48 x 10/100/1G RJ45 port 4 x 10G SFP+ Fixed Fiber port	
Stacking Port	2 x QSFP by DAC or 40G QSFP Transceiver			
MAC	1 x BCM56342 (Helix4)		1 x BCM56340 (Helix4)	
GE PHY	3 x BCM54282		6 x BCM54282	
10G PHY	1 x BCM84758			
POE	No	1x STM32F030 + 4x BCM59121 On MainBoard	No	1x STM32F030 + 7x BCM59121 On MainBoard
PCB Size	431.8mm x 230mm			
Mechanical Dimension	17.3" x 13.8" x 1U			
PSU	150W(12V@12.5A)	600W(54.5V@11A)	150W(12V@12.5A)	920W(54.5V@16.88A)
Fan information	None	117000000149A 40x40x28mm 13000RPM	None	117000000149A 40x40x28mm 13000RPM
Cooling	System Fanless	One System FAN	System Fanless	One System FAN

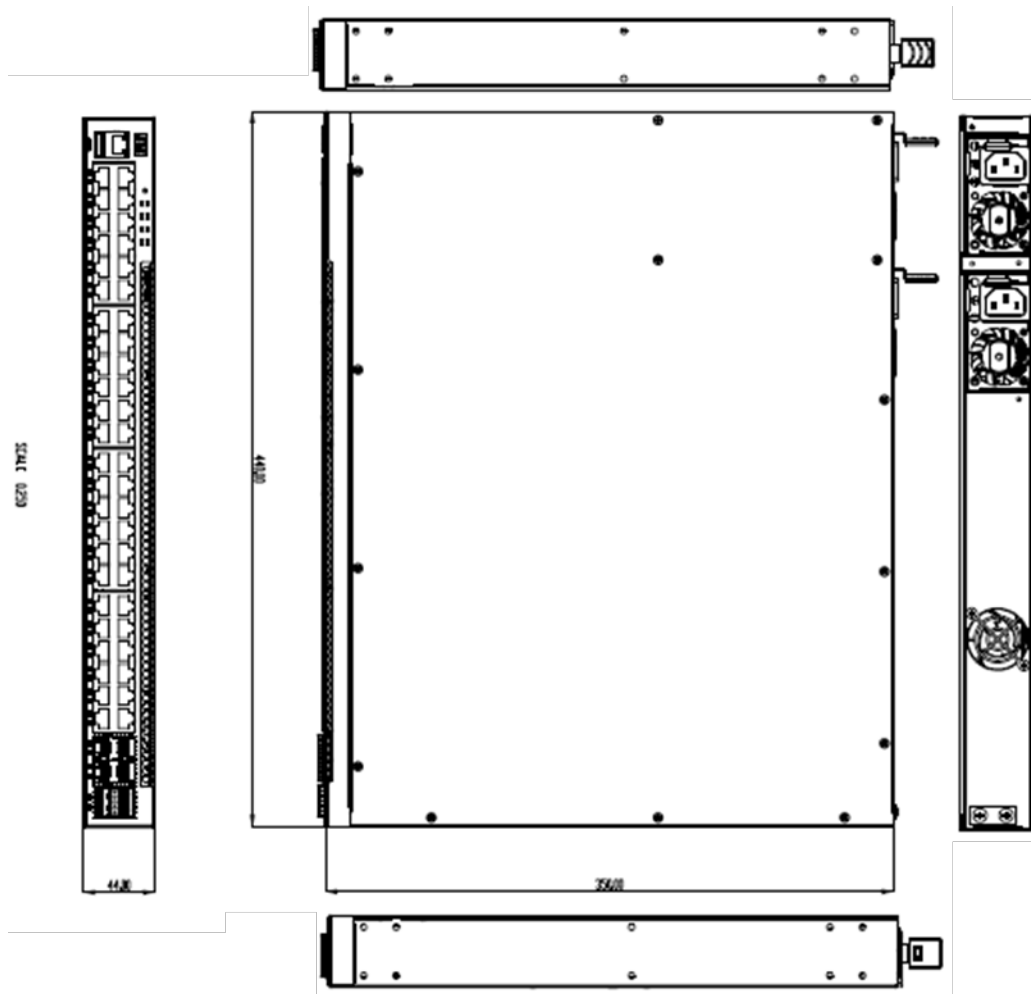
Physical Overview

Dimensions

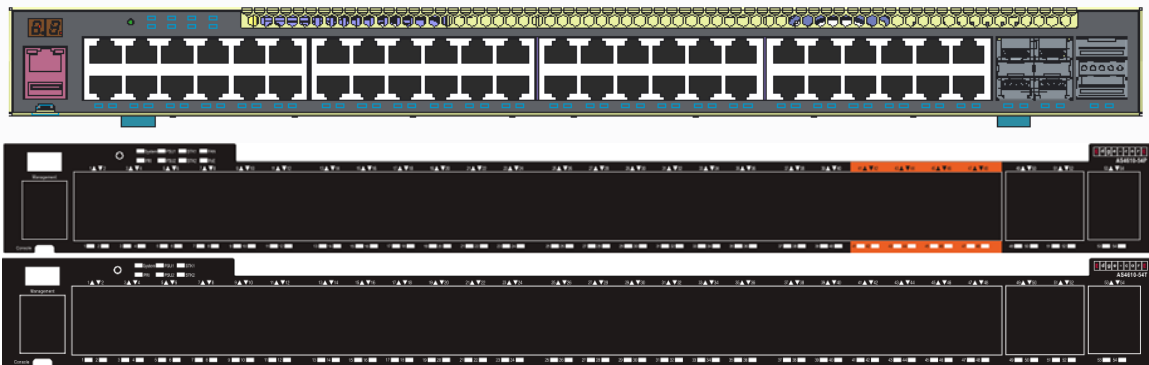
	Inches	Millimeters
Length	20.27	350
Width	17.26	440
Height	1.71	44



