# Mellanox®

TECHNOLOGIES

# SwitchX Evaluation Board Hardware User Manual

PN: MT51336-EN-EVB, MT51336-VPI-EVB

Rev 1.0

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SwitchX Switch  EVB Hardware User Manual

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*Preliminary Draft*

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# Revision

*Table 1 - Revision History*

| Revision | Description |
|----------|-------------|
| 1.0 | Initial Release |
| 0.7 | Added the correct H x W x D and weight<br>Added Power numbers<br>Added verified compliance port to use. |
| 0.6 | Added the word "Hardware" to the name.<br>Added correct graphics of the server side card |
| 0.5 | Added tie down the cables<br>Added Caution Note do not use as a shelf. |
| 0.4 | fixed graphics |
| 0.3 | More fixes |
| 0.2 | Added Initial configuration section |
| 0.1 | Preliminary Release |

# 1   Overview

This EVB is intended to be used as a platform to evaluate the SwitchX silicon. SW engineers can use it as a means for SW developement using the SwitxchX SDK. SW developers can implement initial driver development/integration into non PPC CPU environments.

Signal integrity engineers can use it to evaluate SwitchX SI performance and compliance to spec. This EVB can be used to:

• evaluate and qualify

▪Ethernet SerDes

▪IB SerDes

▪FC SerDes

• Initial Ethernet and IB switch testing for L2/L2+

This EVB can be used both while rack mounted (standard 19" rack) and in a tabletop setup(for Signal Integrity evaluation).

*Figure 1: Connector and Power Side Panels*
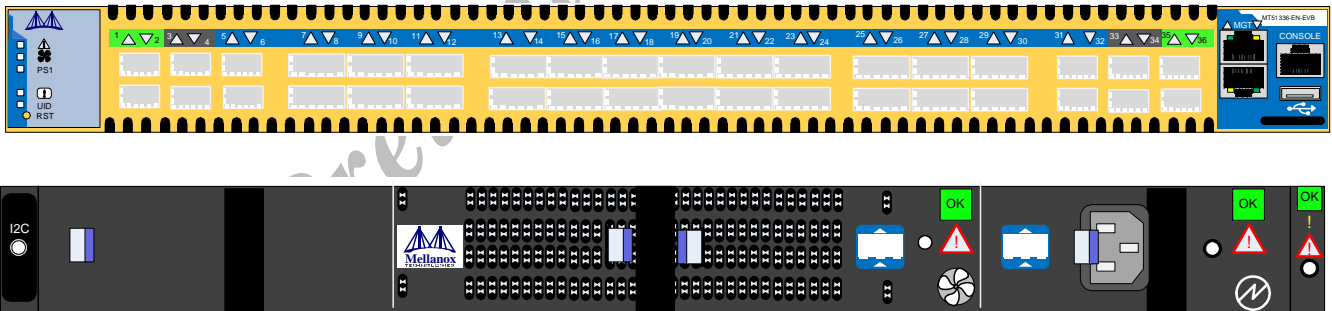


## 1.1   Management CPU

The EVB comes with a Power PC 460E CPU for management. It also comes with a PCIE/1GbE Extender that allows the user bypass the management CPU and to connect directly to the chip.

> When the PCIE/1GbE Extender is used the Power PC is removed from the system and **none** of the management interfaces on the connector side will work.

> When the Power PC is removed the switch/ EVB becomes unmanaged and does NOT need Initial configuration.

## 1.2    PCIE/1GbE Extender Kit

The Power PC management module can be removed and in its place a PCIE/1GbE extender can be installed. When the Management module is removed the EVB becomes externally managed. The PCIE/1GbE extender kit contains the system side board and the server side board.

The board has four connectors:

| Interface | Description |
|---|---|
| CX4 connector | for clocking and reset |
| 2 QSFP connectors | one is blue, one is green<br>• The green one goes from the green labeled connector on the EVBduaghter board to the green label on the server side card included in the kit.<br>• The blue one goes from the blue labeled connector on the EVBduaghter board to the blue label on the server side card included in the kit. |
| Server Side board | a card that gets inserted into the server X8 PCI slot. |
| **Use only one option the PCIE or the Ethernet, do not use both** | |
| RJ 45 connector | for management through an ethernet port |

The server side board in the kit, gets inserted in a server. Connect the card into a 8X or 16X PCI slot. This card has 3 ports:

| Interface | Description |
|---|---|
| CX4 connector | for clocking and reset |
| 2 QSFP connectors | one is blue, one is green<br>• The green one goes from the green labeled connector on the EVBduaghter board to the green label on the server side card included in the kit.<br>• The blue one goes from the blue labeled connector on the EVBduaghter board to the blue label on the server side card included in the kit. |

### 1.2.1    PCIE Extender Kit

This option allows the EVB to be managed through the server. This is done with three cables connecting the EVB to the Server. One cable is for clocking and reset and two cables are for data TX and RX.

### 1.2.2    1GbE Extender Kit

The PCIE extender allows for remote management through the 10/100/1000Mb RJ45 Ethernet connection on the EVB Extender side board. This is connected to any standard Ethernet port fabric management port.

## 1.3 Compliance Ports

Ports 3 and 4 and 33 and 34 are connected to the chip. These are compliance ports and go to the SMA/mini-SMP interfaces. Ports 3 and 4 are SMA ports and ports 33 and34 are mini-SMP ports.

Compliance ports are the worst case loss (for all of the on board connectors) through the channel. They are designed to have an insertion loss of 5.5dB as defined in SFF-8431.

See Figure 12 on page 23 for identifying the trace and compliance ports. See Figure 35 on page 46 and Table 7 on page 47 for locations and numbering of the trace and compliance port board connections.

> As of this revision only port 4 is verified at the proper designed insertion loss.
> **Use port 4 for compliance.**

## 1.4 Reference Traces

Ports 1 and 2 and 35 and 36 are not connected to the chip. These are reference ports and go to the SMA/mini-SMP interfaces. See Figure 35 on page 46 and Table 7 on page 47 For locations and numbering of the board connections. Ports 1 and 2 are SMAports and ports 35 and36 are mini-SMP ports.

