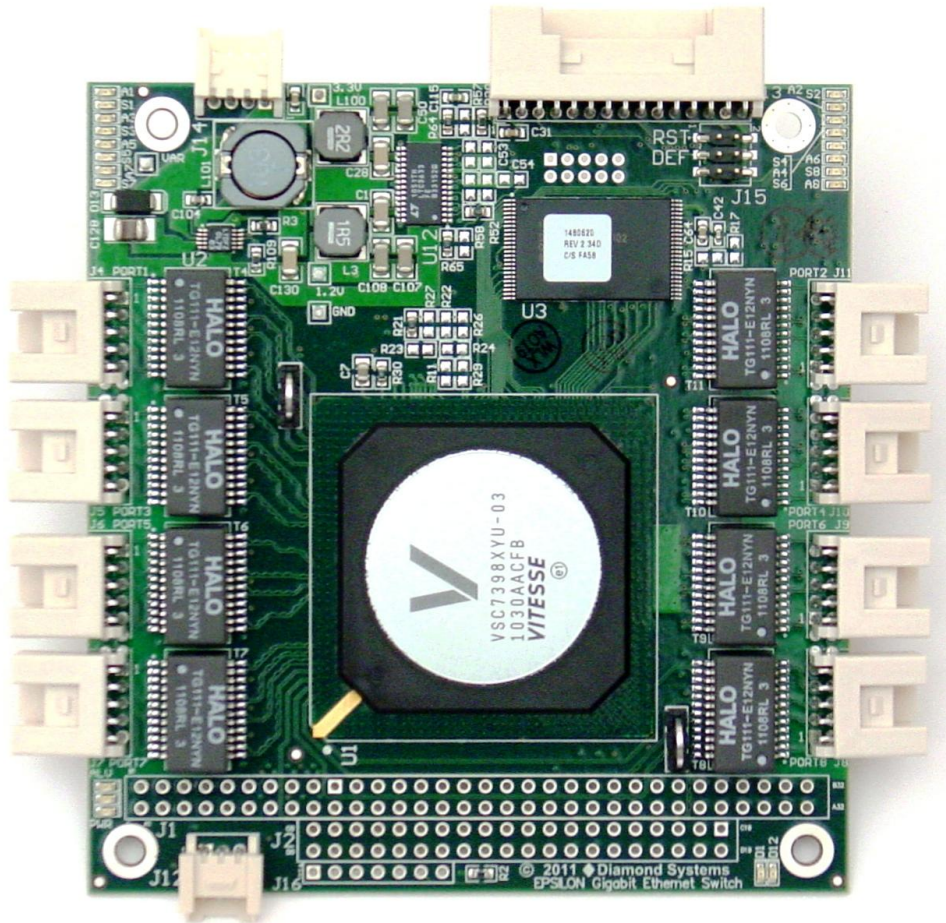




Epsilon User Manual

Managed 8-Port Gigabit Ethernet Switch



Revision	Date	Comment
A	06/29/2011	Initial Release

**FOR TECHNICAL SUPPORT
PLEASE CONTACT:**

support@diamondsystems.com

© Copyright 2011
Diamond Systems Corporation
555 Ellis Street
Mountain View, CA 94043 USA
Tel 1-650-810-2500
Fax 1-650-810-2525
www.diamondsystems.com

CONTENTS

1. Important Safe Handling Information	3
2. Introduction	4
2.1 Features.....	4
2.2 Main Feature List.....	4
2.3 Mechanical and Environmental	5
2.4 Cable List.....	5
3. Functional Overview.....	6
3.1 Functional Block Diagram.....	6
4. Board Outline and Layout.....	7
4.1 Epsilon Board Drawing.....	7
5. Connector and Jumper List	8
5.1 Connector List.....	8
5.2 Jumper Block (J15).....	8
6. Connector Pinout and Pin Description.....	9
6.1 PC/104 Connectors (J1 and J2) - Optional	9
6.2 PCI Power (J3) - Optional.....	10
6.3 Ethernet (J4-J11).....	10
6.4 Serial Interface (J12)	10
6.5 LED Status Signals (J13)	11
6.6 Input Power (J14)	11
6.7 JTAG (J16) – Factory Use Only	11
7. Command Line Interface.....	12
7.1 Com Port Set-up.....	12
7.2 Command Hierarchy.....	12
7.3 Login/Logout Procedures	12
7.4 Help Utility.....	13
7.5 Example.....	13
7.6 Entering Commands	14
7.7 Terminology.....	14
7.8 Changing the IP Address.....	15
7.9 Command Overview	15
7.10 Detailed Command Description.....	17
7.10.1 System Commands.....	17
7.10.2 Console Commands	19
7.10.3 Port Commands	19
7.10.4 MAC Table Commands.....	20
7.10.5 VLAN Commands	21
7.10.6 Aggregation/Trunking Commands	22
7.10.7 LACP Commands	23
7.10.8 RSTP Commands.....	23
7.10.9 User Group Commands	25
7.10.10 QoS Commands	25
7.10.11 Mirror Commands	26
7.10.12 IP Commands	27
7.10.13 Dot1X Commands.....	28
7.10.14 IGMP Snooping Commands.....	29
7.10.15 Debug Commands	29
7.11 Examples.....	30
7.11.1 VLAN configuration	30
7.11.2 User Group Configuration	30
8. Web Interface	31
9. Thermal Solutions.....	33
9.1 Heatspreader	33
9.2 Heatsink.....	34
10. Specifications.....	35
Appendix A Default values	36

1. IMPORTANT SAFE HANDLING INFORMATION



WARNING!

ESD-Sensitive Electronic Equipment

Observe ESD-safe handling procedures when working with this product.

Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.

Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

The Epsilon board contains a high density connector with many connections to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation and connection to other equipment. The list here describes common causes of failure found on boards returned to Diamond Systems for repair. This information is provided as a source of advice to help you prevent damaging your Diamond (or any vendor's) boards.

ESD damage – This type of damage is usually almost impossible to detect, because there is no visual sign of failure or damage. The symptom is that the board eventually simply stops working, because some component becomes defective. Usually the failure can be identified and the chip can be replaced. To prevent ESD damage, always follow proper ESD-prevention practices when handling computer boards.

Damage during handling or storage – On some boards we have noticed physical damage from mishandling. A common observation is that a screwdriver slipped while installing the board, causing a gouge in the PCB surface and cutting signal traces or damaging components.

Another common observation is damaged board corners, indicating the board was dropped. This may or may not cause damage to the circuitry, depending on what is near the corner. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge to avoid possible shorting from this type of damage. However these design rules are not sufficient to prevent damage in all situations.

A third cause of failure is when a metal screwdriver tip slips, or a screw drops onto the board while it is powered on, causing a short between a power pin and a signal pin on a component. This can cause overvoltage / power supply problems described below. To avoid this type of failure, only perform assembly operations when the system is powered off.

Sometimes boards are stored in racks with slots that grip the edge of the board. This is a common practice for board manufacturers. However our boards are generally very dense, and if the board has components very close to the board edge, they can be damaged or even knocked off the board when the board tilts back in the rack. Diamond recommends that all our boards be stored only in individual ESD-safe packaging. If multiple boards are stored together, they should be contained in bins with dividers between boards. Do not pile boards on top of each other or cram too many boards into a small location. This can cause damage to connector pins or fragile components.

Power supply wired backwards – Our power supplies and boards are not designed to withstand a reverse power supply connection. This will destroy each IC that is connected to the power supply (i.e. almost all ICs). In this case the board will most likely will be unrepairable and must be replaced. A chip destroyed by reverse power or by excessive power will often have a visible hole on the top or show some deformation on the top surface due to vaporization inside the package. **Check twice before applying power!**

Overvoltage on analog input – If a voltage applied to an analog input exceeds the design specification of the board, the input multiplexor and/or parts behind it can be damaged. Most of our boards will withstand an erroneous connection of up to $\pm 35V$ on the analog inputs, even when the board is powered off, but not all boards, and not in all conditions.

Overvoltage on analog output – If an analog output is accidentally connected to another output signal or a power supply voltage, the output can be damaged. On most of our boards, a short circuit to ground on an analog output will not cause trouble.

Overvoltage on digital I/O line – If a digital I/O signal is connected to a voltage above the maximum specified voltage, the digital circuitry can be damaged. On most of our boards the acceptable range of voltages connected to digital I/O signals is 0-5V, and they can withstand about 0.5V beyond that (-0.5 to 5.5V) before being damaged. However logic signals at 12V and even 24V are common, and if one of these is connected to a 5V logic chip, the chip will be damaged, and the damage could even extend past that chip to others in the circuit.

2. INTRODUCTION

Epsilon is a managed, 8-Port Gigabit Ethernet Switch with wide power supply voltage input and a serial management port. Epsilon offers 10/100/1000Mbps copper twisted pair ports on a PC/104 format board. The circuit is standalone, so no bus connectors are required. Optional PC/104 bus connectors are available to facilitate the installation in the interior of a stack of boards. An RS-232 interface is provided to enable communication between the on-board management microcontroller and a host processor through a Command Line Interface (CLI). A wide-range DC power supply is built into the board to allow it to be used with industrial power sources as well as the typical embedded +5V supply.

Highly Advanced Gigabit Ethernet Switch

Epsilon is an 8-port Gigabit Ethernet switch in the compact PC/104 form factor. Epsilon operates standalone, but can be included in any PC/104 board stack.

Layer 2+ Managed Switch

Epsilon's Ethernet switch chip includes a built-in microcontroller for configuration and management. It can be accessed either through the on-board RS-232 port or one of the Ethernet ports.

Wide Power DC/DC Power Supply

Epsilon can be powered through a wide voltage +7-36V DC/DC power supply input or a regulated +5VDC input. +5VDC power may also be provided through the PC/104 connector.

Rugged Design

Extended temperature operation of -40°C to +85°C is tested and guaranteed. Epsilon was designed with harsh applications in mind. Latching connectors provide increased reliability.

PC/104 Bus Interface

Optionally Epsilon provides a full passthrough PC/104 interface, allowing it to be integrated into any PC/104 stack.