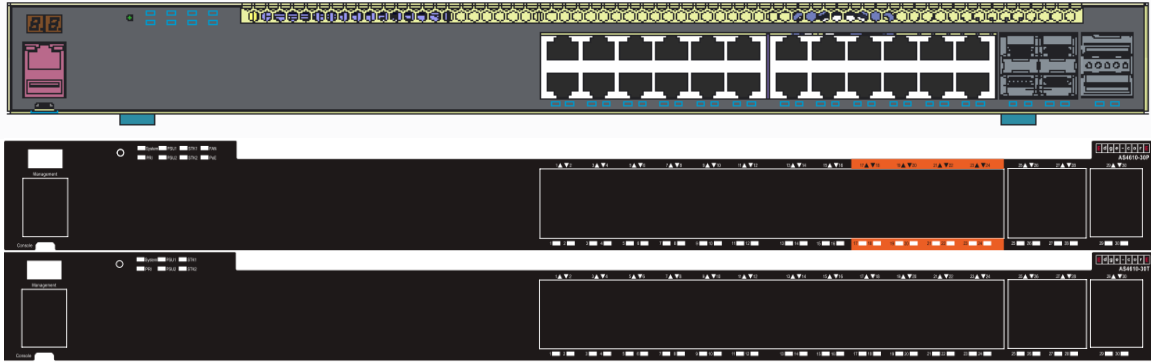
Mechanical Overview



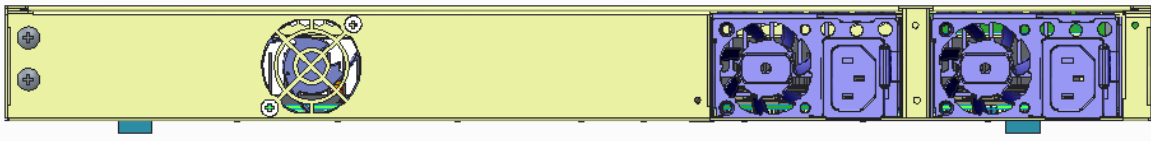
AS4610-54P/54T Front Panel



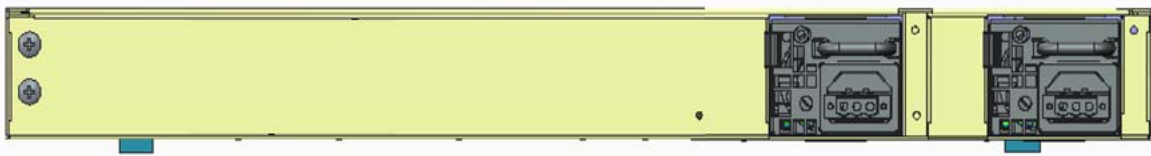
AS4610-30P/30T Front Panel



AS4610-30P/54P Rear Panel

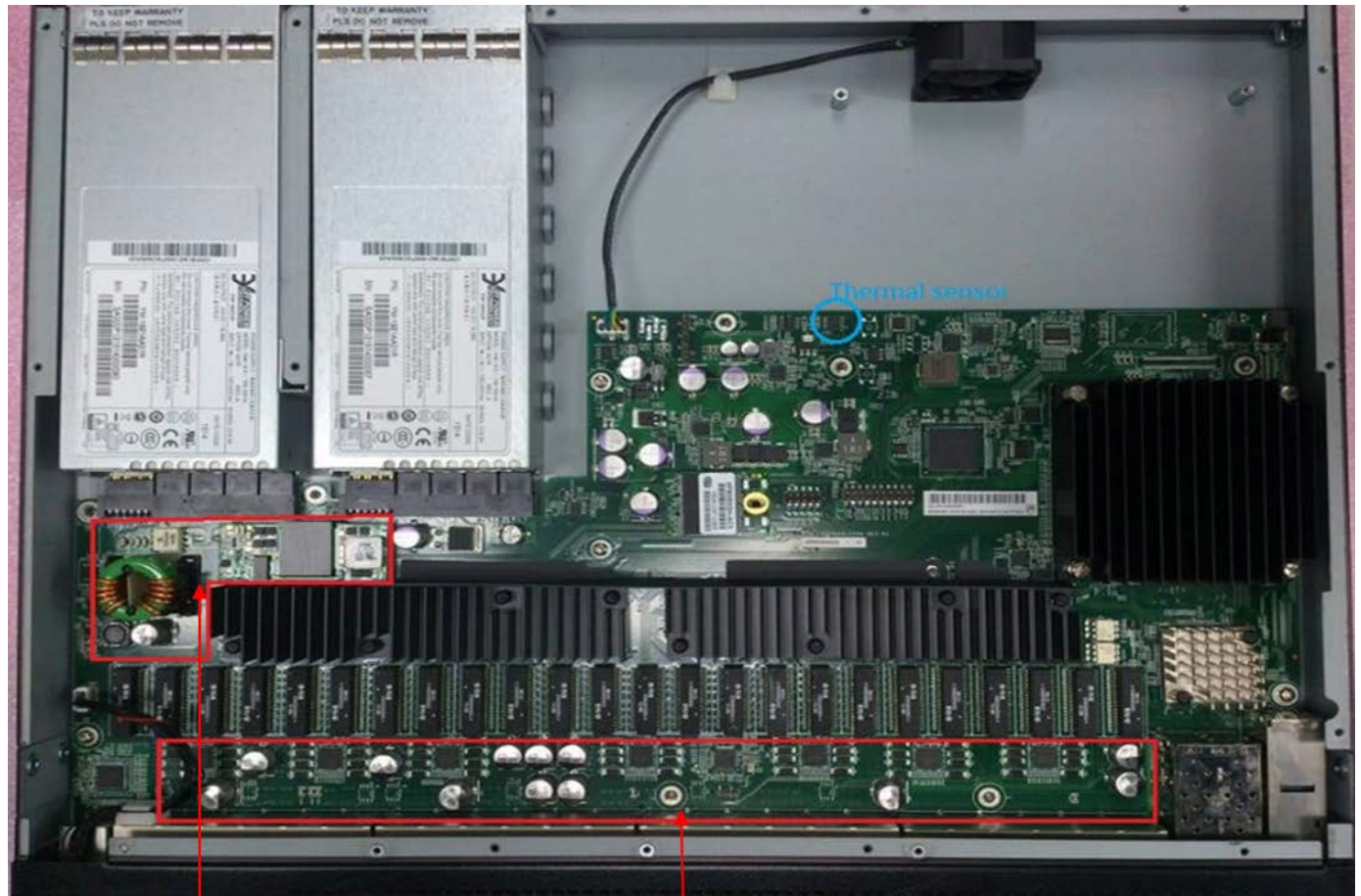


AS4610-30T/54T Rear Panel



Top View

The top view of the AS4610-XXX shows the PCBs and associated components in the AS4610-XXX system

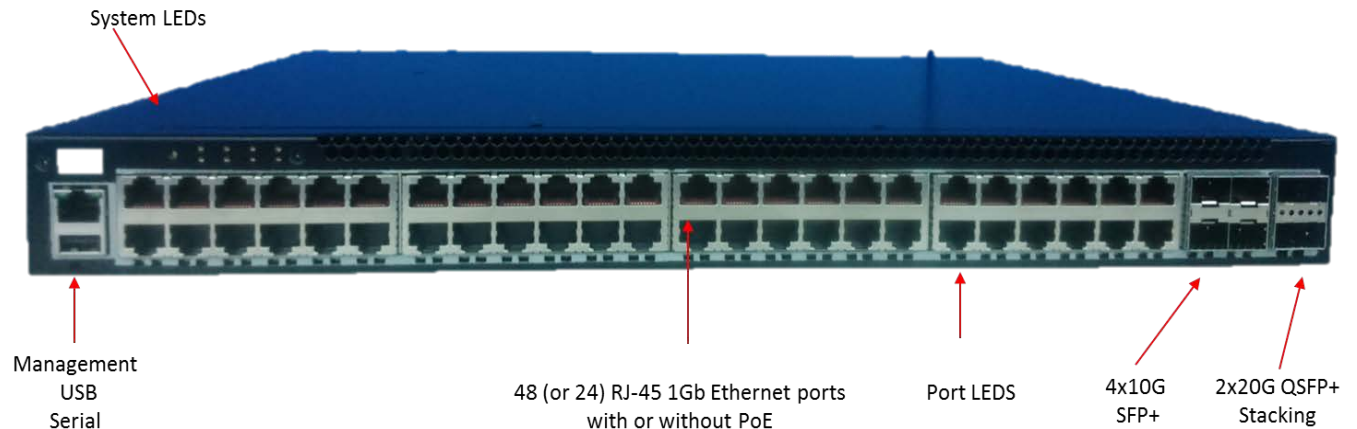


54.5V / 12V Brick

POE Circuitry

AS4610-54P shown

Front View



The front panel view of the AS4610-XXX includes the following key components:

- Up to 48 RJ-45 1Gb Ethernet Ports
 - Capable of operating at 10Mb, 100MB, 1000Mb
 - Optional PoE support based upon SKU
- Four SFP+ 10Gb ports
- Two QSFP+ ports
 - 20Gb capacity per port used for stacking
- Network port LEDs
 - One LED per port
- System LEDs
 - Up to eight LEDs depending on SKU
 - Two digital numeric LED indicators
- Management port
 - RJ-45 10/100/1000Mb
- USB port
 - Used for optional external storage
- Micro USB RS232 management port
 - Supports asynchronous mode with the default being eight data bits, one stop bit, no parity

Rear View



The rear view of the AS4610-XXX includes the following key components:

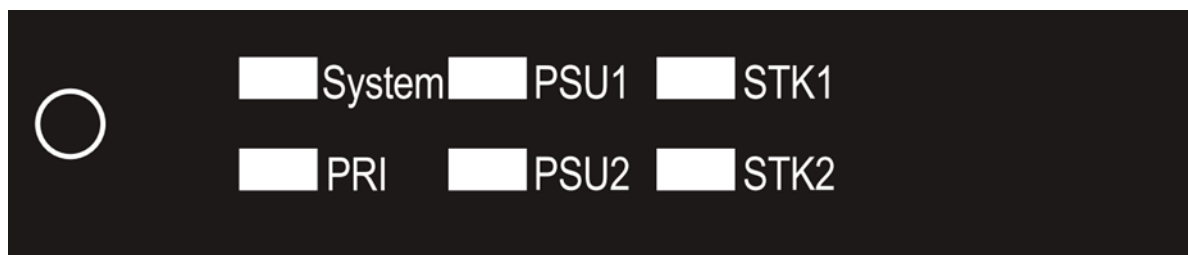
- One system fan
 - Fan only included in PoE SKUs
- Two redundant hot swappable power supply modules
 - LED per power supply to indicate status
 - Color coding handles to indicate airflow direction
 - Latching mechanism to secure power cord

LED Definitions

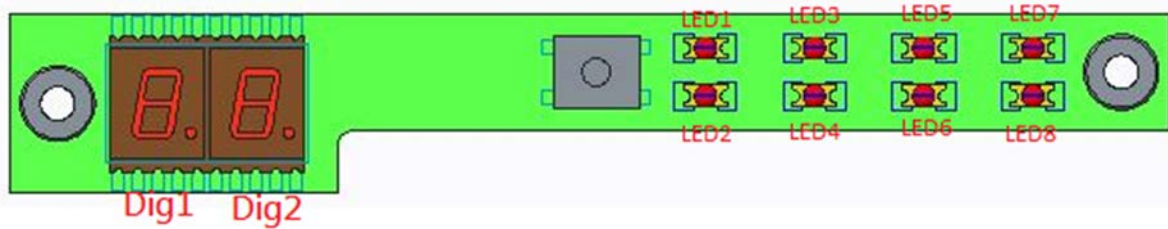
Front panel system LEDs



AS4610—30P/54P



AS4610—30T/54T



LED	Condition	Status
System	Green solid	System Diagnostic & OS OK
	Green Blinking	System Diagnostic & OS in progress
	Amber solid	System Diagnostic & OS Failed
PRI	Green solid	It is Master unit in the Stacking
	Amber solid	It is Slave unit in the Stacking
	Off	It is in inconsistent/error state
PSU1	Green solid	Power supply 1 operates normally
	Amber solid	Power supply 1 present but fault
	Off	Power supply 1 isn't presented. No PSU1
PSU2	Green solid	Power supply 2 operates normally
	Amber solid	Power supply 2 present but fault
	Off	Power supply 2 isn't presented. No PSU2
STK1 (Reserved for future use)	Green solid	(Reserved for future use)
	Amber solid	(Reserved for future use)
	Off	(Reserved for future use)
STK2 (Reserved for future use)	Green solid	(Reserved for future use)
	Amber solid	(Reserved for future use)
	Off	(Reserved for future use)
FAN (PoE SKUs only)	Green solid	Fan works normally
	Amber solid	Fan fail
PoE (PoE SKUs only)	Green solid	System has power budget for PoE.
	Amber solid	System doesn't have power budget for PoE.
Seven segment LEDs Digit 1 / Digit 2	Numeric	Reserved to indicate unit ID in stack

Front Panel RJ-45 port LED

Green	Port Link without POE
Green Blinking	Port Link/Activity without POE
Amber	Port Link with POE
Amber Blinking	Port Link/Activity with POE
Off	No Link

Front Panel SFP+ port LEDs

Green	10G Link
Green Blinking	10G Link/Activity
Amber	1G Link
Amber Blinking	1G Link/Activity
Off	No Link

Front Panel QSFP+ Stacking port LEDs




Green	20G Link
Green Blinking	20G Link/Activity
Off	No Link

Field Replaceable Units

Power Supply Modules

The AS4610-xxx supports two load sharing, hot swappable, redundant field replaceable power supply modules as listed below.

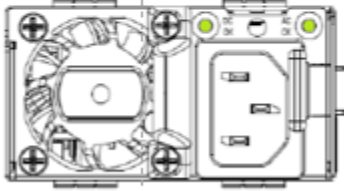
- AS4610-30T and AS4610-54T will use Non-POE 150W PSU
- AS4610-30P and AS4610-54P will use Low POE 600W PSU or High POE 920W PSU

Model	PSU Wattage	Output	PSU Dimension (W x L x H)	Efficiency	Remark
AS4610-30 AS4610-54	150W AC-DC	12V@12.5A	50.5mm x 185mm x 39mm	89% 	Vendor: 3Y P/N: YM-1151DAR
AS4610-30P AS4610-54P	600W AC-DC	54.5V@11A	73.5mm x 185mm x 40mm	92% 	Vendor: 3Y P/N: YM-1601X
	920W AC-DC	54.5V@16.88A	73.5mm x 185mm x 40mm	92% 	Vendor: 3Y P/N: YM-1921X