These reference traces are designed to have identical insertion loss as the corresponding compliance ports, and those traces are routed in the same geometry and length as the traces of the compliance ports.

## 1.5    Features

### Full Feature List

- Reference traces SMA and mini-SMP
- Compliance ports SMA and mini-SMP
- 2 ports connect to mini SMP connectors for SI testing
- 24 QSFP ports
- 1 PSU
- 12 SFP+ ports
- RADIUS
- TACACS+
- LDAP
- SSH
- DHCP
- CLI
- IPv6 MNG
- Telnet
- FTP
- RSTP
- PFC
- Static MAC
- TFTP
- SCP
- SNTP
- AAA
- Syslog
- Dual SW image
- Auto temprature control
- Upload/download configuration
- System alarms
- VLAN aware
- ETS
- Flow Control
- 36 FDR (56Gb/s) ports in a 1U switch
- IBTA 1.3 and 1.21 complaint
- SDR/DDR/QDR/FDR10/FDR link speed
- Congestion control
- Adaptive routing

- Port mirroring
- FDR10 supports 20% more bandwidth over regular QDR using the same cables/connectors**
- Up to 8 multiple switch partitions*
- All ports can be set to gateway ports connecting to 40GigE (over QSFP) or 1/10GigE (over QSA)*
- 4.032 Tb/s aggregate data switching capacity with ultra low latency
- CBF *
- DCBX *
- LAG/LACP *
- QCN *

## 1.6    Serial Number and Product Version Information

The Serial number and GUID for the switch and the MAC for the Management PC are found on the pull out tab below the USB interface connection.

*Figure 2: Pull Out Tab*
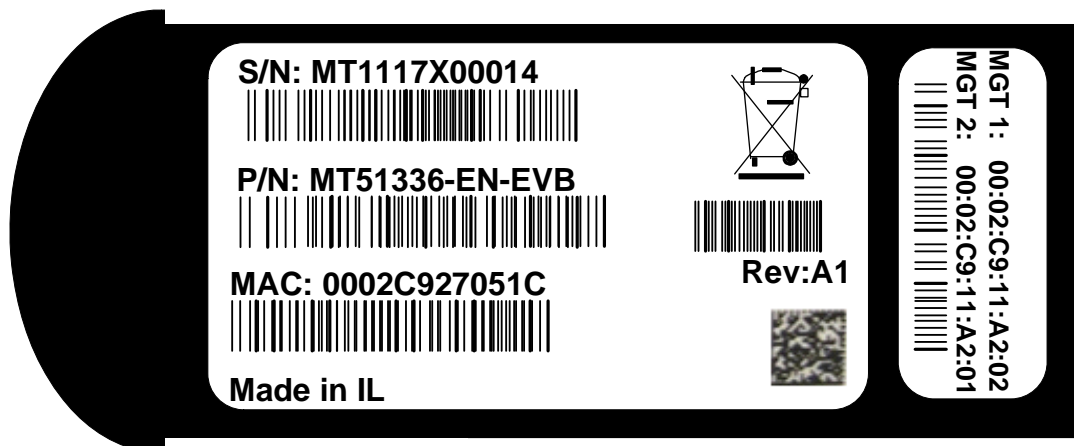
# 2    40 Gb/s Ethernet

40 Gb ETH is only guaranteed to work with approved Mellanox Cables.

Each QSFP port is capable of up to 40GigE and with a QSA the ports can run at 10GigE/1GigE. Up to 24 QSFP ports are capable of 1/2/4/8G Fibre Channel with a QSA.

All ports are capable of virtual switching (VEPA+). All usable virtual switching ports are grouped together.

The port protocol can only be obtained from the management interface.

# 3   FDR

The SwitchX EVB supports FDR, a pre-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 14.0625Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 54.54Gb/s. The FDR physical layer is an IBTA specified physical layer using different block types, deskew mechanism and framing rules.

SwitchX™ also supports FDR10, a non-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 10.3125Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 40Gb/s.

FDR10 supports 20% more bandwidth over regular QDR using the same QSFP cables/connectors.

Both FDR and FDR10 support Forward Error Correction (FEC), as described in IEEE 802.3ap chapter 74.

FDR10 is only guaranteed to work with approved Mellanox ConnectX-3 adapters.

# 4      Basic Operation and Installation

## 4.1    Switch Platform Hardware Overview

Figure 4 shows the power side panel and connector side panel views of the switch EVB.

*Figure 3: Connector and Power Side Panel*
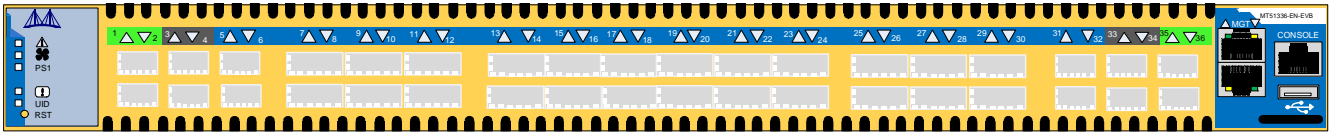


The figure shows port configurations for the switch systems, including:

- 2 – Ethernet RJ45 connectors
- 1 – RJ45 connector for connecting to a host PC (CONSOLE)
- 1 – USB connector
- 24 QSFP ports
- 12 SFP+ ports
- various switch, port, fan and power status LEDs

*Figure 4: Power Side Panel*
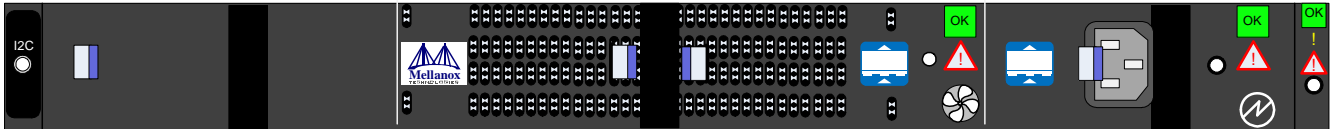


- 1 – hot-swap fan module
- 1 – power supply unit
- 1 – I2C banana connector
- various switch, port, fan and power status LEDs

All connectivity except for power cords is via the connector side panel. All connectors can support active cables.