Software Support

The switch is ready to plug into your application without any driver installation or firmware upgrades. A web interface and a CLI provide an intuitive GUI for configuring and managing the switch.

2.1 Features

2.2 Main Feature List

- ◆ PC/104 form factor
- ◆ 8 ports of 10/100/1000Mbps Ethernet over copper
- ◆ Layer 2+ managed switch
- ◆ Built-in microcontroller with management software and web interface for control and configuration
- ◆ 176KB on-board frame buffer; jumbo frame support at all speeds
- ◆ 8K MAC addresses and 4K VLANs (IEEE 802.1Q), 8K IP multicast group support
- ◆ Programmable multi-layer classifier with 4 QoS classes
- ◆ DSCP remarking for IPv4 and IPv6 frames
- ◆ Rapid spanning tree protocol (RSTP)
- ◆ Right angled, locking pin headers for all Ethernet ports (standard configuration)
- ◆ Safe Flash/configuration update through web and serial interfaces
- ◆ Reset and Factory Default signals available on Status Signal connector
- ◆ +7-36VDC or +5VDC power supply input

2.3 Mechanical and Environmental

- ◆ PC/104 compliant form factor including:
 - ◆ Board dimensions
 - ◆ Mounting holes
 - ◆ Component and optional heatsink height
 - ◆ Optional ISA bus connectors
 - ◆ -40°C to +85°C ambient operating temperature with heatspreader
or -40°C to +71°C ambient operating temperature with heatsink

2.4 Cable List

<i>Part Number</i>	<i>Cable Description</i>
6981050	Serial cable
6981051	Power cable
6981052	Ethernet cable (1 per port)

PC/104™ and PC/104-Plus™ are trademarks of the PC/104 Embedded Consortium.
All other trademarks are the property of their respective owners.

3. FUNCTIONAL OVERVIEW

3.1 Functional Block Diagram

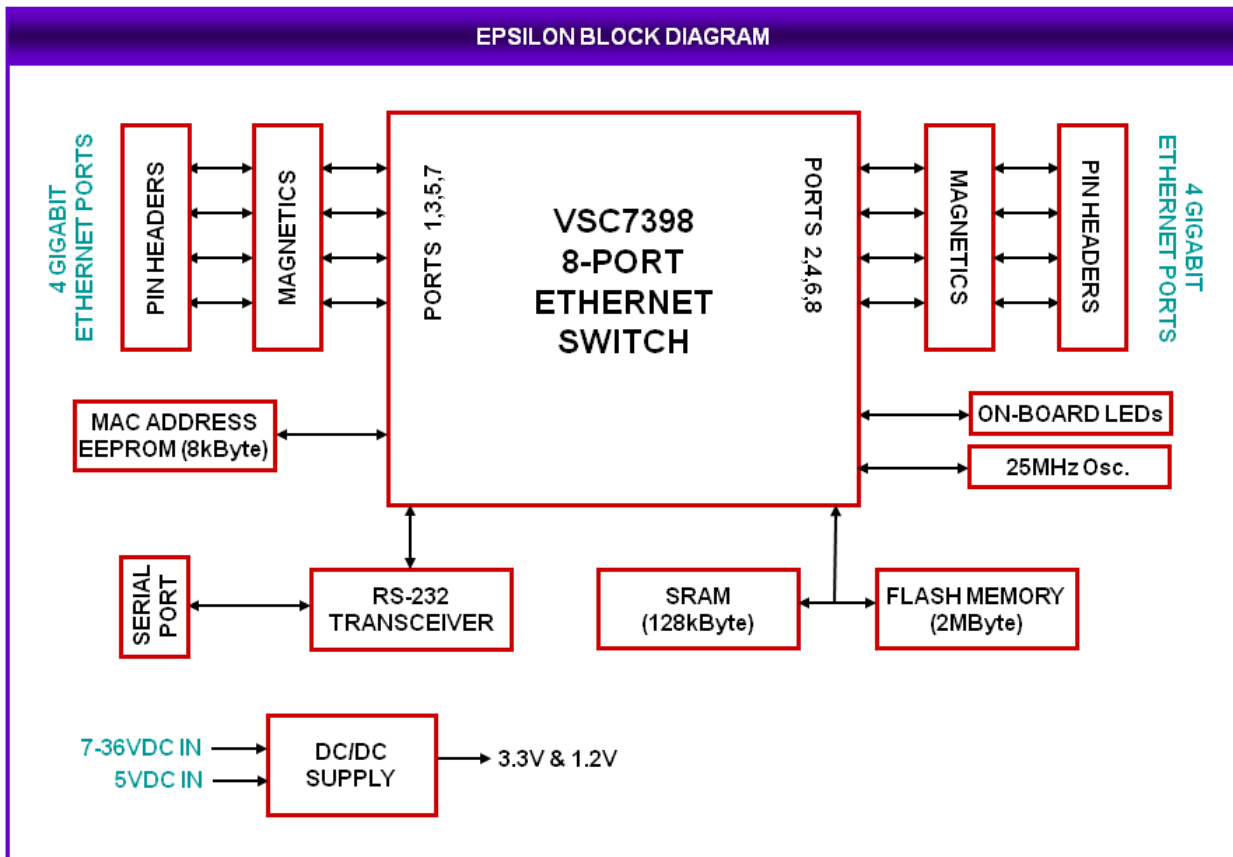


Figure 1. Functional Block Diagram

Epsilon is an 8-Port managed Gigabit Ethernet switch module offering 10/100/1000Mbps copper twisted pair ports on a PC/104 form factor board. Epsilon operates standalone, requiring no connection to a single board computer in the stack.

Epsilon is a Layer 2+ managed Ethernet switch with built-in microcontroller and memory for configuration and management. The Flash memory holds dual application images along with the boot code, The SRAM is used for program execution and storing the MAC addresses. The EEPROM holds the configuration parameters. .

An RS-232 interface is provided to enable communication between the on-board management microcontroller and a host processor through a CLI interface. The microcontroller is also accessible through one of the Ethernet ports via a web management interface.

Power can be provided through the +7-36VDC wide-range DC power supply built into the board, enabling use with industrial power sources. Epsilon can also be powered from a +5VDC input source, using either the main power connector or an optional connection to the PC/104 bus or PC/104-Plus (PCI) bus.

4. BOARD OUTLINE AND LAYOUT

4.1 Epsilon Board Drawing

The following diagram shows the locations for all connectors and jumpers which are described in the next sections.

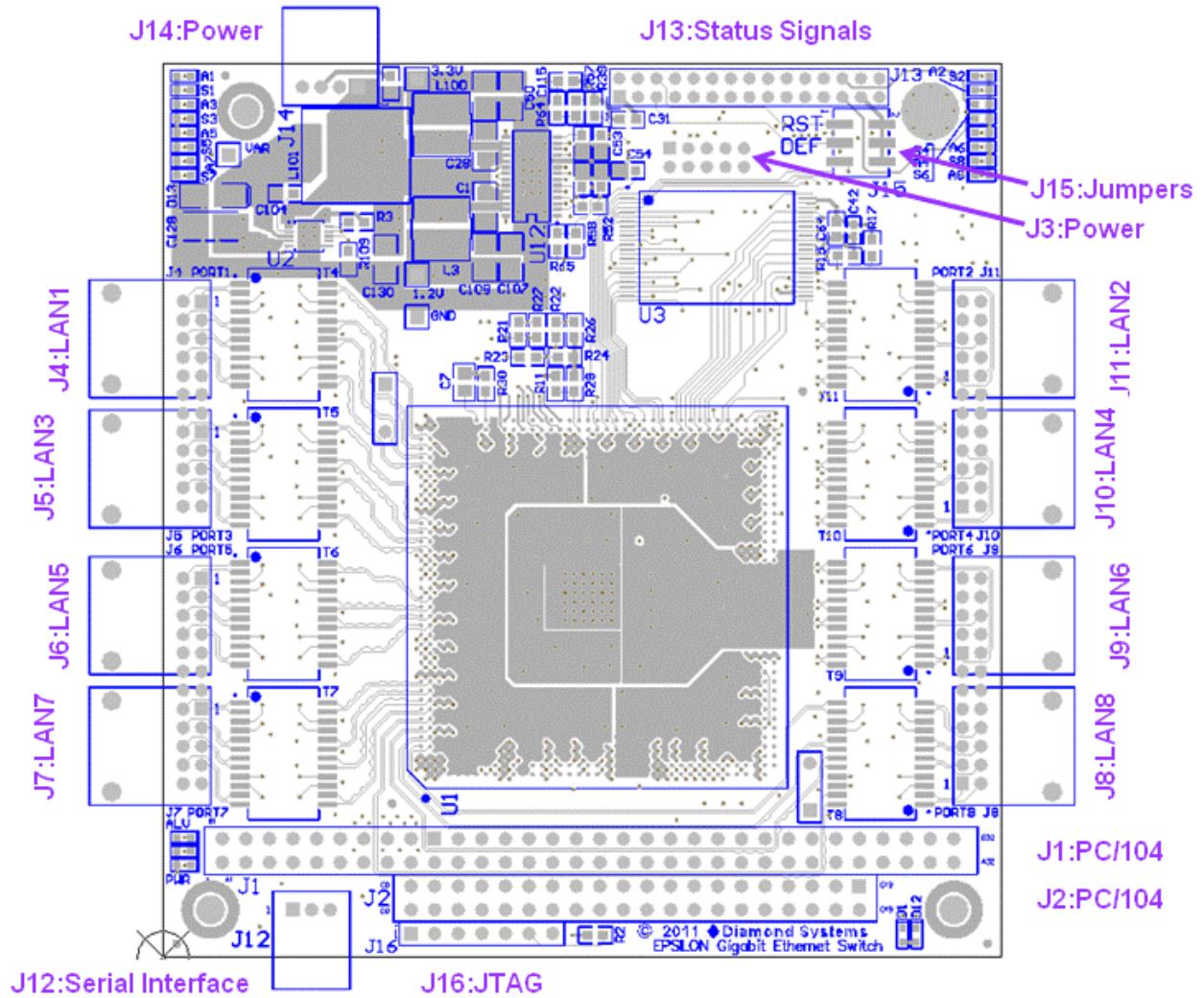


Figure 2. Epsilon Top (Connectors and Jumpers)

5. CONNECTOR AND JUMPER LIST

5.1 Connector List

The following table summarizes the functions of Epsilon's interface connectors. Refer to the Figure 2 for the locations of these connectors on Epsilon. Signal functions relating to all of Epsilon's interface connectors are discussed in greater detail in Section 6 of this document. Other connectors and jumper blocks on Epsilon are reserved for Diamond's use only.