Power Supply LEDs

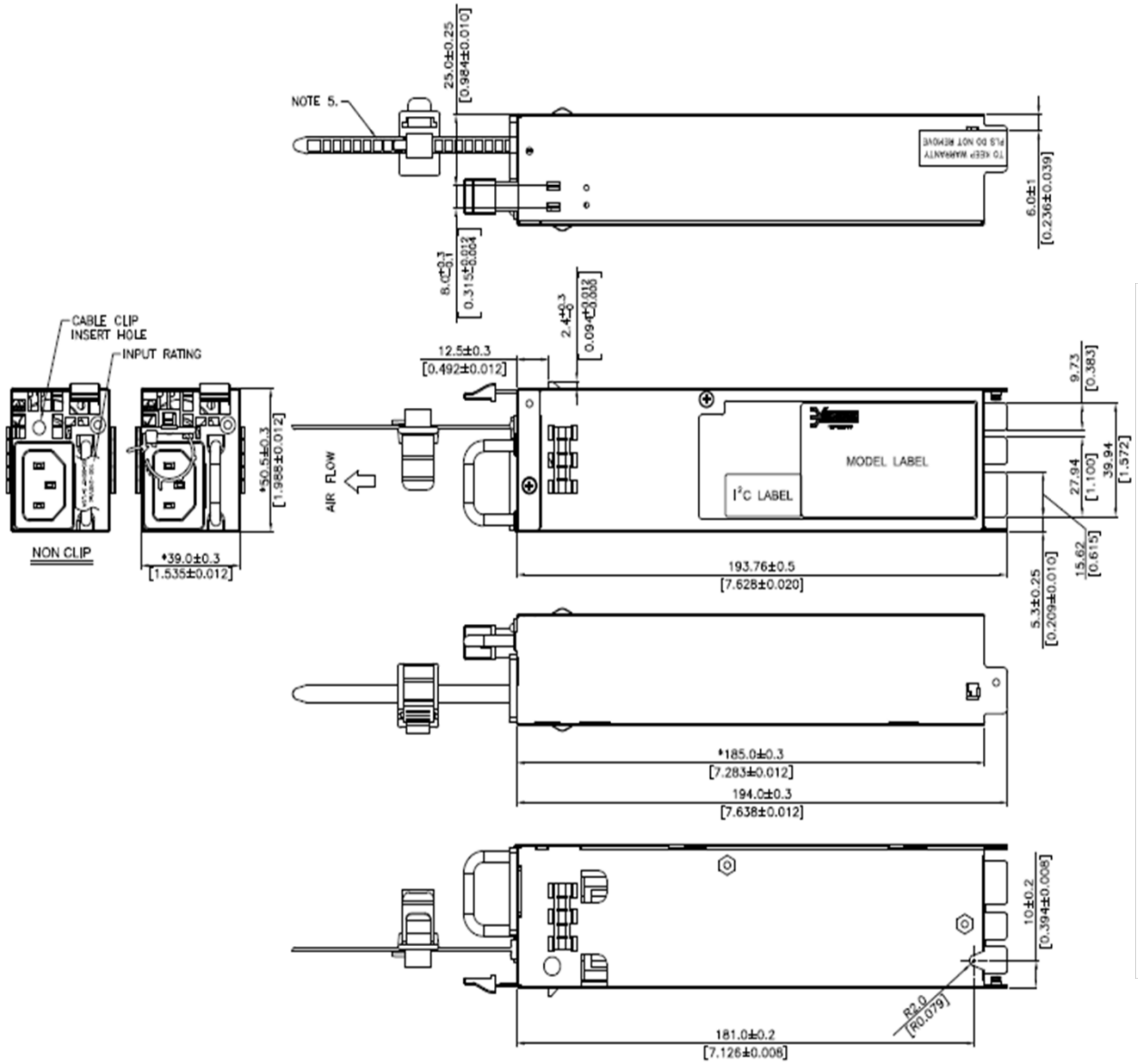
	AC OK	DC OK
LED location	Right side of front panel.	Left side of front panel.
Color=GREEN	AC on:line.	DC is good.
Frequency	1Hz	1Hz
Color=RED	Loss AC. @1+1	DC is fail. @1+1
Frequency	1Hz	1Hz

Note: " @1+1 " the mean is 1+1 redundant mode condition.



DC OK and AC OK LED indication location diagram

150W Power Supply Mechanical Overview

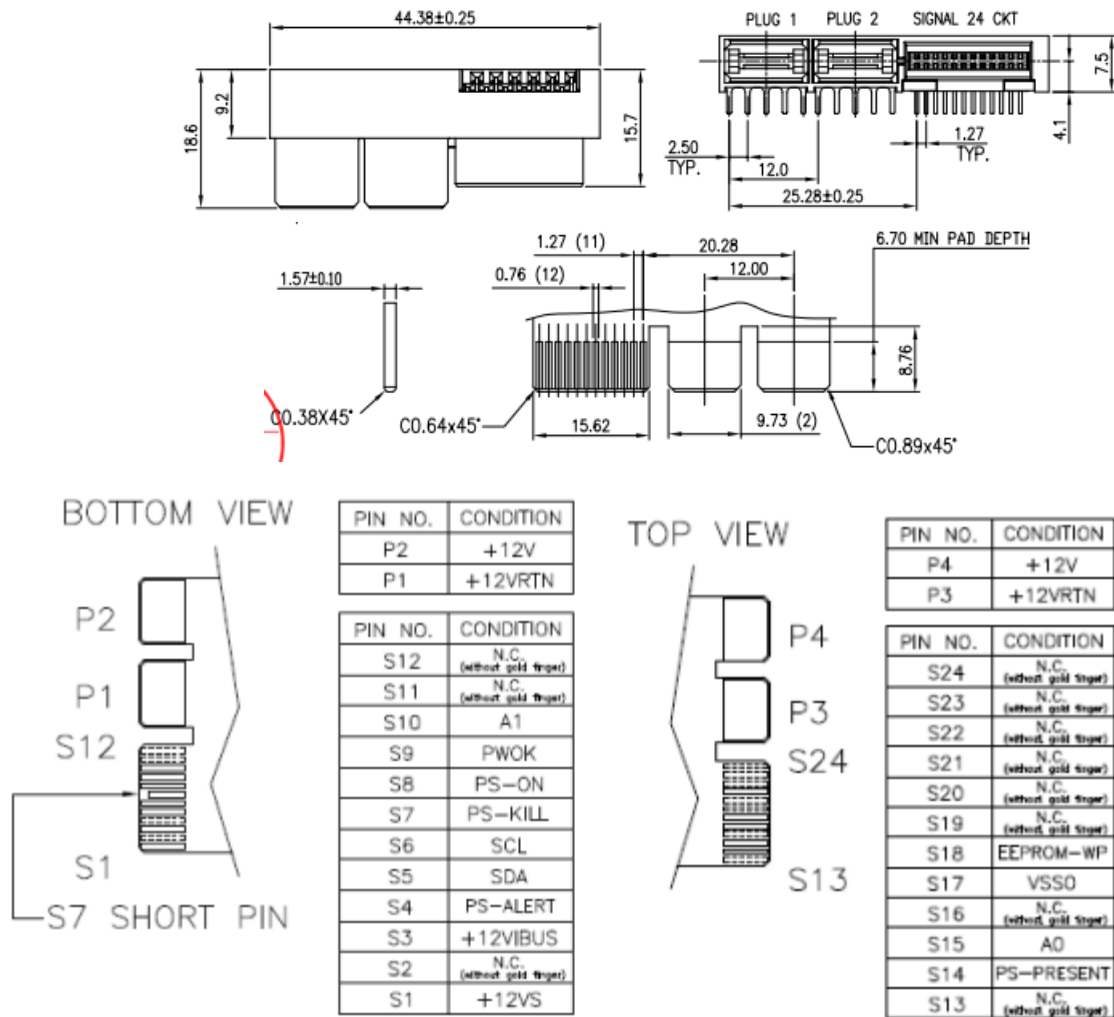


150W PSU Connector

AS4610-30T/54T 150W PSU mating connector is shown below and has 24 signal pins and 2 power pins. Each power pins has maximum current rating 30A.