### 4.1.1  Status LEDs

#### 4.1.1.1  System Status Indicators

The System Status Indicators(⚠) are located to the left of the connectors on the connector side panel, and on the power side at the far right. Both of these LEDs give identical information.

Green – OK

Yellow – a fault in the system

Red – Major Fault or Fatal Error

Led Color shows the switch status

Power side status LED

Connector side status LED
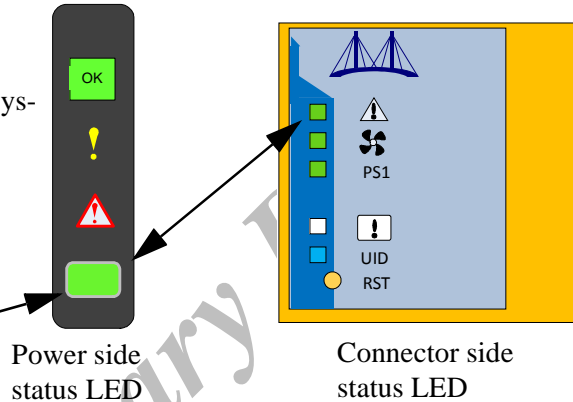
The system status indicators should display as follows:

- When the switch is plugged in, within three minutes the STATUS LED should light up green.

- The PSU LED should light up green.

> As long as there is power to the switch and the switch is booted up and running, the status LED should be green.

- The FAN LED should light up green.

> If the STATUS LED shows red after three minutes, unplug the switch and call your Mellanox representative for assistance.

If the FAN LED shows red, troubleshoot the fan module.

> If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See "Troubleshooting" on page 64.

If the PSU LED is not green, this indicates a problem with the power supply. The switch is operational only if the PSU LED is green.

*Figure 5: Power, Fan, and System LEDs*
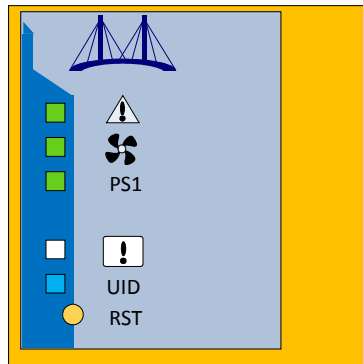


*Table 2 - System Status LED Configurations*

| LED Configuration | STATUS/ System Health LED |
|---|---|
| Green | OK – The system is up and running. |
| Flashing Green | The system is booting up. |
| Yellow | Error – A fault in the system, most likely the firmware did not BOOT properly. |
| Red | Major Error – Possible damage can result to the switch. Turn off immediately. e.g. bad firmware, can't boot, overheated |
| Off | Off – The system has no power. |

## 4.1.1.2 Power Side Panel System LED

On the right side of the power side panel is a single system LED that displays the health of the switch. This indicator is the same as the system status indicator on the other side of the switch. The LED assignment is as in Table 2.

*Figure 6: System Health LED*



This is a three color LED

Green — OK

Yellow — Fault in the system

Red — Major fault
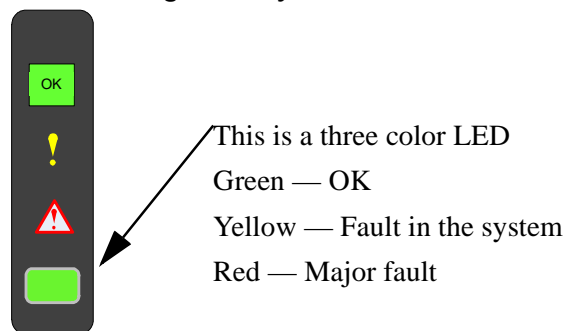
## 4.1.1.3 Port Connector LED Assignment

Above the ports are two LEDs one for the upper port ▲ and one for the lower port ▼ . The following table shows the port status according to the LED indication.

*Table 3 - Connector Physical and Logical Link Indications*

| LED Status | LED Description |
|---|---|
| Off | No power to the port |
| Solid Green | Logical link up |
| Flashing Green | Data activity flashing speed ≈ data transfer speed |
| Orange | Physical link up |
| Flashing Orange | A problem with the physical link. Usually the SM is down or not enabling the port. |

### 4.1.1.4  Power Supply Status Indicators

The switch EVB is only available with one installed Power Supply Unit.

*Figure 7: Power Side Panel*

Fan status LED

PSU1 status LED

Fan Unit
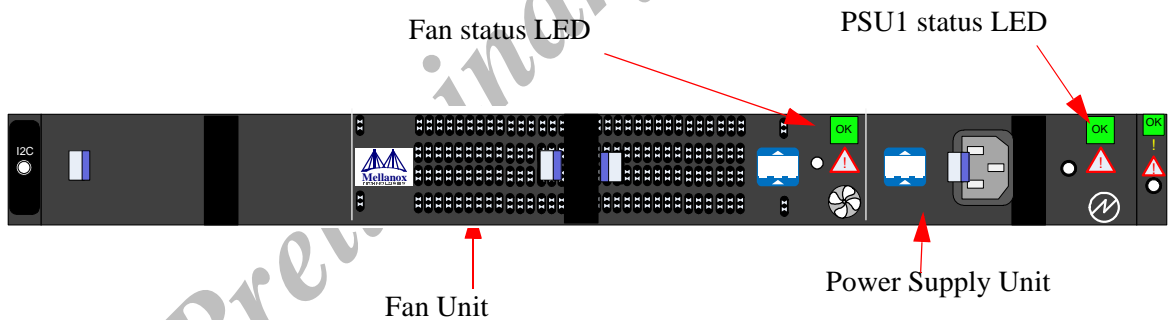
Power Supply Unit

The power supply unit (PSU) is located on the right side of the power side panel. The PSU has a single 2 color LED on the right side of the PSU, that indicates the internal status of the unit.