Connector	Function
J1 & J2	PC-104 Expansion bus (optional)
J3	PCI Power (optional)
J4-J11	Ethernet (x8)
J12	RS-232 Serial Interface
J13	LED Status Signals and Resets
J14	Power In
J15	Jumpers (see Jumper Block (J15))
J16	JTAG

5.2 Jumper Block (J15)

The following table summarizes the functions of Epsilon's jumper block, J15. Refer to the drawing in Section 4 for the locations of J15 on Epsilon.

Jumper J15 Pins	Function
1&2	Reset: Install jumper to reset the switch
3&4	Default Set: Install jumper to set the switch to its factory default settings
5&6	Factory Use Only

6. CONNECTOR PINOUT AND PIN DESCRIPTION

6.1 PC/104 Connectors (J1 and J2) - Optional

Connectors J1 and J2 are a special order option to provide a passthrough ISA bus which allows Epsilon to be incorporated into a PC/104 stack. Epsilon can also be powered from the ISA bus when these connectors are installed. The PC/104 stackable bus is supported by a standard PC/104 ISA stackable expansion bus connector. The four row, 104-pin female header connector is actually broken into two pieces (J1 - A/B, J2 - C/D) with the pin assignment shown below.

Note: For more information on the PC/104 specification, visit the PC/104 Embedded Consortium website, at <http://www.pc104.org>.

J1: PC/104 8-bit bus connector

IOCHK	A1	B1	GND
SD7	A2	B2	RESET
SD6	A3	B3	+5V
SD5	A4	B4	IRQ9
SD4	A5	B5	-5V
SD3	A6	B6	DRQ2
SD2	A7	B7	-12V
SD1	A8	B8	SRDY
SD0	A9	B9	+12V
IOCHRDY	A10	B10	KEY
AEN	A11	B11	SMEM
SA19	A12	B12	SMEM
SA18	A13	B13	IOW
SA17	A14	B14	IOR
SA16	A15	B15	DACK3
SA15	A16	B16	DRQ3
SA14	A17	B17	DACK1
SA13	A18	B18	DRQ1
SA12	A19	B19	REFRE
SA11	A20	B20	BCLK
SA10	A21	B21	IRQ7
SA9	A22	B22	IRQ6
SA8	A23	B23	IRQ5
SA7	A24	B24	IRQ4
SA6	A25	B25	IRQ3
SA5	A26	B26	DACK2
SA4	A27	B27	TC
SA3	A28	B28	BALE
SA2	A29	B29	+5V
SA1	A30	B30	OSC
SA0	A31	B31	GND
GND	A32	B32	GND

J2: PC/104 16-bit bus connector

GND	D0	C0	GND
MEMCS1	D1	C1	SBHE
IOCS16	D2	C2	LA23
IRQ10	D3	C3	LA22
IRQ11	D4	C4	LA21
IRQ12	D5	C5	LA20
IRQ15	D6	C6	LA19
IRQ14	D7	C7	LA18
DACK0	D8	C8	LA17
DRQ0	D9	C9	MEMR
DACK5	D10	C10	MEMW
DRQ5	D11	C11	SD8
DACK6	D12	C12	SD9
DRQ6	D13	C13	SD10
DACK7	D14	C14	SD11
DRQ7	D15	C15	SD12
+5V	D16	C16	SD13
MASTER	D17	C17	SD14
GND	D18	C18	SD15
GND	D19	C19	KEY

6.2 PCI Power (J3) - Optional

Connector J3 is a special order option to supply power via the PCI bus. In the pinout below, the pins are noted as Epsilon pin number / PCI standard pin number. The function are also listed as Epsilon signal/PCI standard signal, with only one name when the function is common (i.e., +5V or ground).

NC / AD26	1 / B20	2 / A20	Ground
+5V	3 / B21	4 / A21	NC / AD269
NC / AD30	5 / B22	6 / A22	+5V
Ground	7 / B23	8 / A23	NC / REQ0#
NC / REQ2#	9 / B24	10 / A24	Ground

Connector Type: 2mm dual row straight pin header with gold flash plating

6.3 Ethernet (J4-J11)

Epsilon contains eight right-angle, locking pin headers for the eight Ethernet ports. Each port has the same style and pinout. Each signal is associated with a particular color inside of the Cat6 cable.

(White/Brown) DD+	1	2	DD- (Brown)
(White/Blue) DC+	3	4	DC- (Blue)
(White/Green) DB+	5	6	DB- (Green)
(White/Orange) DA+	7	8	DA- (Orange)
Ground	9	10	Ground

Connector Type: 2mm dual row right-angle, locking pin header with tin plating

Mating Connector: JST Sales America PUDP-10V-S housing with SPUD-002T-P0.5 terminals

6.4 Serial Interface (J12)

Epsilon contains an RS-232 connector, J12, that connects the on-board 8051 microcontroller to an external serial port.

1	Ground
2	TxD Out
3	RxD In

Connector Type: 2mm single row right-angle, locking pin header with tin plating

Mating Connector: Molex Connector 35507-0300 housing with 50212-8100 terminals

6.5 LED Status Signals (J13)

Connector J13 provides access to the Ethernet LED signals for each of the eight ports. This connector has duplicate connections for Reset and Default control inputs.

LEDs may be directly connected to these signals without requiring any current-limiting resistors. The 3.3V supply required for the LEDs is also provided by the connector.

Reset: Causes a reset of the switch when connected to Ground.

Default: Causes the switch to return to its factory settings when connected to Ground (to be implemented).

SW_GPIO1 and SW_GPIO2 - are mainly used to provide control for user defined LEDs.

3.3V	1	2	3.3V
SW_GPIO1	3	4	SW_GPIO0
Default-	5	6	Reset-
Port 1 Speed	7	8	Port 1 Activity
Ground	9	10	Port 3 Activity
Port 3 Speed	11	12	Ground
Port 5 Speed	13	14	Port 5 Activity
Ground	15	16	Port 7 Activity
Port 7 Speed	17	18	Ground
Port 8 Activity	19	20	Port 8 Speed
Ground	21	22	Port 6 Speed
Port 6 Activity	23	24	Ground
Port 4 Activity	25	26	Port 4 Speed
Ground	27	28	Port 2 Speed
Port 2 Activity	29	30	Ground

Connector Type: 2mm dual row right-angle, locking pin header with tin plating

Mating Connector: JST Sales America PUDP-30V-S housing with SPUD-002T-P0.5 terminals

6.6 Input Power (J14)

Input power may be supplied either through the dedicated 4pin connector (J14), the +5V pins of the optional PC/104 connectors (J1 and J2), or an optional 2x5 section of the PCI connector (J3). The pinout for J14 is:

1	+5V In
2	Ground
3	Ground
4	+7-36VDC In

Connector Type: 2mm single row right-angle, locking pin header with tin plating

Mating Connector: Molex Connector 35507-0400 housing with 50212-8100 terminals

Note: The board requires only +5VDC input power to operate. All other required voltages are generated on board with miniature switching regulators. An on-board DC power supply converts the wide range +7-36VDC input, if present, down to +5VDC.

6.7 JTAG (J16) – Factory Use Only

This connector provides a scan capability that is for factory use only.

7. COMMAND LINE INTERFACE

7.1 Com Port Set-up

To use the command line interface, you must connect the COM port of a PC to the RS-232 serial interface connector (J12) and activate a terminal program (e.g. HyperTerminal under Windows). The COM port must be set up to run 8 data bits, 1 stop bit, no parity, 38400 baud rate and without flow control.

7.2 Command Hierarchy

The CLI is hierarchical with two levels: a top level and a group level. The group level consists of the following groups:

- System
- Console
- Port
- MAC
- VLAN
- Aggregation
- LACP
- RSTP
- User Group
- QoS
- Mirror
- IP
- Dot1X
- IGMP
- Filter
- Debug

At the top level you may enter a command by giving the full command string, including group, or you may change context into a group by entering the name of the group.

At the group level you may enter commands for the particular group you have chosen without specifying the group name or you may return to the top level by entering the *up* command.

The current level and group is indicated by a user definable prompt. If you are at the top level, the default prompt will be:

```
>
```

If you are at group level, the prompt will display the actual group, e.g.

```
System>
```

At group level you also have the option of using the slash (/) key to refer to a context relative to the top level. E.g. you may be in the system group and enter a */console/configuration* command or change context into the console group by entering */console*.

7.3 Login/Logout Procedures

To get access to the CLI you must login by entering a password. You will automatically be queried about the password.

The password is configurable. The password check may be disabled by setting the password to an empty string "", in which case any password entered during login will be accepted.

You may logout at any time and at any context level using the *exit* command.

7.4 Help Utility

You may get help by pressing the ? key or entering *help*. The help info depends on the context:

- At top level, a list of command groups is displayed.
- At group level, a list of the command syntaxes for the current group is displayed.
- If the help command is issued for a specific command, the command syntax and a description of the command are shown.

7.5 Example

The command hierarchy and the help utility is demonstrated in the following example:

```
> ? <enter>
Commands at top level:
System - System commands
Console - Console commands
Port - Port commands
MAC - MAC table commands
VLAN - VLAN commands
Aggregation - Aggregation/Trunking commands
LACP - IEEE802.3ad Link aggregation commands
RSTP - IEEE802.1w Rapid Spanning Tree commands
User Group - User Group commands
QoS - QoS commands
Mirror - Mirror commands
IP - IP commands
Dot1x - Dot1x commands
PoE - Power Over Ethernet commands
IGMP - IGMP Snooping commands
Filter - Filter commands
Debug - Debug commands
> console <enter>
Console> ? <enter>
Commands at Console level:
Console Configuration
Console Password [<password>]
Console Timeout [<timeout>]
Console Prompt [<prompt string>]
-----
Up
Console> password ?
Syntax:
Console Password [<password>]
Description:
```

Set or display console password. The empty string ("") disables the password check.