Vendor: ALLTOP, P/N: C21418-126H5-Y

150W PSU Pinout

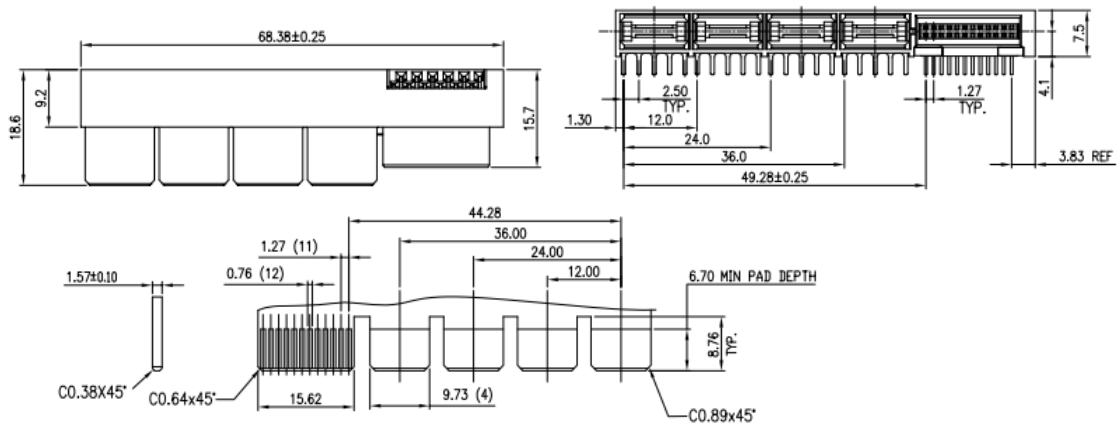


600W/900W PSU Connector

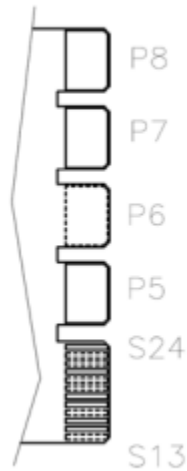
AS4610-30P/54P 600w/920W PSU mating connector is shown below and has 24 signal pins and 4 power pins. Each power pins has maximum current rating 30A.

Vendor: ALLTOP, P/N: C21419-128H5-Y

600W/920W PSU Pinout



TOP VIEW

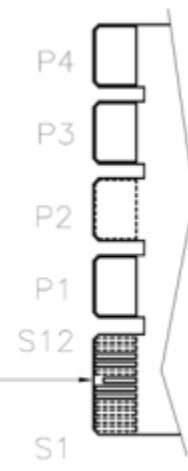


PIN NO.	CONDITION
P8	+52.7V
P7	+52.7VRTN

PIN NO.	CONDITION
P6	N.C. (without gold finger)
P5	+12VRTN

PIN NO.	CONDITION
S24	+52.7VIBUS
S23	N.C. (without gold finger)
S22	N.C. (without gold finger)
S21	PDB-FAIL
S20	N.C. (without gold finger)
S19	N.C. (without gold finger)
S18	EEPROM-WP
S17	VSS0
S16	N.C. (without gold finger)
S15	A0
S14	PS-PRESENT
S13	N.C. (without gold finger)

BOTTOM VIEW



PIN NO.	CONDITION
P4	+52.7V
P3	+52.7VRTN

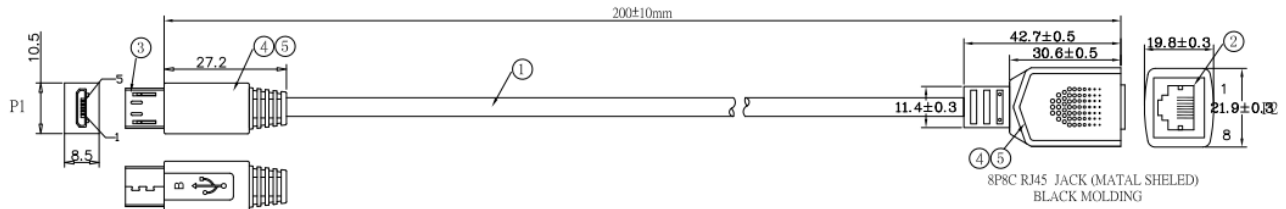
PIN NO.	CONDITION
P2	N.C. (without gold finger)
P1	+12VRTN

PIN NO.	CONDITION
S12	N.C. (without gold finger)
S11	N.C. (without gold finger)
S10	A1
S9	PWOK
S8	PS-ON
S7	PS-KILL
S6	SCL
S5	SDA
S4	PS-ALERT
S3	N.C. (without gold finger)
S2	N.C. (without gold finger)
S1	N.C. (without gold finger)

S1
S7 SHORT PIN

Micro USB serial cable

The AS4610-xxx utilizes a Micro USB port for the serial communication port and a Micro USB to RJ45 cable is supplied with the switch. The pinout of the cable is listed below:

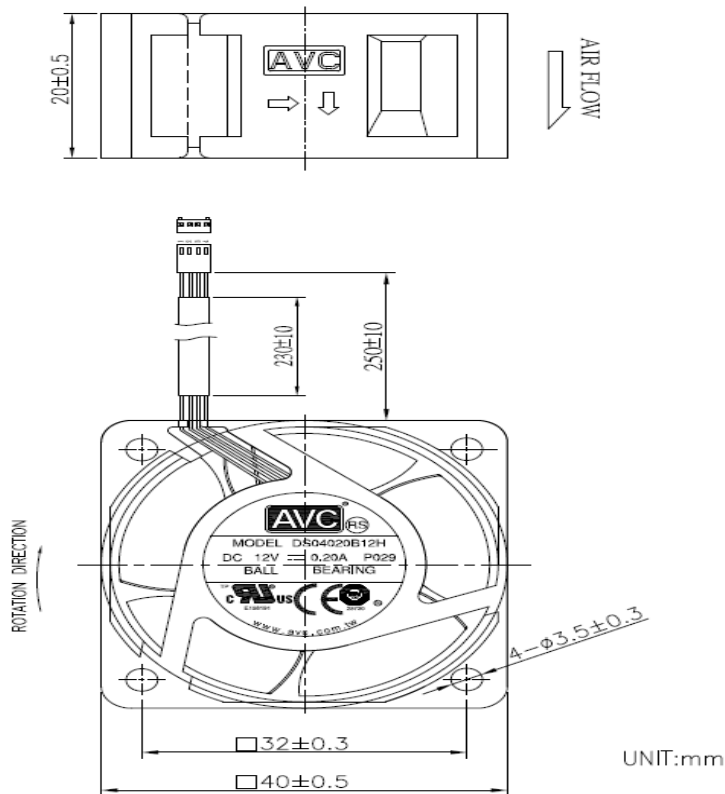


PIN ASSIGNMENT:

		RXD	TXD	GND
P1	1	2	3	4+5
P2	X	3	6	4+5

System Fan

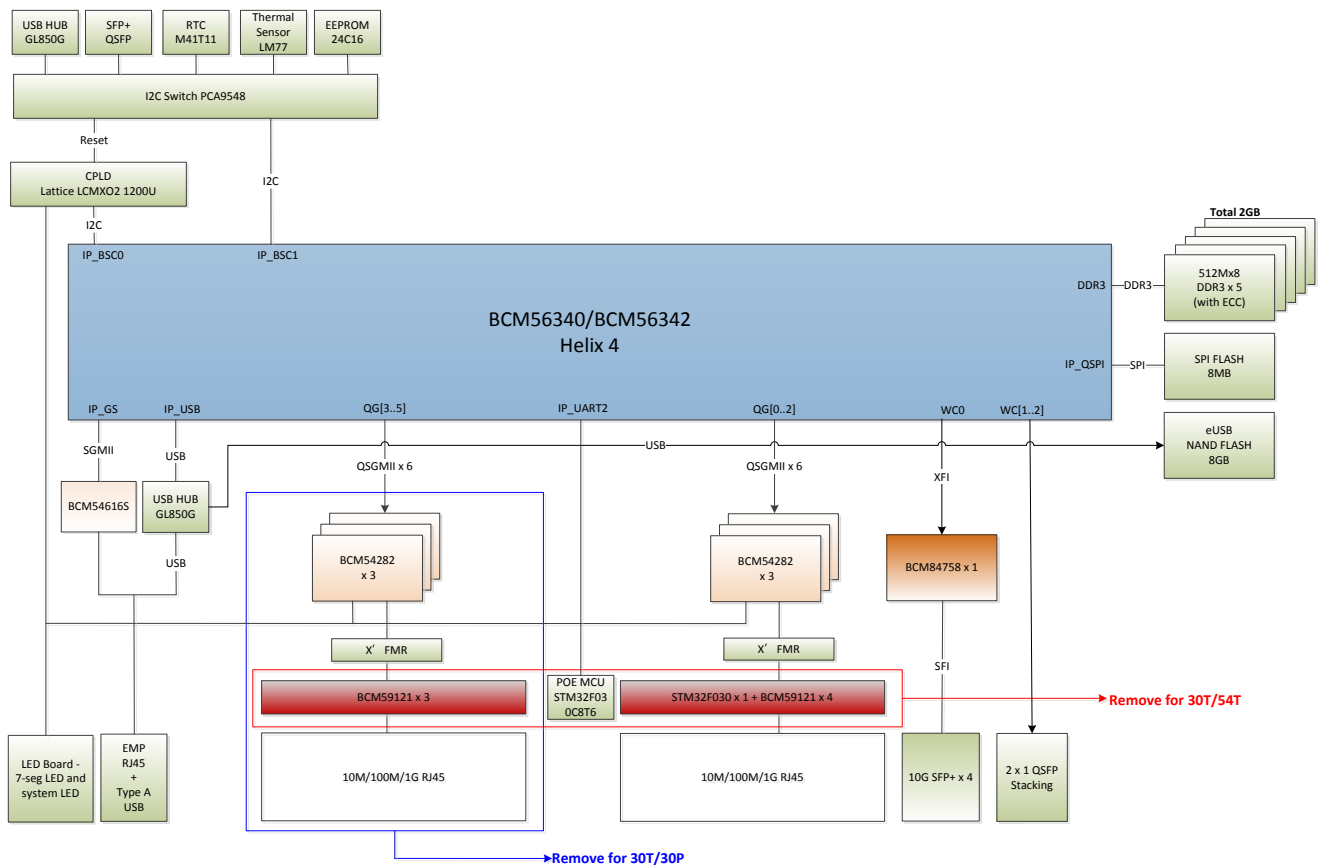
A single Fan is included in the AS4610-30P/54P PoE versions of the AS4610-XXX. The vendor of the fan is Asia Vital Components Model # DS04020B12HP029



System Overview:

The AS4610-xxx utilizes the Broadcom 56340 / 56342 Helix 4 switching silicon for the main packet forwarding engine. Connected to the 56340 / 56342 are Broadcom 54282 PHYs (up to six) for the 10/100/1000 RJ-45 ports, one Broadcom 84758 PHY for the four 10Gb SFP+ ports, and one Broadcom 54616s for the Ethernet management port.

System Block Diagram



Power Over Ethernet

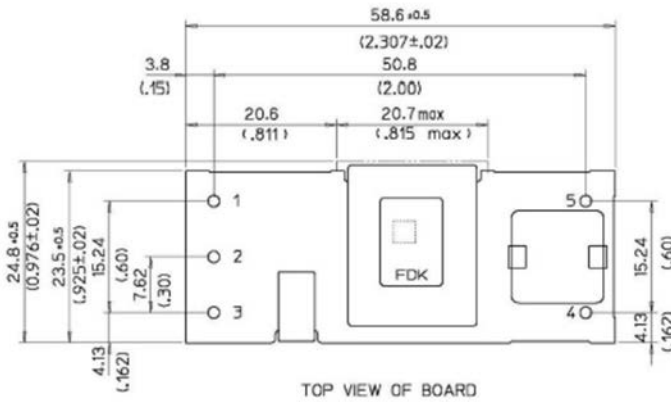
For the AS4610-30P/54P SKUs that support power over Ethernet a MCU STM32F03 Power Over Ethernet Controller and up to seven Broadcom 59121 power sourcing controllers are used.

The AS4610-30P/54P SKUs use a single output 54.5V PSU therefore a DC-DC module to transfer the 54.5V to 12V for the system is needed. A 1/8 brick (58.6mm x 24.8mm x 9.1mm) capable of 132W (12V@11A) from FDK with efficiency up to 93%. Is used.

Vendor: FDK
 Part number: FPER48T01211NA



FPER48T01211*A



Pin Connections	
Pin #	Function
1	Vin (+)
2	ON/OFF
3	Vin (-)
4	Vout (-)
5	Vout (+)

All front panel RJ-45 1G ports on the AS4610-30P/54P support 803.2af /803.3at POE functionality. Each POE port is 802.3at capable (30W) and all the POE ports can support 802.3at simultaneously provided the system power supply installed can allocate the required power budget as the PCB trace width and circuitry is designed in such a way that it is capable to supporting 802.3at POE at all ports simultaneously.

The following table summarizes how many ports of “802.3af” and “802.3at” will be supported with the different power supply options:

	P24		P48	
	“af” ports	“at” ports	“af” ports	“at” ports
One 600W PSU (At least 400W POE rating)	24	13	24	13
Two 600W PSU (At least 800W POE rating)	24	24	48	26
One 920W PSU (At least 750W POE rating)	24	24	48	25
Two 920W PSU (At least 1500W POE rating)	24	24	48	48

Universal Power Over Ethernet Support UPOE

UPOE is supported on the last eight ports of the AS4610-30P/54P. The increased UPOE power demand (60W) is shared with the other PoE ports total power budget.