*Figure 8: PSU Status LEDs*

This is a two color LED

Green — OK

Red — Major fault

Off — No power to the system

Fan air flow indicator
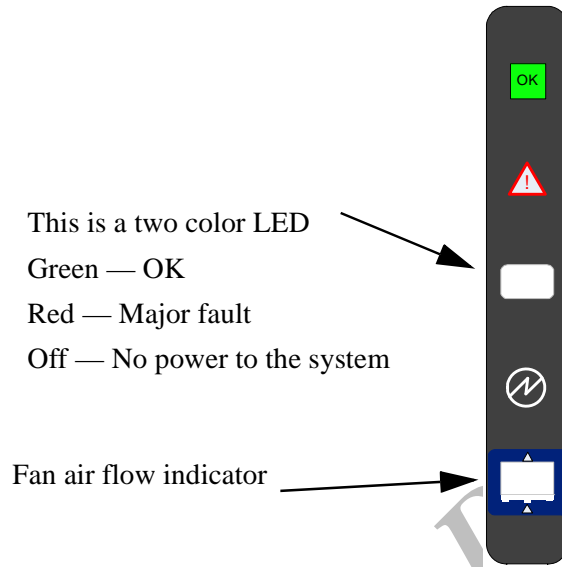
*Table 4 - PSU Status LED Configurations*

| LED Color | Status |
|-----------|--------|
| Green | OK – The Power supply is delivering the correct voltage. 12VDC |
| Red | Error – The PSU is not operational |
| Off | Off – There is no power to the system . |

### 4.1.1.5  Fan Status Indicators

The indicator ✺ is located to the left of the connectors on the connector side panel.

*Figure 9: Fan Status LED Connector Side*

This is a two color LED

Green — OK

Red — Major fault

Off — No power to the system
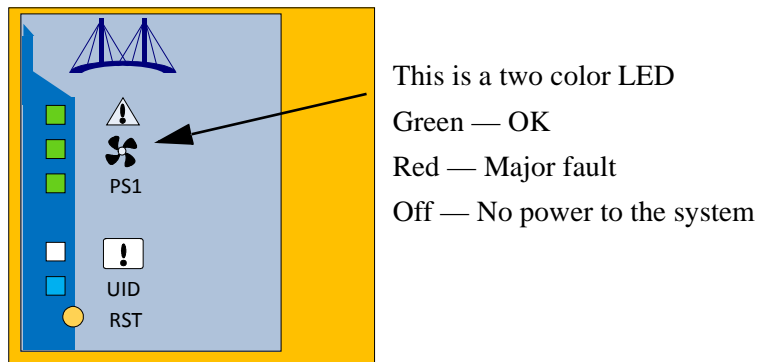
The LED indicator on the Fan Module is on the right side of the module.

*Figure 10: Fan Status LED Power side*

This is a two color LED

Green — OK

Red — Major fault

Off — No power to the system

Fan air flow indicator
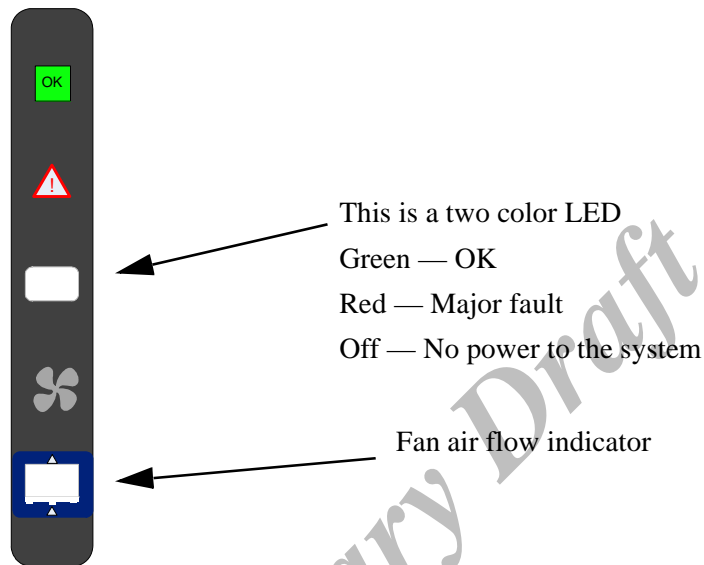
The following fan status conditions are possible:

*Table 5 - Fan Status LED Configurations*

| LED Configuration | FAN LED |
|---|---|
| Green | OK – The system is up and running. |
| Red | Error – One or more fans is not operating properly. The system should be powered down and troubleshoot the fan module. |
| Off | Off – The fan unit is not receiving any power. Check that the fan unit is properly and completely inserted. |

All fans must be operating while the power supply is plugged in.

If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See "Troubleshooting" on page 64.

## 4.1.1.6  Bad Port LED

The Bad Port indicator is located on the left side of the connector side panel of the unit. The following Bad Port conditions are possible:

*Table 6 - Bad Port LED Configurations*

| LED Configuration | Description |
|---|---|
| Off | OK – All ports are up and running. |
| Flashing Orange | Error –One or possibly more ports has just received a symbol error. |

This LED shows symbol errors. Possible causes for this are:

• bad cable

• bad connection

• bad connector

This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

#### 4.1.1.7 UID LED Switch Identifier

The UID LED is a debug feature that will become available to customers in the near future. For details please contact Mellanox Technologies support.

### 4.1.2 Reset Button

On the connector side panel under the system LEDs is a reset button. This reset button requires a tool to be pressed, a paper clip will do.

> DO NOT use a sharp pointed object such as needle or push pin for pressing the Reset button. Sharp objects can cause damage, use a flat object such as a paper clip.