[<password>]: Password string of up to 16 characters.

Console>

7.6 Entering Commands

- Commands are not case-sensitive.
- You may use the horizontal arrow-keys ← and → to move the cursor within the command you are entering.
- You may use the backspace key (provided you are using a terminal that sends the BS (8) character when the backspace key is pressed) to delete chars from the command you are entering.
- You may use the vertical arrow-keys ↑ and ↓ to scroll through a command history buffer of the latest 20 commands issued.
- If you are using a terminal (e.g. HyperTerminal) that supports <home> and <end> keys, you may use these keys to move the cursor to respectively the start of the command line and the end of the command line.

7.7 Terminology

The following table shows general parameter types used in command syntaxes and descriptions.

<port>	Port identifier: Any number in the range 1-8 (i.e. the number of ports on the switch).
<portlist>	Comma and/or dash separated port list. This type can be used for specifying individual ports or a range of ports. The keyword 'none' can be used to specify an empty port list. The keyword 'all' can be used to specify all ports. Example: 1,3,4-8
<macaddress>	MAC Address; format: "hh-hh-hh-hh-hh-hh", "hh:hh:hh:hh:hh:hh" or "hhhhhhhhhhhh". The hh is Hexadecimal number in the range 0x00 to 0xFF. Example: 00-00-24-F1-02-03
<vid>	VLAN ID: Decimal number in the range 1-4095. The keyword 'all' can be used to specify all VLAN IDs.
<vidlist>	Comma and/or dash separated VLAN ID list. This type can be used for specifying individual VLAN IDs or a range of VLAN IDs. The keyword 'none' can be used to specify an empty VLAN ID list. Example: 1,2,4-6
<UDP/TCP port>	UDP/TCP port number: Decimal number in the range 0-65535.
<rate>	Leaky bucket rate in Kbit/s [0-1000000k] or Mbit/s [0-1000m).
<class>	Internal class of service. The classes offered depend on the chip and the number of queues: 2 queues: low high 4 queues: low normal medium high
<grouplist>	Comma and/or dash separated user group list. This type can be used for specifying individual user groups or a range of user groups. The range is 1 to 5/8/12/16/24.
<shared secret>	A text string, with the purpose to ensure integrity for communication between a RADIUS server and the 802.1X switch authenticator.

The <portlist> type is very useful when setting up multiple ports in the same mode. For example, the following commands will divide the ports into two untagged VLANs and enable VLAN awareness:

```
vlan add 1 1-4
vlan add 2 5-8
vlan pvid 1-4 1
vlan pvid 5-8 2
vlan aware all enable
```

7.8 Changing the IP Address

The board is shipped with an IP address of 192.168.1.60 and the IP mode enabled. This allows the WEB interface to be accessed at that address.

The *ip setup* command can be used to change the IP address to the desired value:

IP Setup [ipaddress> [<ipmask> [ipgateway>]]] [<vid>]

The IP address, mask and gateway must be set according to your environment or you can enable IP and DHCP if your environment include a DHCP server. For example:

```
>ip setup 10.10.129.189 255.255.252.0 10.10.128.14 1
>ip mode enable
```

7.9 Command Overview

```
?
Help
Up
Exit
System Configuration [all]
System Restore Default [keepIP]
System Name [<name>]
System Reboot
System SNMP [enable|disable]
System Trap [<IP Address>]
System Readcommunity [<community string>]
System Writecommunity [<community string>]
System Trapcommunity [<community string>]
System Power Saving [full|up|down|disable]
Console Configuration
Console Password [<password>]
Console Timeout [<timeout>]
Console Prompt [<prompt string>]
Port Configuration [<portlist>]
Port Mode [<portlist>] [<mode>]
Port Flow Control [<portlist>] [enable|disable]
Port State [<portlist>] [enable/disable]
Port MaxFrame [<portlist>] [<framesize>|reset]
Port Statistics [<portlist>] [clear]
Port Excessive Collisions Drop [enable|disable]
Port VeriPHY [<portlist>] [full|anomaly|termination]
MAC Configuration
MAC Add <macaddress> <portlist>|none [<vid>]
MAC Delete <macaddress> [<vid>]
MAC Lookup <macaddress> [<vid>]
MAC table <vidlist>
```

MAC Flush
MAC Agetime [<agetime>]
VLAN Configuration [<portlist>]
VLAN Add <vidlist> [<portlist>]
VLAN Delete <vidlist>
VLAN Lookup <vidlist>
VLAN Aware [<portlist>] [enable|disable]
VLAN PVID [<portlist>] [<vid>|none]
VLAN Frame Type [<portlist>] [all|tagged]
VLAN Ingress Filtering [<portlist>] [enable|disable]
Aggr Configuration
Aggr Add <portlist>
Aggr Delete <portlist>
Aggr Lookup <portlist>
Aggr Mode [smac|dmac|xor]
Lacp Configuration [<portlist>]
Lacp Mode [<portlist>] [enable|disable]
Lacp Key [<portlist>] [<key>|auto]
Lacp Status
Lacp Statistics
Rstp Configuration [<portlist>]
Rstp sysprio [<sysprio>]
Rstp hellotime [<secs>]
Rstp maxage [<hops>]
Rstp fwddelay [<secs>]
Rstp version [normal|compat]
Rstp Mode [<portlist>] [enable|disable]
Rstp Aggr [enable|disable]
Rstp Edge [<portlist>] [enable|disable]
Rstp Pathcost [<portlist>] [<pathcost>|auto]
Rstp mcheck <portlist>
Rstp Status
Rstp Statistics
UserGroup Configuration
User Group Add <grouplist> [<portlist>]
User Group Delete <grouplist>
User Group Lookup <grouplist>
QoS Configuration [<portlist>]
QoS Mode [<portlist>] [tag|port|diffserv]
QoS Default [<portlist>] [low|high]
QoS Tagprio [<portlist>] [<tagpriolist>] [<class>]
QoS DiffServ [<portlist>] [<dscplist>] [low|high]
QoS Userprio [<portlist>] [<tagprio>]
QoS Storm Control [<traffic type>] [enable|disable] [<rate>]
Mirror Configuration
Mirror Port [<port>]
Mirror Source [<portlist>] [enable|disable]
IP Configuration
IP Status
IP Setup [<ipaddress> [<ipmask> [<ipgateway>]]] [<vid>]

```
IP Mode [enable|disable]
IP Ping [-n <count>] [-w <timeout>] <ipaddress>
IP ARP
IP DHCP [enable|disable]
Dot1x Configuration
Dot1x Mode [enable|disable]
Dot1x State [<portlist>] [Auto|ForceAuthorized|ForceUnauthorized]
Dot1x Server [<IP Address>]
Dot1x UDP Port [<value>]
Dot1x Secret [<Shared Secret>]
Dot1x Statistics [<portlist>]
Dot1x Reauthenticate [<portlist>] [now]
Dot1x Parameters [<parameter>] [<value>]
```

An IGMP snooping module has been implemented. When enabled, the module snoops on host IGMP membership reports, and controls IP multicast forwarding using entries in the MAC table.

The following commands are available:

```
IGMP Configuration
IGMP Status
IGMP Groups <vidlist>
IGMP Mode [enable|disable]
IGMP State <vidlist> [enable|disable]
IGMP Querier <vidlist> [enable|disable]
IGMP Router ports [<portlist>] [enable|disable]
IGMP Unregistered Flood [enable|disable]
```

7.10 Detailed Command Description

Some of the commands have optional parameters. If the optional parameter is omitted, a default value may be used or the command may display the current setting (i.e. function as a get command).

Example 1, omitted parameter interpreted as display command:

```
Syntax: System Name [<name>]
>system name <enter>
System Name: SuperSwitch-01
```

Example 2, omitted parameter interpreted as default value (VLAN ID 1):

```
Syntax: MAC Add <macaddress> <portlist> [<vid>]
>mac add 010203ABCDEF 16 <enter>
```

The following sections list the individual commands by showing the syntax and a description of each command.

7.10.1 System Commands

7.10.1.1 SYSTEM CONFIGURATION

Syntax: System Configuration [all]

Description: Show system name, software version, hardware version and management MAC address. Optionally show the full configuration

[all]: Show the total switch configuration (default: System configuration only).

7.10.1.2 SYSTEM RESTORE DEFAULT

Syntax: System Restore Default [keepIP]

Description: Restore factory default configuration.

[keepIP]: Preserve IP configuration (default: Not preserved).

7.10.1.3 SYSTEM NAME

Syntax: System Name [<name>]

Description: Set or show the system name. The empty string ("") clears the system name.

[<name>]: String of up to 16 characters (default: Show system name).

7.10.1.4 SYSTEM REBOOT

Syntax: System Reboot

Description: Reboot the switch.

7.10.1.5 SYSTEM SNMP

Syntax: System SNMP [enable|disable]

Description: Activate or deactivate SNMP.

[enable|disable]: Enable/disable SNMP (default: Show SNMP mode).

7.10.1.6 SYSTEM TRAP

Syntax: System Trap [<IP Address>]

Description: Set or show SNMP traps destination.

[<IP Address>]: IP address to send traps to. 0.0.0.0 disables traps (default: Show trap destination).

7.10.1.7 SYSTEM READCOMMUNITY

Syntax: Readcommunity [<community string>]

Description: Set or show SNMP read community string.

[<community string>]: New community string. (default: Show current value).

7.10.1.8 SYSTEM WRITECOMMUNITY

Syntax: Writecommunity [<community string>]

Description: Set or show SNMP write community string.

[<community string>]: New community string. (default: Show current value).