- Ports 17-24 on the AS4610-30P support nonstandard UPOE up to 60W per port
- Ports 41-48 on the AS4610-54P support nonstandard UPOE up to 60W per port

CPU Subsystem:

The AS4610-XXX utilizes the Broadcom 56340/56342 integrated dual-core ARM Cortex A9 processor running at 1GHz to allow a complete solution to be developed without an external host processor.

The device controller consists of:

- Core: 1.0GHz dual-core ARM Cortex A9
- Caches: 32KB/32KB level 1 cache per CPU and a shared 512KB level 2 cache
- DRAM: 32-bits DDR3 interface with ECC support
- PCIe: single x2/dual x1 Gen 2.0 interface, Root complex and/or Endpoint capable
- GbE: two processor GbE ports
- USB: USB 2.0 interface supports host and device modes
- Flash: parallel and serial flash interfaces
- UART: two UART interfaces

Memory

SPI FLASH

The AS4610-XXX uses 8MB SPI FLASH as boot device, the SPI FLASH vendor and part number is MXIC MX25L6435EM2I-10G.

eUSB NAND FLASH

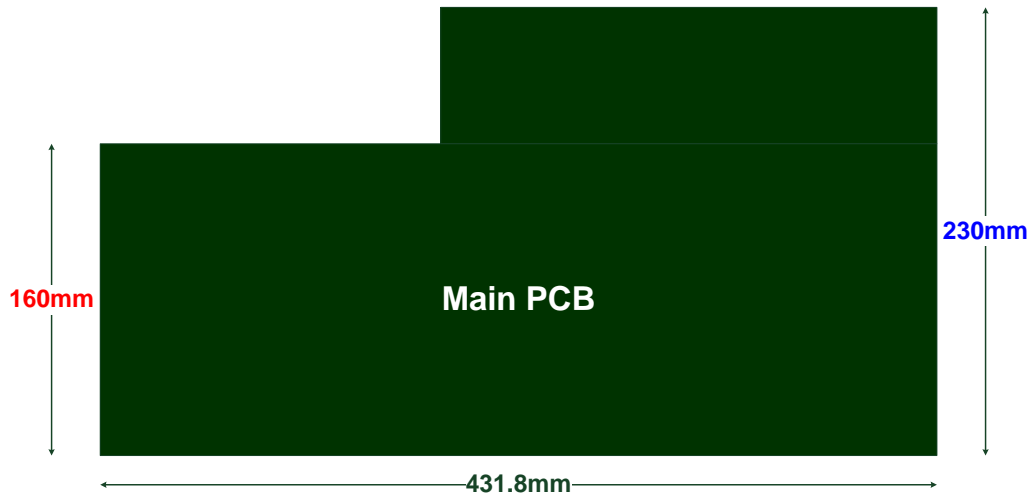
The AS4610-XXX uses eUSB NAND FLASH for network operating system storage the size of eUSB NAND FLASH is 8GB.

DDR3 SDRAM

The AS4610-XXX will uses 5pcs DDR3 device (support ECC) to implement total 2GB memory size. Each DDR3 device is 4Gb (512M x 8bit), the DDR3 vendor and part number is Samsung K4B4G0846B-HCK0.

PCB Board

The AS4610-XXX family are built using a common PCB with build BOM changes to make up the four specific SKUs.



Main Switch PCB

The Main Switch PCB is a six layer board supporting the switching silicon, front panel networking and management ports, LEDs, and other associated components requires to build specific SKUs.