#### *Figure 11: Reset Button*

Use an opened paper clip to press the reset button for 15 seconds to reset the main and management CPUs and to delete the existing password.
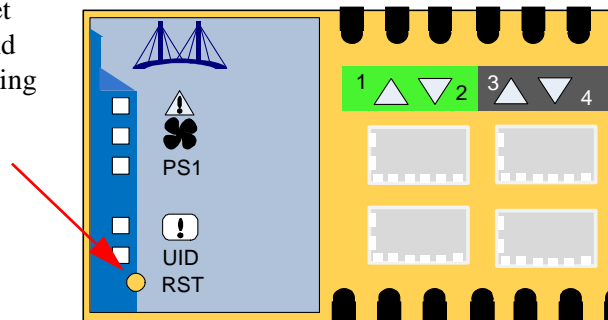
This button resets both the CPU of the switch device and the CPU of the management module. It thereby resets all of the ports by bringing them down and powering them up when the button is pushed. A quick push of this button performs this reset. When the button is held down for 15 seconds the switch is reset and the password is deleted. You will then be able to enter without a password and make a new password for the user admin.

If the PCIE/1GbE Extender is installed the reset button resets the CPU of the switch device only.

## 4.2    QSFP Cable Power Budget Classification

The SwitchX EVB QSFP ports are designed for active cables with a max power per module of 2W. Typical power per port is 1.5W.

## 4.3    SFP+ Cable Power Budget Classification

The SwitchX EVB SFP+ ports are designed for active cables with a max power per module of 1.5W. Typical power per port is 1W.

## 4.4    Interfaces

### 4.4.1    Port Connector Interfaces

#### 4.4.1.1    36 Port Switches

The Connector side of the switch EVB has 24 QSFP ports and 12 SFP+ ports. These are placed in two rows, 18 ports to a row. The ports are labelled as shown in Figure 12. The bottom row ports are flipped from the top row. See Figure 13 for bottom row - top row port orientation.

*Figure 12: Port Numbering*
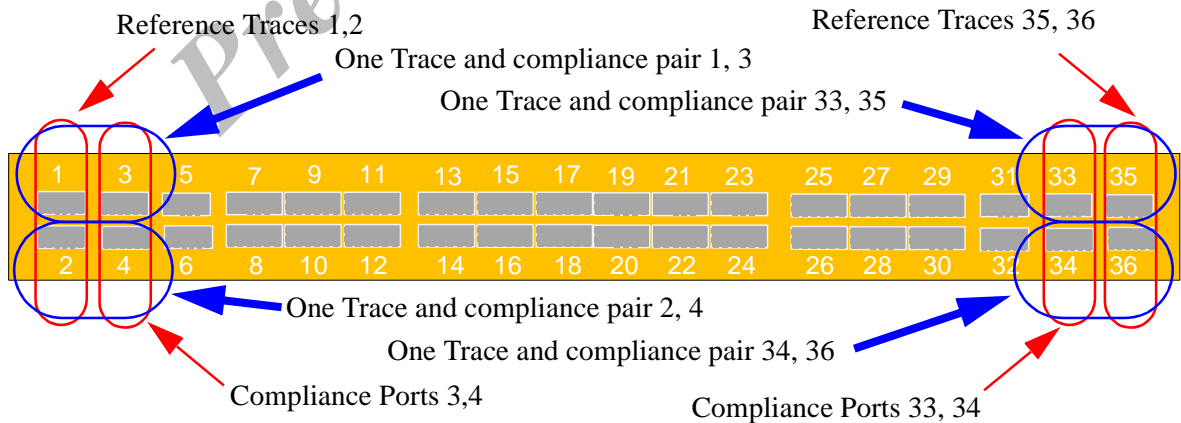
#### 4.4.1.2 Top and Bottom Orientation

*Figure 13: Top and Bottom Ports*
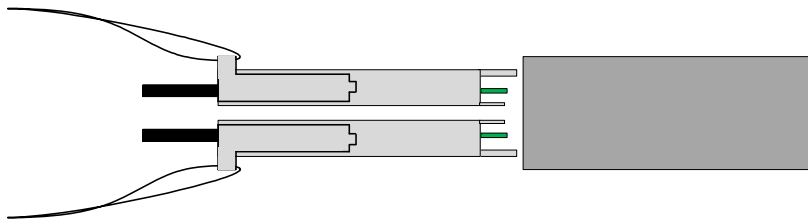


## 4.4.2 Management and Firmware Updating Interfaces

> **NONE OF THE MANAGEMENT INTERFACES ON THE CONNECTOR SIDE WILL WORK IF THE MANAGEMENT BOARD WAS REMOVED AND/OR REPLACED WITH THE PCIE/1GbE EXTENDER!**

There are four interfaces to connect to the EVB:

• 2 X 10/100Mgb/1Gb Ethernet connectors labelled "MGT".

• 1 USB port that is labelled ⟶. This interface can be used to update software or firmware.

• 1 connector that is labelled "CONSOLE". Use this connector to connect to the host PC.

There is one I2C interface to connect to the SwitchX MT51336 on the power side, but this is for Mellanox FAEs and advances users only.

*Figure 14: Management Interfaces*
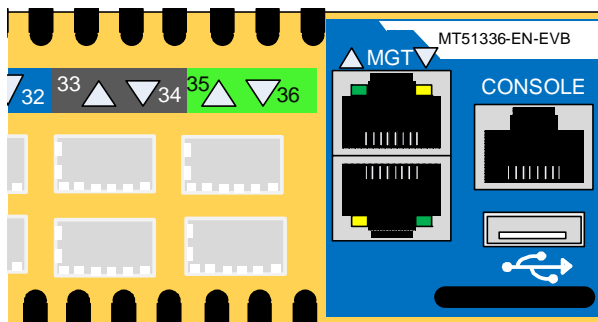


#### 4.4.2.1 RJ-45 Connector (CONSOLE)

The port labelled "CONSOLE" is for a local host connection to the management module. This is used the first time the switch is connected. An HAR 000028 harness is included in the package to

connect to a DB9 connection on a host PC. Connecting to a local host PC and following the instructions in the Installation Guide, "Configuring the Switch for the First Time", must be done before any remote management is available. For the Socket pinout see "RJ45 CONSOLE and Ethernet Interfaces" on page 51.