7.10.1.9 SYSTEM TRAPCOMMUNITY

Syntax: Trapcommunity [<community string>]

Description: Set or show SNMP trap community string.

[<community string>]: New community string. (default: Show current value).

7.10.1.10 SYSTEM POWER SAVING

Syntax: Power Saving [full|up|down|disable]

Description: Configure mode of power saving.

[full]: Power saving at both link-up and link-down.

[up]: Power saving at link-up only.

[down]: Power saving at link-down only.

[disable]: No power saving.

7.10.2 Console Commands

7.10.2.1 CONSOLE CONFIGURATION

Syntax: Console Configuration

Description: Show configured console password and timeout.

7.10.2.2 CONSOLE PASSWORD

Syntax: Console Password [<password>]

Description: Set or show the console password. The empty string ("") disables the password check.

[<password>]: Password string of up to 16 characters.

7.10.2.3 CONSOLE TIMEOUT

Syntax: Console Timeout [<timeout>]

Description: Set or show the console inactivity timeout in seconds. The value zero disables timeout.

[<timeout>]: Timeout value in seconds, 0, 60-10000.

7.10.2.4 CONSOLE PROMPT

Syntax: Console Prompt [<prompt_string>]

Description: Set or show the console prompt string. The empty string ("") clears the prompt string.

[<prompt_string>]: Command prompt string of up to 10 characters.

7.10.3 Port Commands

7.10.3.1 PORT CONFIGURATION

Syntax: Port Configuration [<portlist>]

Description: Show the configured and current speed, duplex mode, flow control mode and state for the port.

<portlist>: Port list (Default: All ports).

7.10.3.2 PORT MODE

Syntax: Port Mode [<portlist>] [<mode>]

Description: Set or show the speed and duplex mode for the port.

<portlist>: Port list (Default: All ports).

<mode> : Port speed and duplex mode (Default: Show configured and current mode).

10hdx : 10 Mbit/s, half duplex.

10fdx : 10 Mbit/s, full duplex.

100hdx : 100 Mbit/s, half duplex.

100fdx : 100 Mbit/s, full duplex.

1000fdx : 1 Gbit/s, full duplex.

auto : Auto negotiation of speed and duplex.

7.10.3.3 PORT FLOW CONTROL

Syntax: Port Flow Control [<portlist>] [enable|disable]

Description: Set or show flow control mode for the port.

<portlist> : Port list (default: All ports).

[enable|disable]: Enable/disable flow control (default: Show flow control mode).

7.10.3.4 PORT STATE

Syntax: Port State [<portlist>] [enable/disable]

Description: Set or show the state for the port.

<portlist> : Port list (default: All ports).

[enable|disable]: Enable or disable port state (default: Show state).

7.10.3.5 PORT MAXFRAME

Syntax: Port MaxFrame [<portlist>] [<framesize>|reset]

Description: Set or show the maximum frame size in bytes (including FCS) for frames received on the port. Tagged frames are allowed to be 4 bytes longer than the maximum frame size. Use the reset option to return to the default setting.

<portlist> : Port list (default: All ports).

<framesize>|reset]: Maximum frame size or reset to 1518 bytes (default: Show maximum frame size).

7.10.3.6 PORT STATISTICS

Syntax: Port Statistics [<portlist>] [clear]

Description: Show or clear statistics for the port.

<portlist>: Port list (default: All ports).

[clear] : Clear port statistics (default: Show statistics).

7.10.3.7 PORT EXCESSIVE COLLISIONS DROP

Syntax: Port Excessive Collisions Drop [enable/disable]

Description: Enable or disable drop of frames when excessive collisions occur in half duplex mode.

[enable|disable]: Enable/disable frame drop (default: Show Excessive Collisions Drop Mode).

7.10.3.8 PORT VERIPHY

Syntax: Port VeriPHY [<portlist>] [full|anomaly|termination]

Description: Perform VeriPHY cable diagnostics on the specified port(s).

<portlist>: Port list (default: All ports).

[full|anomaly|termination] : Type of diagnostics. Full comprises cable length and full anomaly check, anomaly comprises full anomaly check and termination comprises anomaly check without check for coupling between pairs (default: full).

7.10.4 MAC Table Commands

7.10.4.1 MAC CONFIGURATION

Syntax: MAC Configuration

Description: Show the permanently stored MAC table and the MAC ageing timer.

7.10.4.2 MAC ADD

Syntax: MAC Add <macaddress> <portlist>|none [<vid>]

Description: Add a static MAC address table entry and VLAN ID on ports.

<macaddress>: MAC address, 12-digit hex string, optionally separated with dashes or colons (e.g. 010203ABCDEF or 01-02-03-AB-CD-EF or 01:02:03:AB:CD:EF).

<portlist> : Port list. Use "none" to specify no ports.

[<vid>] : VLAN ID, 1-4095 (default: 1).

7.10.4.3 MAC DELETE

Syntax: MAC Delete <macaddress> [<vid>]

Description: Delete MAC address and VLAN ID.

<macaddress>: MAC address, 12-digit hex string, optionally separated with dashes or colons (e.g. 010203ABCDEF or 01-02-03-AB-CD-EF or 01:02:03:AB:CD:EF).

[<vid>] : VLAN ID (default: 1).

7.10.4.4 MAC LOOKUP

Syntax: MAC Lookup <macaddress> [<vid>]

Description: Lookup MAC address and VLAN ID.

<macaddress>: MAC address, 12-digit hex string, optionally separated with dashes or colons (e.g. 010203ABCDEF or 01-02-03-AB-CD-EF or 01:02:03:AB:CD:EF).

[<vid>] : VLAN ID, 1-4095 (default: 1).

7.10.4.5 MAC TABLE

Syntax: MAC Table <vidlist>

Description: Show MAC table for the VLAN Ids specified. Since the list can be very long, only the first 20 entries are shown.

<vidlist> : VLAN ID list.

7.10.4.6 MAC FLUSH

Syntax: MAC Flush

Description: Removes non-static MAC address table entries.

7.10.4.7 MAC AGE TIME

Syntax: MAC Agetime [<agetime>]

Description: Set or show the MAC age timer in seconds. The value zero disables ageing.

[<agetime>]: Age timer in seconds, 0 or 10-65535 (default: Show timer).

7.10.5 VLAN Commands

7.10.5.1 VLAN CONFIGURATION

Syntax: VLAN Configuration [<portlist>]

Description: Show the VLAN aware mode, port VLAN ID and accepted frame type for the port and the permanently stored VLAN table.

[<portlist>]: Port list (default: All ports).

7.10.5.2 VLAN ADD

Syntax: VLAN Add <vidlist> [<portlist>]

Description: Add VLAN entry and include ports in member set.

<vidlist> : VLAN ID list.

[<portlist>]: Port list (default: All ports).

7.10.5.3 VLAN DELETE

Syntax: VLAN Delete <vidlist>

Description: Delete VLAN entry (all ports excluded from member set).

<vidlist> : VLAN ID list.

7.10.5.4 VLAN LOOKUP

Syntax: VLAN Lookup <vidlist>

Description: Lookup VLAN entry and show port list.

<vidlist> : VLAN ID list.

7.10.5.5 VLAN AWARE

Syntax: VLAN Aware [<portlist>] [enable|disable]

Description: Set or show the VLAN awareness mode for the port. VLAN aware ports will strip the VLAN tag from received frames and insert the tag in transmitted frames (except PVID). VLAN unaware ports will not strip the tag from received frames or insert the tag in transmitted frames.

[<portlist>]: Port list (default: All ports).

[enable|disable]: Enable/disable VLAN awareness (default: Show awareness).

7.10.5.6 VLAN PVID

Syntax: VLAN PVID [<portlist>] [<vid>|none]

Description: Set or show the port VLAN ID. Untagged frames received on the port will be classified to this VLAN ID. Frames classified to this VLAN ID will be sent untagged on the port.

[<portlist>]: Port list (default: All ports).

[<vid>|none]: Port VLAN ID, 1-4095 (default: Show PVID).

The 'none' option can be used for trunk links.

7.10.5.7 VLAN FRAME TYPE

Syntax: VLAN Frame Type [<portlist>] [all|tagged]

Description: Set or show the accepted frame type for the port.

[<portlist>]: Port list (default: All ports).

[all|tagged]: Accept all or only tagged (default: Show frame type).

7.10.5.8 VLAN INGRESS FILTERING

Syntax: VLAN Ingress Filtering [<portlist>] [enable|disable]

Description: Set or show VLAN ingress filtering for the port.

[<portlist>]: Port list (default: All ports).

[enable|disable]: Enable or disable VLAN ingress filtering (default: Show current setting).

7.10.6 Aggregation/Trunking Commands

7.10.6.1 AGGREGATION CONFIGURATION

Syntax: Aggr Configuration

Description: Shows the aggregation groups and the aggregation mode.

7.10.6.2 AGGREGATION ADD

Syntax: Aggr Add <portlist>

Description: Add link aggregation group including ports.

<portlist>: Aggregation port list.

7.10.6.3 AGGREGATION DELETE

Syntax: Aggr Delete <portlist>

Description: Delete link aggregation group.

<portlist>: Port list. Aggregations including any of the ports will be deleted.

7.10.6.4 AGGREGATION LOOKUP

Syntax: Aggr Lookup <portlist>

Description: Lookup and display link aggregation group.

<portlist>: Port list. Aggregations including any of the ports will be shown.

7.10.6.5 AGGREGATION MODE

Syntax: Aggr Mode [smac|dmac|xor]

Description: Set or show link aggregation traffic distribution mode.

[smac|dmac|xor]: Aggregation mode, SMAC, DMAC or XOR (default: Show mode).

7.10.7 LACP Commands

LACP (IEEE 802.3ad Link Aggregation Protocol) provides a way to set up aggregation automatically between switches.

7.10.7.1 LACP CONFIGURATION

Syntax: LACP Configuration [<portlist>]

Description: Show the configuration of LACP on all or some ports.

<portlist>: Port list. Default is all ports.

7.10.7.2 LACP MODE

Syntax: LACP mode [portlist] [enable|disable]

Description: Enable or disable LACP on all or some ports.