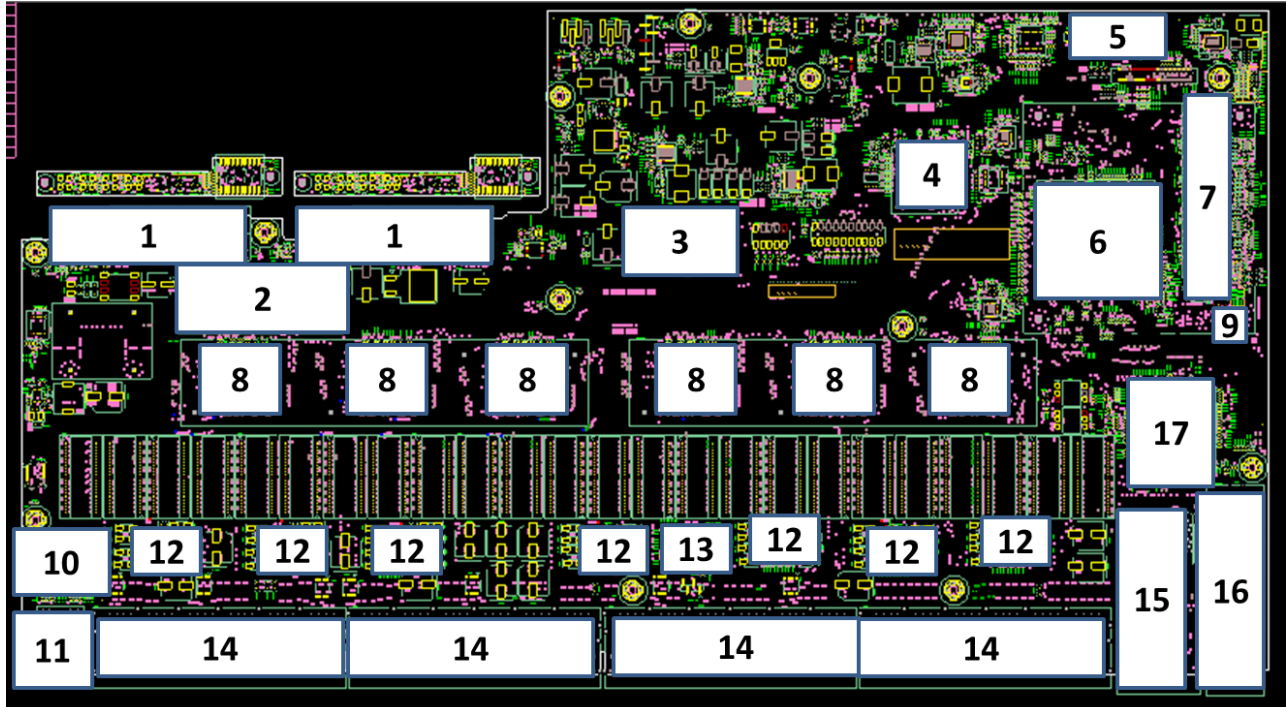
Main PCB Dimensions

	Inches	Millimeters
Length	9.05	230
Width	17	431.8

Main PCB major components

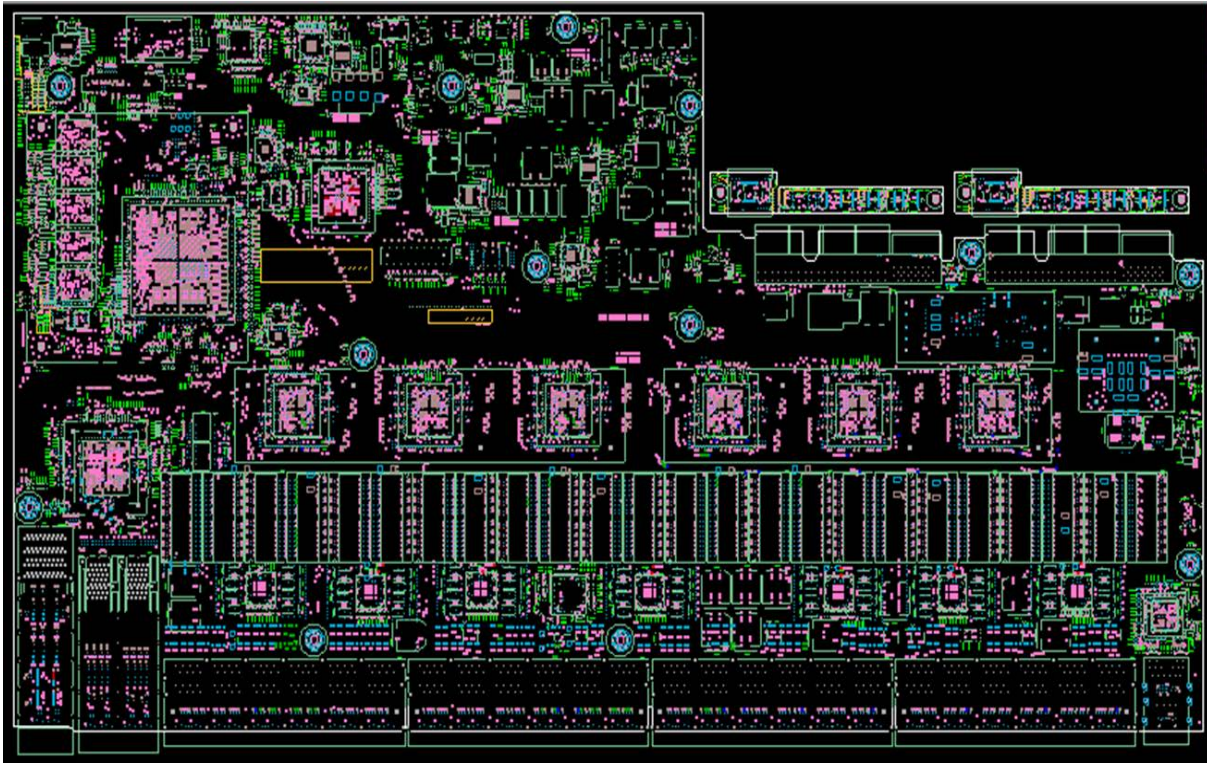
Component	Vendor	MFG P/N	Quantity	Remark
Switch Controller integrated CPU	Broadcom	BCM56340	1	For 54/54P
Switch Controller integrated CPU	Broadcom	BCM56342	1	For 30/30P
1G Non-MACsec PHY	Broadcom	BCM54282	3 for 30/30P 6 for 54/54P	
10G MACsec PHY	Broadcom	BCM84758	1	
PSE	Broadcom	BCM59121	4 for 30/30P 7 for 54/54P	PoE
SPI FLASH	MXIC	MX25L6435EM2I-10G	1	8MBytes
eUSB NAND	ATP	AF8GSSGH-AC3	1	8GBytes
DDR3	Samsung	K4B4G0846B-HCK0	5	512M x 8
CPLD	Lattice	LCMXO2-1200UHC-4FTG256C	1	
I2C Switch	NXP	PCA9548APW	1	
RTC	ST	M41T11M6F	1	
Thermal Sensor	NS	LM77CIMX-3/NOPB	1	
Board ID EEPROM	ATMEL	AT24C16C-SSHM-T	1	
10G PHY Initial EEPROM	ATMEL	AT25256B-XHL-T	1	
USB HUB IC	Genesys	GL850G-OHY31	1	
PSU	3Y	YM-1151DA03R	2	150W AC
PSU	3Y	YM-1601AA01R	2	600W AC
PSU	3Y	1921AA01R	2	920W AC
Connector 2x1 QSFP	Allbest	R-TR-Q1-4CMA-5C	1	
Connector 2x2 SFP	Allbest	R-OP-008080-6-B-N-08	1	
Connector 2x6 RJ-45	Kinsun	30226B5625	4	

Main PCB Top view



No.	Component	No.	Component	No.	Component	No.	Component
1	PSU connector	6	MAC	11	1x1 RJ cage + USB 2.0	16	2x1 QSFP cage
2	DC to DC brick (PoE only)	7	DDR 512x8 (4+1 ECC)	12	PoE chip (PoE only)	17	10G PHY
3	8G eUSB	8	1G PHY	13	PoE MCU (PoE only)	18	
4	CPLD	9	SPI flash	14	2x12 RJ cage	19	
5	NAND flash (option)	10	Manage PHY	15	2x2 SFP cage	20	

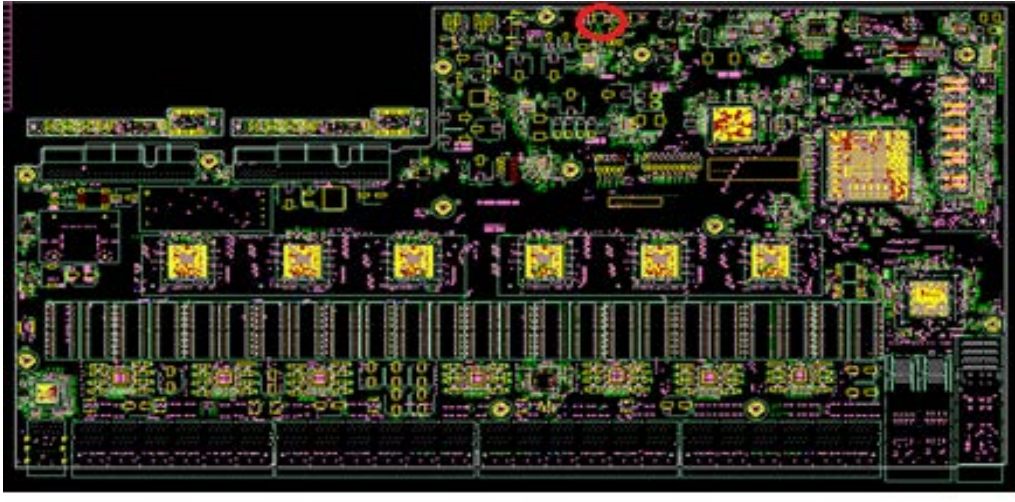
Main PCB Bottom View



Thermal Monitoring

The AS4610-2T/54T contains 1 system fan used to cool device. The system is designed with an LM77 temperature sensor which allows programming of a high threshold temperature limits which can be used for fan speed adjustment.

Main PCB Thermal sensor locations



Software Support

The AS4610-XXX supports a base software package composed of the following components:

ONIE

See <http://onie.opencompute.org/> for the latest supported version

Open Network Linux

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

Open Compute SAI support

Dependent on Broadcom support

Specifications

Power Consumption

The total estimated system power consumption of the AS4610-XXX is ~115 Watts (does not include PoE). This is based upon worst case power assumptions for traffic, optics used, 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)