> This connector will not work if the management module is removed. That is if you are using the PCIE/1GbE Extender.

### 4.4.2.2   RJ-45 Ethernet Connector (MGT)

The Ethernet connection labelled "MGT" provides access for remote management. The switch can be connected to any Ethernet port.

> This connector will not work if the management module is removed. That is if you are using the PCIE/1GbE Extender.

> Each Ethernet connector gets connected to Ethernet switches. These switches must be configured to 10M/100M/1G auto-negotiation.

### 4.4.2.3   USB interface

> The USB interface can be used to update the MLNX-OS™ SX Web User Interface (WebUI) or MLNX-OS™ SX Command Line Interface (CLI).

There is a single USB connector. This connector can be used to install software and or firmware upgrades using a memory device that has a USB connector.

> This connector will not work if the management module is removed. That is if you are using the PCIE/1GbE Extender.

### 4.4.2.4   I2C Interface

There is an I2C connector (banana pin type connector) on the far left of the power side of the switch. **This interface is for Debug and Troubleshooting only by a certified Mellanox FAE.** This con-

nector can be used to install firmware upgrades, should the firmware image be damaged and cannot be upgraded through a host PC or remotely. This interface is for support personnel and advanced users only.

There are also three more three pin I2C interfaces on the board. Access to these connectors is only available with the top cover removed.

# 4.5    Switch Platform Installation and Operation

Installation and initialization of the switch platform are straightforward processes, requiring attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

The switch EVB platform requires initial configuration to operate as an InfiniBand switch. All switches come with an internal PPC based management board. This board allows for managing the switch through a host PC or remotely through the Ethernet.

## 4.5.1    Installation Safety Warnings

For Safety Warnings in French see Section F,"Avertissements de sécurité d'installation (French)," on page 53, for German see Section G,"Installation - Sicherheitshinweise (German)," on page 55, and for Spanish see Section H,"Advertencias de seguridad para la instalación (Spanish)," on page 57.

For special regulations regarding Finland, Sweden, Denmark, and Norway see Section ,"," on page 59.

1.    **Installation Instructions**

Read all installation instructions before connecting the equipment to the power source.

2.    **Over-temperature**

This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

3.    **Stacking the Chassis**

The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

**4.  Redundant Power Supply Connection - Electrical Hazard**

This product includes a blank cover over the space for the redundant power supply. Do not operate the product if the blank cover is not securely fastened or if it is removed.

**5.  During Lightning - Electrical Hazard**

During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

**6.  Copper Cable Connecting/Disconnecting**

Copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions. Support the weight of copper by tying them to the rack or to a cable management system.

**7.  Rack Mounting and Servicing**

When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

**8.  Equipment Installation**

This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

**9.  Equipment Disposal**

Disposal of this equipment should be in accordance to all national laws and regulations.

**10.  Local and National Electrical Codes**

This equipment should be installed in compliance with local and national electrical codes.

**11. Battery Replacement**

There is a risk of explosion should the battery be replaced with a battery of an incorrect type.

Dispose of used batteries according to the instructions.For Shark and Mammoth

**12. Hazardous Radiation Exposure**

Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CLASS 1 LASER PRODUCT and reference to the most recent laser standards:
IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001

**13. Do Not use as a Shelf**
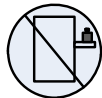
Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space.

**14. UL Approved AC Power Cords**

For North American power connection, select a power supply cord that is UL Listed and CSA Certified

3 - conductor, [18 AWG], terminated in a molded on plug cap rated at 125 V, [15 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m

For European connection, select a power supply cord that is internationally harmonized and marked "<HAR>",

3 - conductor, minimum 0,75 mm2 wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded on plug cap rated 250 V, 10 A.

For Shark

## 4.5.2  Mechanical Installation

The switch platform can be rack mounted and is designed for installation in a standard 19" rack. The power side of the switch includes a hot-swap power supply module, a blank cover, and a hot-swap fan tray. There are two possible air flow directions. Be sure that the switch air flow direction is compatible with your system, rack, and PSU. The connector side of the switch has the data ports, system LEDs, and management connection ports.

The switch platform contains auto-sensing 100 - 240 VAC connections for the PSU.

The installer should use a rack capable of supporting the mechanical and environmental character-
istics of a fully populated platform.

> The rack mounting holes conform to the EIA-310 standard for 19-inch racks. Take pre-
> cautions to guarantee proper ventilation in order to maintain good airflow at ambient
> temperature. Cable routing in particular should not impede the air exhaust from the
> chassis.

## 4.6    Package Contents and Installation

Before you install your new EVB board, unpack the system and check to make sure that all the
parts have been sent, check this against the parts list below. Check the parts for visible damage that
may have occurred during shipping.

The switch comes packed with the following items:

| Part | Quantity | Description |
|------|----------|-------------|
| EVB Switch | 1 | Switch EVB |
| PCIE/1GbE Extender kit | 1 | a kit that replaces the management module and allows for external management |
| Power cable | 1 | Type B 6ft US 125V 10A chord. See "Replacement Parts Ordering Numbers" on page 52 to order power cords for various countries. |
| harness | 1 | For connecting from the RJ45 CONSOLE connector to a DB9 connector of a laptop (host) |
| MTUSB | 1 MTUSB | For use by Mellanox FAEs only |
| QSA | 2 | QSFP to SFP+ Adapter modules |
| MC2207130-002 | 2 | QSFP FDR 30AWG 2m cables |
| MCC1S30A-002 | 2 | SFP+ 30AWG 2m cables |
| bumpers | 5 x | Rubber feet for using the EVB on a table top. |

> If anything is damaged or missing, contact your customer representative immediately.