<portlist>: List of ports to enable or disable LACP. Default is all ports.

[enable|disable]: Enable or disable LACP on the ports.

7.10.7.3 LACP KEY

Syntax: LACP key [<portlist>] [<key>|auto]

Description: The key determines which ports potentially can aggregate together.

7.10.7.4 LACP STATUS

Syntax: LACP Status

Description: Show LACP group and port status.

7.10.7.5 LACP STATISTICS

Syntax: LACP Statistics

Description: Show LACP protocol port statistics.

7.10.8 RSTP Commands

RSTP is a protocol that prevents loops in the network and dynamically reconfigures which physical links in a switch should forward frames.

7.10.8.1 RSTP CONFIGURATION

Syntax: RSTP Configuration [<portlist>]

Description: Show the RSTP Configuration.

7.10.8.2 RSTP SYSPRIO

Syntax: RSTP Sysprio [<sysprio>]

Description: Set or show the RSTP system priority.

<sysprio>: Number between 0 and 61440 in increments of 4096. This provides for 16 distinct values: 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344 and 61440.

The lower the system priority the more likely the switch is to become root in Spanning tree.

7.10.8.3 RSTP HELLOTIME

Syntax: RSTP Helloime [<secs>]

Description: Set or show the RSTP Helloime value.

<secs>: Number between 1 - 10 (default is 2)

7.10.8.4 RSTP MAXAGE

Syntax: RSTP Maxage [<secs>]

Description: Set or show the RSTP MaxAge value.

<secs>: Number between 6 - 40 (default is 20)

7.10.8.5 RSTP FWDDELAY

Syntax: RSTP Fwddelay [<secs>]

Description: Set or show the RSTP Forward Delay value.

<secs>: Number between 4 - 30 (default is 15)

7.10.8.6 RSTP VERSION

Syntax: RSTP Version [<version>]

Description: Set or show the RSTP default protocol version to use.

<version>: normal - use RSTP, compat - compatible with old STP

7.10.8.7 RSTP MODE

Syntax: RSTP Mode [<portlist>] [enable|disable]

Description: Set or show the RSTP mode for the designated ports.

[<portlist>]: Port list (Default: All ports).

[enable|disable]: Enable or disable.

7.10.8.8 RSTP AGGR

Syntax: RSTP Aggr [enable|disable]

Description: Set or show the RSTP mode for aggregated links.

[enable|disable]: Enable or disable.

7.10.8.9 RSTP EDGE

Syntax: RSTP edge [enable|disable]

Description: Expect the port to be an edge port (an end station) or a link to another STP device.

[enable|disable]: End-station or bridge.

7.10.8.10 RSTP PATHCOST

Syntax: RSTP pathcost [<portlist>] [<pathcost>|auto]

Description: Set or show the RSTP path cost for the designated ports.

[<portlist>]: Port list (Default: All ports).

[<pathcost>]: Number between 1 - 200000000. Auto means autogenerated pathcost

Pathcost is normally reverse proportional to the physical (or aggregated) link speed.

7.10.8.11 RSTP MCHECK

Syntax: RSTP Mcheck <portlist>

Description: Force protocol renegotiations on the specified ports.

<portlist>: Port list.

7.10.8.12 RSTP STATUS

Syntax: RSTP Status

Description: Show the current state of all RSTP incarnations and the physical (and aggregation) ports that they control.

7.10.8.13 RSTP STATISTICS

Syntax: RSTP Statistics

Description: Show the current statistics of all RSTP BPDU frames received and transmitted on the physical (and aggregation) ports.

7.10.9 User Group Commands

User groups provide another way than VLAN for making port grouping. With user groups it is possible to share a port between more user groups. An example on how to use user groups is given in chapter 3.5.

7.10.9.1 USER GROUP CONFIGURATION

Syntax: User Group Configuration

Description: Show the user groups.

7.10.9.2 USER GROUP ADD

Syntax: User Group Add <grouplist> [<portlist>]

Description: Add user group entry including the ports.

<grouplist> : User group ID list.

[<portlist>]: Port list (default: All ports).

7.10.9.3 USER GROUP DELETE

Syntax: User Group Delete <grouplist>

Description: Delete user group entry.

<grouplist>: User group ID list.

7.10.9.4 USER GROUP LOOKUP

Syntax: User Group Lookup <grouplist>

Description: Lookup user group entry and show port members.

<groupist>: User group ID list.

7.10.10 QoS Commands

7.10.10.1 QOS CONFIGURATION

Syntax: QoS Configuration [<portlist>]

Description: Show the configured QoS mode, IP ToS Precedence priority mapping, VLAN user priority mapping, default priority, default VLAN user priority, L4 default priority, L4 match priority and UDP/ TCP entries for the port.

[<portlist>] : Port list (default: All ports).

7.10.10.2 QOS MODE

Syntax: QoS Mode [<portlist>] [tag|port|diffserv]

Description: Set or show the priority mode for the port.

[<portlist>] : Port list (default: All ports).

[tag|diffserv]: Enable tag or IP differentiated services for the port (default: Show mode).

7.10.10.3 QOS DEFAULT

Syntax: QoS Default [<portlist>] [<class>]

Description: Set or show the default class. In tag mode, the default class is used for untagged frames. In port mode, the default class is used as the port priority. In the other modes, the default class is used for non-IP frames and IP frames with options.

[<portlist>]: Port list (default: All ports).

[<class>]: Internal class of service (default: Show class).

7.10.10.4 QOS TAGPRIO

Syntax: QoS Tagprio [<portlist>] [<tagpriolist>] [<class>]

Description: Set or show the VLAN user priority mapping.

[<portlist>] : Port list (default: All ports).

[<tagpriolist>]: VLAN user priority list, 0-7 (default: All user priorities).

[<class>]: Internal class of service (default: Show class).

7.10.10.5 QOS DIFFSERV

Syntax: QoS DiffServ [<dscplist>] [<class>]

Description: Set or show the IP Differentiated Services mapping.

[<dscplist>]: IP DSCP list, 0-63 (default: All DSCP values).

[<class>]: Internal class of service (default: Show class).

Constraint: only takes a single DSCP number as parameter instead of a DSCP list.

7.10.10.6 QOS USERPRIO

Syntax: QoS Userprio [<portlist>] [<tagprio>]

Description: Set or show the default VLAN user priority for received untagged frames.

[<portlist>]: Port list (default: All ports).

[<tagprio>]: VLAN tag user priority, 0-7 (default: Show user priority).

7.10.10.7 QOS STORM CONTROL

Syntax: QoS Storm Control <traffic type> [enable|disable] [<rate>]

Description: Set or show the storm control configuration. The allowed frame rates for multicasts, broadcasts and flooded unicasts are controlled using a central storm controller.

<traffic type> : Storm controller to set. Can be one of [Broadcast|Multicast|Flood Unicast] (default: Show all).

[enable|disable] : Enable or disable specified storm controller.

[<rate>] : Unit is 1982 frames per second. Allowed values are 1982, 2*1982, 3*1982, ... 127*1982

7.10.11 Mirror Commands

7.10.11.1 MIRROR CONFIGURATION

Syntax: Mirror Configuration

Description: Show the mirror destination port and mirror mode for source ports.

7.10.11.2 MIRROR PORT

Syntax: Mirror Port [<port>]

Description: Set or show the mirror destination port.

[<port>]: Mirror destination port (default: Show mirror port).

7.10.11.3 MIRROR SOURCE

Syntax: Mirror Source [<portlist>] [enable|disable]

Description: Set or show the source port mirror mode.

[<portlist>] : Source port list (default: All ports).

[enable|disable]: Enable/disable mirroring of frames received on port (default: Show mirror mode).

7.10.12 IP Commands

The TFTP related commands in below are not supported by all versions. From 2.33, they are not supported anymore.

7.10.12.1 IP CONFIGURATION

Syntax: IP Configuration

Description: Show configured IP address, mask, gateway, VLAN ID and mode.

7.10.12.2 IP STATUS

Syntax: IP Status

Description: Show current IP status. Not implemented

7.10.12.3 IP SETUP

Syntax: IP Setup [ipaddress> [<ipmask> [ipgateway>]]] [<vid>]

Description: Set or show IP configuration.

[<ipaddress>]: IP address (default: Show IP configuration).

[<ipmask>] : IP subnet mask (default: Subnet mask for address class).

[<ipgateway>]: Default IP gateway (default: 0.0.0.0).

[<vid>] : VLAN ID, 1-4095 (default: 1).

7.10.12.4 IP MODE

Syntax: IP Mode [enable|disable]

Description: Activate or deactivate the IP configuration.

[enable|disable]: Enable/disable IP (default: Show IP mode).

7.10.12.5 IP PING

Syntax: IP Ping [-n <count>][-w <timeout>] <ipaddress>

Description: Ping the specified IP address.

[-n <count>]: Number of echo requests to send (default: 1).

[-w <timeout>]: Timeout in seconds to wait for each reply (default: 2).

7.10.12.6 IP ARP

Syntax: IP Arp

Description: Show the current content of the ARP table.

7.10.12.7 IP DHCP

Syntax: IP Dhcp [enable|disable]

Description: Activate or deactivate the DHCP Protocol.

[enable|disable]: Enable/disable DHCP (default: Show DHCP mode).

7.10.13 Dot1X Commands

7.10.13.1 DOT1X CONFIGURATION

Syntax: Dot1x Configuration

Description: Show current 802.1X configuration.

7.10.13.2 DOT1X MODE

Syntax: Dot1x Mode [enable|disable]

Description: Enable or disable 802.1X process for the switch.

[enable|disable]: new mode (default: Show current configuration).

7.10.13.3 DOT1X STATE

Syntax: Dot1x State [<portlist>] [Auto|ForceAuthorized|ForceUnauthorized]

Description: Set or show the 802.1X state for the port.

[<portlist>]: Port list (default: All ports).

[Auto|ForceAuthorized|ForceUnauthorized]: Set 802.1X state for the ports (default: Show mode).