### 4.6.1  Installing the Switch in the Rack

Tools and Customer Supplied Parts

- Phillips Screwdrivers #1 and #2
- ESD strap
- grounding screw
- grounding wire sufficient to reach a valid ground.

- ESD mat

Parts included in the rail kit:

- 2 rails
- 2 rail slides
- 2 switch slides

- 14 recessed flat head screws for the standard switch
- 10 caged nuts
- 10 pan head screws M6

**Figure 15: Rack Rail Kit Parts**
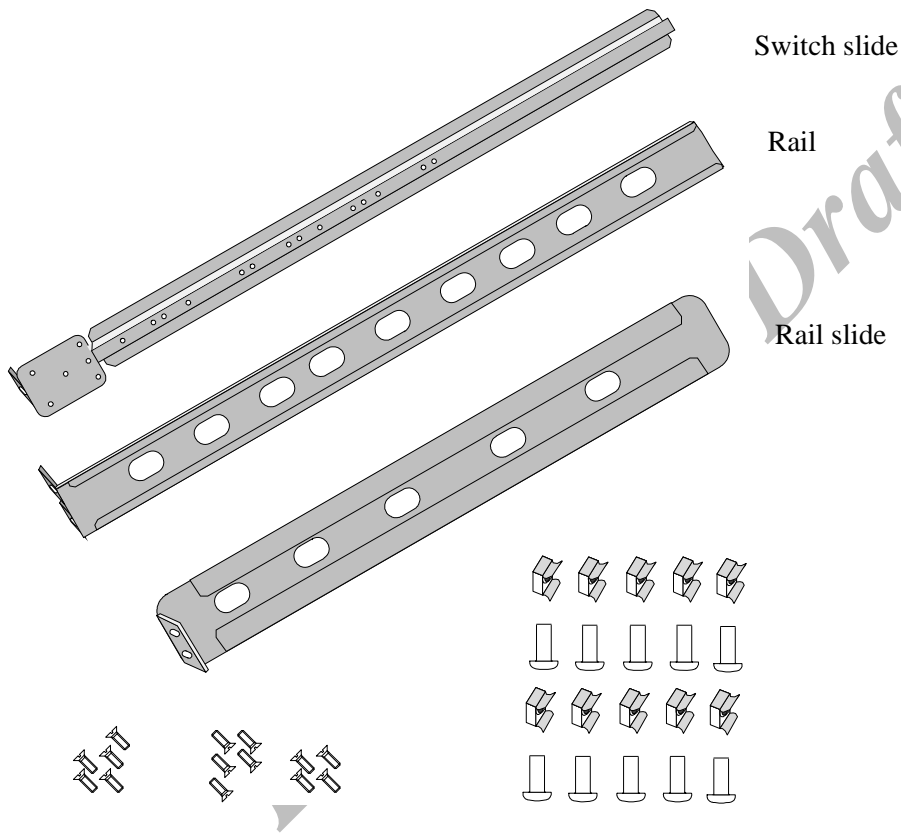


Switch slide

Rail

Rail slide

1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.

2. Choose which side of the switch you want even with the rack vertical support. Either the side with the power supply units or the side with the IB connectors can be even with one of the vertical rack supports.

> To Transfer the power cord from the connector side to the power side through the rail kit see Section B, "Transferring the Power Cord," on page 71.

Things to consider before choosing where to mount the rails and rail slides.

The distance between the rack and the door can be as little as 4 cm on one side of the rack and as much as 18 cm on the other side of the rack. Keep in mind that there can be as many as 36 cables connected to the switch.

▪Do you want the connector side recessed in the rack to allow for a larger cable bending radius? It is possible to recess the connector side by 5cm by optional placement of the switch rails. See Figure 16,"Mounting Options".

▪Will the connector side be recessed past other equipment in the rack and will this be problematic?

▪The installation kit allows for a 2" recess of the switch past the vertical support.