7.10.13.4 DOT1X SERVER

Syntax: Dot1x Server [<IP Address>]

Description: Set or show RADIUS server IP address.

[<IP Address>]: IP address of external RADIUS server. (default: Show current configuration)

7.10.13.5 DOT1X UDP PORT

Syntax: Dot1x UDP Port [<value>]

Description: Set up UDP Port for the external RADIUS server.

[<value>]: The UDP port the RADIUS server listens to (default: Show current configuration).

7.10.13.6 DOT1X SECRET

Syntax: Dot1x Secret [<Shared Secret>]

Description: Set or show the secret shared with the RADIUS server.

[<Shared Secret>]: Shared secret shared with external RADIUS server. (default: Show current configuration)

7.10.13.7 DOT1X STATISTICS

Syntax: Dot1x Statistics [<portlist>]

Description: Show 802.1X statistics for the port.

[<portlist>]: Port list (default: All ports).

7.10.13.8 DOT1X REAUTHENTICATE

Syntax: Dot1x Reauthenticate [<portlist>] [now]

Description: Refresh (restart) 802.1X authentication process for the port by setting reAuthenticate TRUE.

[<portlist>]: Port list (default: All ports).

[now]: if specified, force re-authentication immediately.

7.10.13.9 DOT1X PARAMETERS

Syntax: Dot1X Parameters [<parameter>] [<value>]

Description: Set up advanced 802.1X parameters.

[<parameter>]: Parameter to change.

[<value>]: New value for the given parameter.

7.10.14 IGMP Snooping Commands

7.10.14.1 IGMP SNOOPING DESCRIPTION

Per default – and when enabled - IGMP snooping will function in each statically defined VLAN (i.e. those VLANs that are stored in non-volatile configuration memory). The IGMP snooping module will listen to IP multicast router IGMP queries and the IGMP reports from hosts, and will update the switch device MAC table with IP multicast group MAC addresses and port masks according to the received reports. If no IP multicast router is present in an IGMP enabled VLAN, the switch will perform the querying itself in that particular VLAN.

The switch querying functionality can be enabled and disabled per VLAN. The switch must be setup for IP management in order for the querying to work.

7.10.14.2 IGMP CONFIGURATION

Syntax: IGMP Configuration

Description: Show the IGMP configuration.

7.10.14.3 IGMP STATUS

Syntax: IGMP Status

Description: Show the IGMP operational status and statistics.

7.10.14.4 IGMP GROUPS

Syntax: IGMP Groups <vidlist>

Description: Show IGMP groups for given VLANs.

7.10.14.5 IGMP MODE

Syntax: IGMP Mode [enable|disable]

Description: Set or show global IGMP mode.

(default: Show current mode)

7.10.14.6 IGMP STATE

Syntax: IGMP State <vidlist> [enable|disable]

Description: Set or Show IGMP state per VLAN.

(default: Show IGMP state)

7.10.14.7 IGMP QUERIER

Syntax: IGMP Querier <vidlist> [enable|disable]

Description: Set or Show IGMP querier state per VLAN.

(default: Show IGMP querier state)

7.10.14.8 ROUTER PORTS

Syntax: IGMP Router ports [<portlist>] [enable|disable]

Description: Set or show IGMP administrative router ports.

(default: Show current router ports)

7.10.14.9 UNREGISTERED FLOOD

Syntax: IGMP Unregistered Flood [enable|disable]

Description: Set or show forwarding mode for unregistered (not-joined) IP multicast traffic. Will flood when enabled, and forward to router-ports only when disabled

(default: Show current mode)

7.10.15 Debug Commands

The Debug commands are for factory use only.

7.11 Examples

7.11.1 VLAN configuration

This example shows how to configure two VLANs with the following setup on at 8-port switch:

- VID 1 spans ports 2-8 and VID 2 spans ports 1-3, so port 2 and 3 are members of both VLANs and all 8 ports must be VLAN aware.
- Port 1 is the access port for VID 2, so PVID of port 1 must be set to 2.
- Port 2 is the trunk port for VID 1 and VID 2, so the PVID of port 2 must be set to 'none' and port 2 must be set to accept tagged frames only.
- Port 3 is the hybrid port for VID 1 and VID 2, where VID 1 is the untagged VLAN, so PVID must be set to 1.
- Ports 4-8 are access ports for VID 1.

The following CLI session does the above setup provided that the initial configuration is the default configuration:

```
>vlan
VLAN>delete 1
VLAN>add 1 2-8
VLAN>add 2 1-3
VLAN>aware enable
VLAN>pvid 1 2
VLAN>pvid 2 none
VLAN>frame type 2 tagged
VLAN>conf
VLAN Configuration:
Port Aware PVID Frame Type
      Port  Aware    PVID  Ingress Filtering  Frame Type
      1:   enabled    2     disabled           All
      2:   enabled  none     disabled           Tagged
      3:   enabled    1     disabled           All
      4:   enabled    1     disabled           All
      5:   enabled    1     disabled           All
      6:   enabled    1     disabled           All
      7:   enabled    1     disabled           All
      8:   enabled    1     disabled           All

Entries in permanent table:
      1:  2,3,4,5,6,7,8
      2:  1,2,3
VLAN>
```

7.11.2 User Group Configuration

This example shows how to configure two user groups, port 1 + port 2 and port 4 + port 5, with a common server, port 3.

The following CLI session does the above setup on a 8-port switch provided the initial configuration is the default configuration:

```
>user group                                # Go to user group level
User Group>delete 1                         # Delete default user group 1
```

```
User Group>add 2 1-3      # Create user group with ports 1-3
User Group>add 3 3-5      # Create user group with ports 3-5
User Group>add 1 6-8      # Restore default group excluding ports 1-5

Groups:
 1:  6,7,8
 2:  1,2,3
 3:  3,4,5
```

8. WEB INTERFACE

The web interface offers an alternate user interface to the CLI. The web interface is in-band and requires use of one of the Ethernet ports. This port provides simultaneous web management and normal usage. The same commands with the same functionality can be accessed via either interface. Refer to Section 7:

Command Line Interface for specific command information.

From the WEB interface it is possible to, among other things:

- Set port mode
- Enable/disable flow control
- Configure simple port-based VLAN
- Configure aggregation groups
- Configure LACP parameters
- Configure RSTP parameters
- Configure QoS
- Read and clear statistics counters
- Monitor LACP status
- Monitor RSTP status
- Configure and monitor 802.1X
- Configure and monitor IGMP snooping (if defined for switch device)
- Configure source-IP address and DHCP server filter
- Upgrade software

All operations are password protected. The password must be entered at login. The password is the same as is being used in the command line interface.

The IP mode is disabled in the factory default configuration. To be able to use the WEB interface, the IP must be enabled and configured via the command line interface. The IP address, mask and gateway must be set according to your environment or you can enable IP and DHCP if your environment include a DHCP server.

Example on enabling the WEB interface via the command line interface:

```
>ip setup 10.10.129.189 255.255.252.0 10.10.128.14 1  
>ip mode enable
```

The web interface and any Ethernet traffic to the internal microcontroller is limited to a size of 1472 bytes.

9. THERMAL SOLUTIONS

There are two thermal management solutions available for the Epsilon board: heatspreader or heatsink. The choice depends on the temperature range the board will encounter.

9.1 Heatspreader

For the full temperature range (-40°C to +85°C) the recommended solution is the conduction cooling heatspreader plate shown in Figure 3. The plate attaches to Epsilon using the four #4-40 holes in the corner that are also used to attach the board to another PC/104 board. The four #6-32 holes in the plate are used to attach it to the enclosure wall. In the case where there are no fans present, this attachment provides the best path for removing heat.

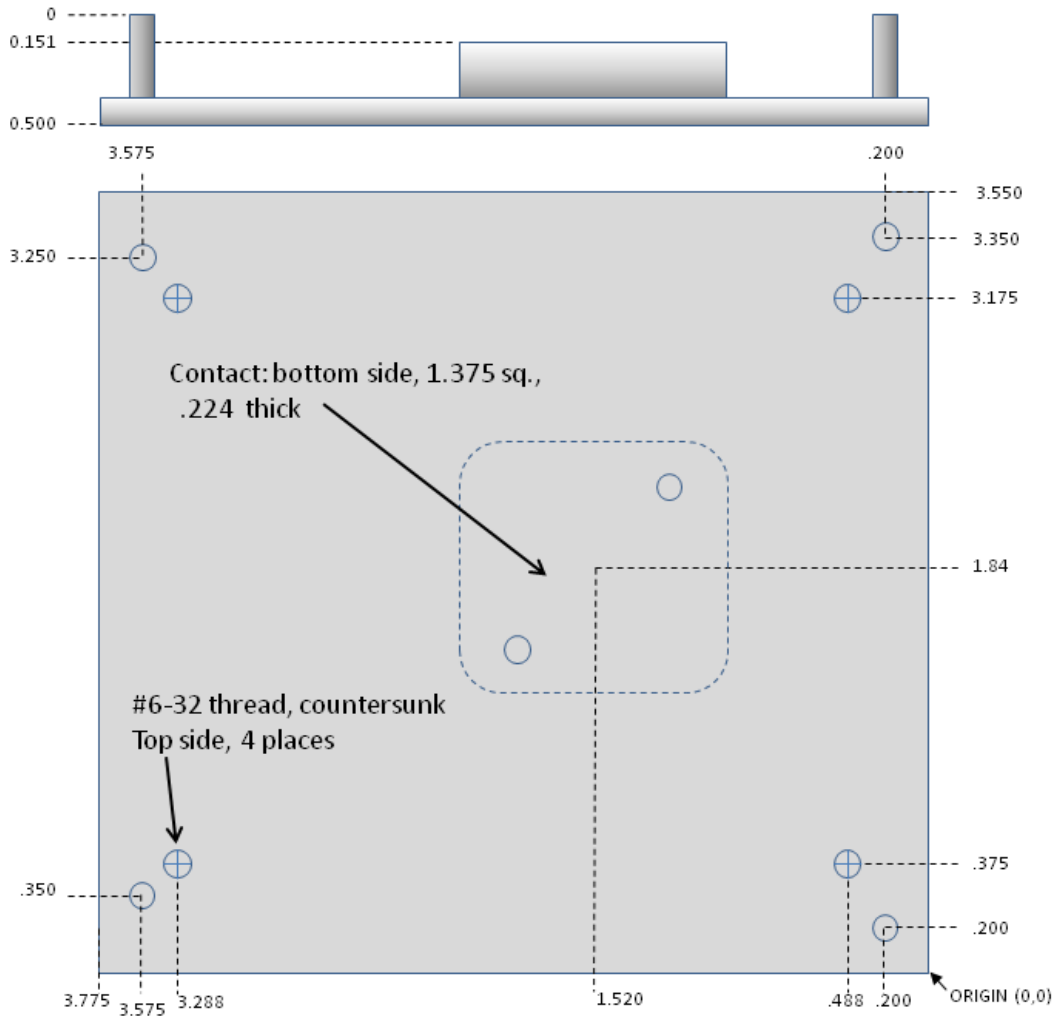


Figure 3. Epsilon Heatspreader Plate

9.2 Heatsink

When a fan is present (i.e., there is airflow) or the ambient temperature stays in the range -40°C to +71°C, the recommended solution is the heatsink shown in Figure 4. The heatsink has a lower profile and is better adapted to removing heat from the board when there is airflow.

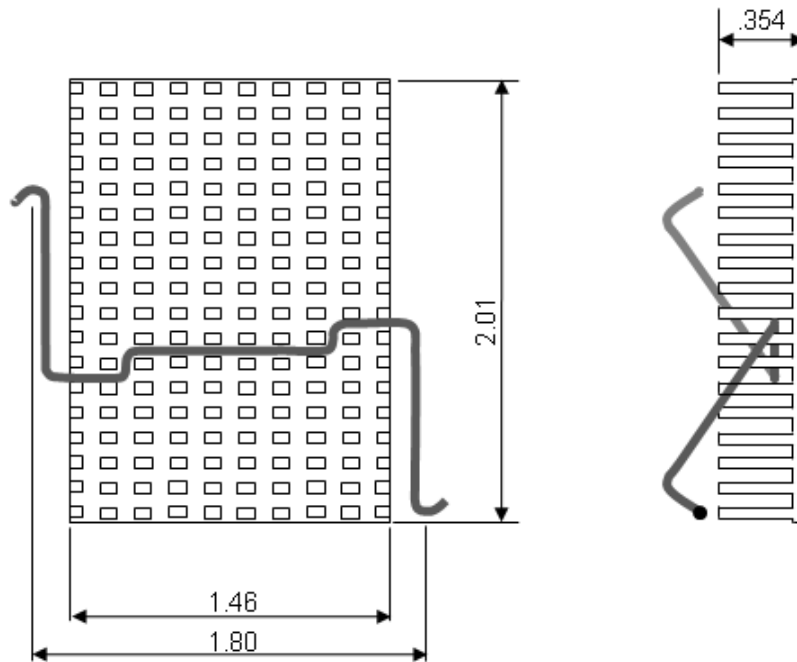


Figure 4. Epsilon Heatsink

10. SPECIFICATIONS

The specifications for the board are summarized in the following table.

Ethernet switch	8-port, layer 2+ switch Built-in 8051 microcontroller for configuration and management
Number of ports	8 10/100/1000Mbps copper Ethernet ports with non-blocking wire-speed performance
On-board memory	2MB flash for boot and application code 128KB SRAM 8KB EEPROM
Frame buffer	176 kilobyte on-chip frame buffer Jumbo frame support at all speeds
DSCP	DSCP remarking for both IPv4 and IPv6 frames
Serial port	1 RS-232 for host interface
Indicator LEDs	16 status LEDs, two per port 2 general purpose LEDs
Classifier	Programmable multi-layer classifier with 4 QoS classes
RSTP	Rapid spanning tree protocol (IEEE 802.1W)
Standalone Capable	Can operate as a standalone network switch or in combination with a PC/104 embedded computer
Power Input	+7-36V DC/DC power supply +5VDC input (either external, from PC/104 bus, or from PC/104-Plus bus)
Power consumption	5.4W typical at +5VDC with all 8 ports active, approx. 0.26W less for each inactive port
Bus interface	PC/104 (ISA) bus passthrough
Form factor	PC/104 (3.55' x 3.775")
Operating temp	-40°C to +85°C (-40°F to +185°F) with heatspreader plate or -40°C to +71°C (+40°F to +160°F) with heatsink
Weight	3.4oz (96g) without heatspreader plate or heatsink
RoHS	Compliant

The timing specifications for the board are summarized in the following table.

Time to Login and alive LED flashing after power-on, power cycle, or reboot	8 sec.
Time for ports to reconnect after power-on, power cycle, or reboot	15 sec.
Time for all ports to start passing data after power-on, power cycle, or reboot	<30 sec. (typical 24-26 sec.)
Time for all ports to start passing data after restoring factory defaults	8 sec.

APPENDIX A DEFAULT VALUES

When the *System Restore Default [keepIP]* command is issued, the switch configuration returns to its factory settings. The following lists show the values of the various configuration parameters.

The software version will change with any new application code that is loaded onto the board. The MAC address is unique to the particular board. The IP address is set to 192.168.1.60 in the factory and can be changed by the user. The default value will not change as long as the “keepIP” flag is used in restoring the factory default values.

System Configuration:

```
Name:
S/W Version: Luton 2.34d 2m diamond system
CVS Tag: sw_8051_2_34d
Compile Date: Feb 25 2011 11:35:44
H/W Version: 1.0

MAC address: 00-06-d5-25-10-14 #Unique value for every board
SNMP: enabled
Trap IP: 0.0.0.0
Readcommunity: public
Writecommunity: private
Trapcommunity: public
```

Console Configuration:

```
Password:
Timeout: 0
Prompt: >
```

Port Configuration:

Port	State	Mode	Flow control	Link	MaxFrame
1:	enabled	auto	disabled	1000fdx	1518
2:	enabled	auto	disabled	1000fdx	1518
3:	enabled	auto	disabled	1000fdx	1518
4:	enabled	auto	disabled	1000fdx	1518
5:	enabled	auto	disabled	1000fdx	1518
6:	enabled	auto	disabled	1000fdx	1518
7:	enabled	auto	disabled	1000fdx	1518
8:	enabled	auto	disabled	1000fdx	1518

```
Excessive Collisions Drop: disabled
```

MAC Configuration:

```
Entries in permanent table:
None
Agetime: 300
```

VLAN Configuration:

Port	Aware	PVID	Ingress Filtering	Frame Type
1:	disabled	1	disabled	All
2:	disabled	1	disabled	All
3:	disabled	1	disabled	All
4:	disabled	1	disabled	All
5:	disabled	1	disabled	All
6:	disabled	1	disabled	All
7:	disabled	1	disabled	All
8:	disabled	1	disabled	All

```
Entries in permanent table:
1: 1,2,3,4,5,6,7,8
```

Aggr Configuration:

```

Groups:
None
LACP status
None
Mode: xor

```

Operational Status

```

Groups:
None

```

LACP Configuration:

```

System Id: 00-06-d5-25-10-14
System Priority: 32768
Port  Enabled      Key
  1   no           auto
  2   no           auto
  3   no           auto
  4   no           auto
  5   no           auto
  6   no           auto
  7   no           auto
  8   no           auto

```

RSTP Configuration:

```

sysprio: 32768
hellotime: 2
maxage: 20
fwddelay: 15
version: normal
Port  Enabled  Edge  Pathcost
  1   no     yes   auto
  2   no     yes   auto
  3   no     yes   auto
  4   no     yes   auto
  5   no     yes   auto
  6   no     yes   auto
  7   no     yes   auto
  8   no     yes   auto
Aggr  no

```

User Group Configuration:

```

Groups:
1: 1,2,3,4,5,6,7,8

```

QoS Configuration:

Port	Mode	Default	User
1:	port	high	0
2:	port	high	0
3:	port	high	0
4:	port	high	0
5:	port	high	0
6:	port	high	0
7:	port	high	0
8:	port	high	0

Tag Priorities:

Port	0	1	2	3	4	5	6	7
1:	normal	low	low	normal	medium	medium	high	high
2:	normal	low	low	normal	medium	medium	high	high
3:	normal	low	low	normal	medium	medium	high	high
4:	normal	low	low	normal	medium	medium	high	high
5:	normal	low	low	normal	medium	medium	high	high
6:	normal	low	low	normal	medium	medium	high	high
7:	normal	low	low	normal	medium	medium	high	high
8:	normal	low	low	normal	medium	medium	high	high

```
DiffServ:
  DSCP      Class
  All      high
Storm Control:
Broadcast:  disabled      0
Multicast:  disabled      0
Flood Unicast: disabled      0
```

Mirror Configuration:

```
Mirror Port: 1
Source:
Port 1: disabled
Port 2: disabled
Port 3: disabled
Port 4: disabled
Port 5: disabled
Port 6: disabled
Port 7: disabled
Port 8: disabled
```

IP Configuration:

```
Address: 192.168.1.60
Subnet Mask: 255.255.255.0
Gateway: 0.0.0.0
VID: 1
Mode: enabled
dhcp: disabled
```

Dot1x Configuration:

```
Mode: disabled
```

Port	Admin State	Port State
1:	ForceAuthorized	802.1X Disabled
2:	ForceAuthorized	802.1X Disabled
3:	ForceAuthorized	802.1X Disabled
4:	ForceAuthorized	802.1X Disabled
5:	ForceAuthorized	802.1X Disabled
6:	ForceAuthorized	802.1X Disabled
7:	ForceAuthorized	802.1X Disabled
8:	ForceAuthorized	802.1X Disabled

RADIUS Configuration:

```
Server: 0.0.0.0
UDP Port: 1812
Secret:
```

IGMP Configuration:

```
Mode: disabled
```

VID	IGMP Snooping	Querier
1	enabled	enabled

```
Router ports: None
Unregistered Flood: enabled
```