*Figure 16: Mounting Options*
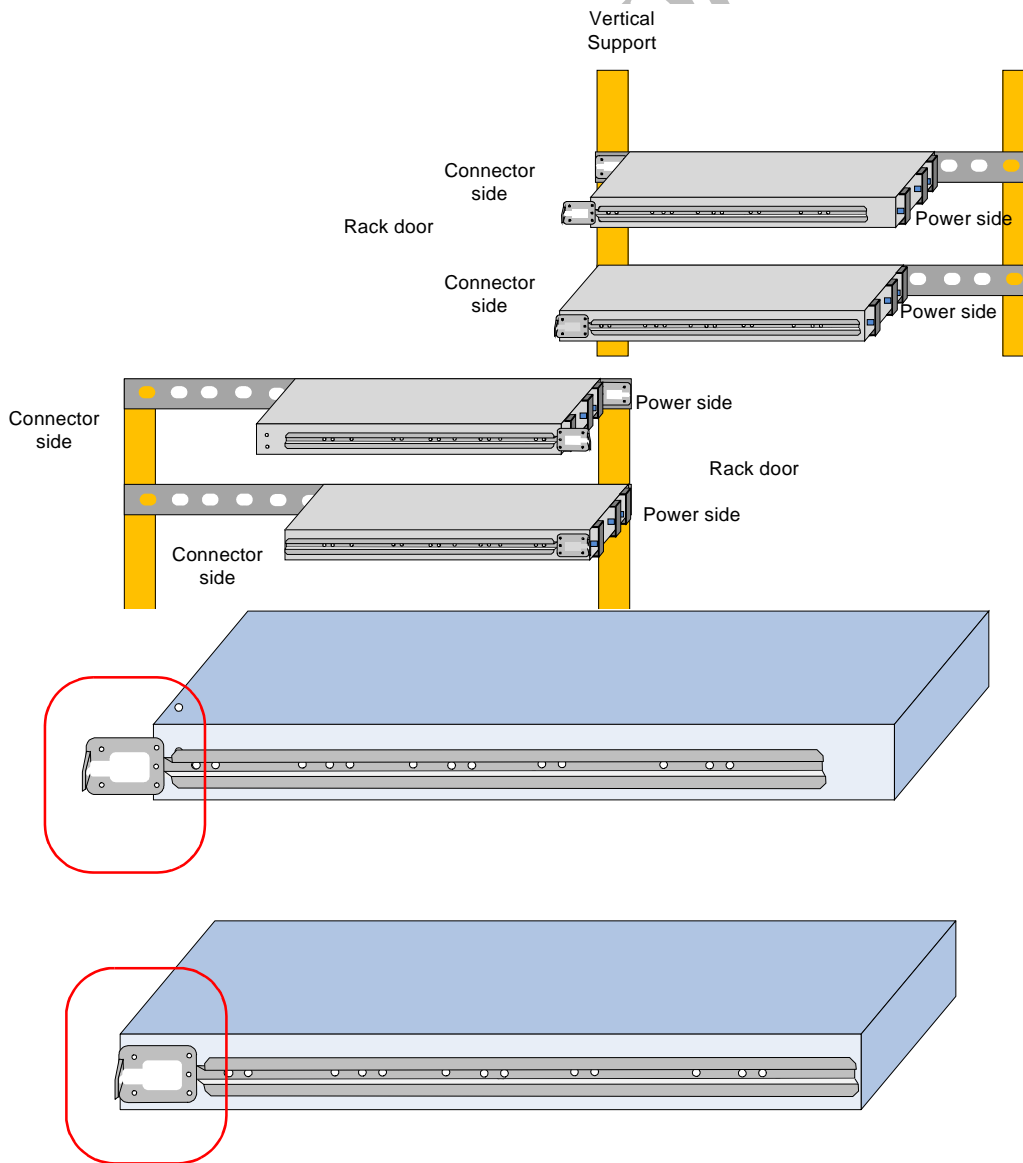


3.    Decide which mounting option you want to use.

4.  To use the rail kit to transfer the power cord from the connector side to the power side go now to "Transferring the Power Cord" on page 47.

5.  Screw the switch slides onto the switch. Use 5 flat head screws for short switches and 7 screws for standard depth switches, to connect each switch slide.

*Figure 17: Screwing on the Rail*



7 screws per side are needed for the standard switch
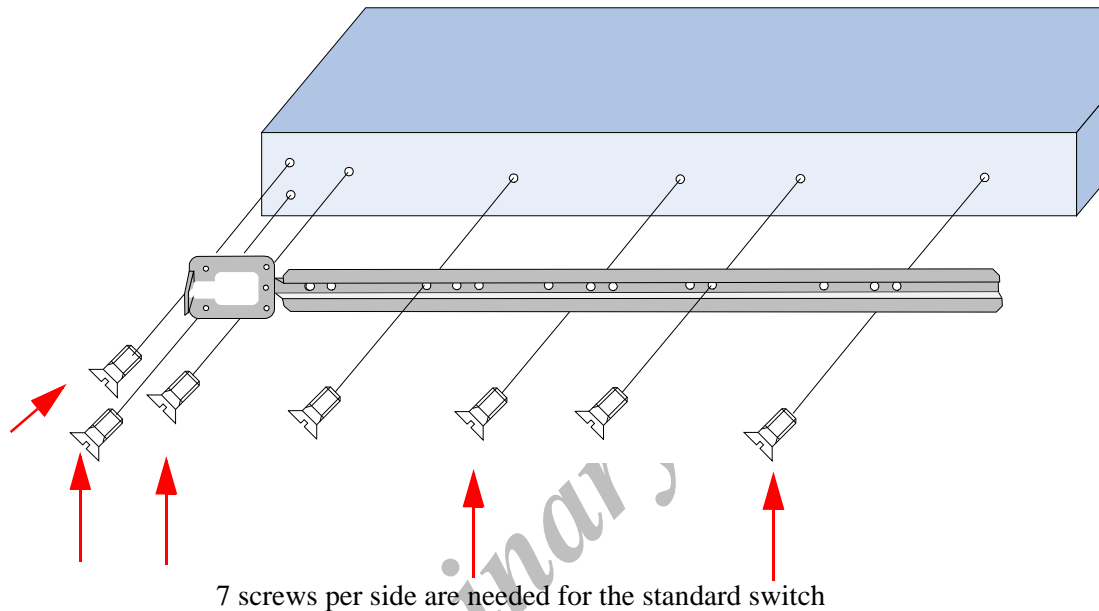
*Figure 18: Inserting the Caged Nuts*



Side you will slide
the swich into

Second side
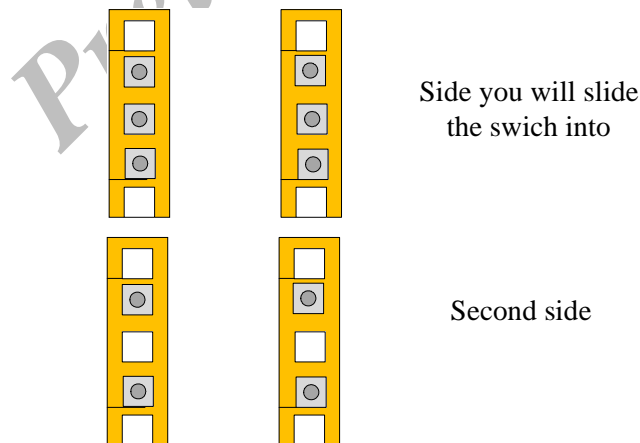
6.  Clip 6 caged nuts into the holes in the rack on the side of the rack you will be sliding the switch into. Check that both sides of the switch, power side and connector side, are at the same level in the rack.

7.  Clip 4 more caged nuts into the holes on the opposite side of the rack Check that both sides of the switch, left and right, are the same level in the rack.

8.  Slide the rail into the rail slide.

9. Using two of the bolts for each corner install the rails and rail slides in the rack. Do not tighten the bolts yet.

*Figure 19: Slide the Rail into the Rail Slide*
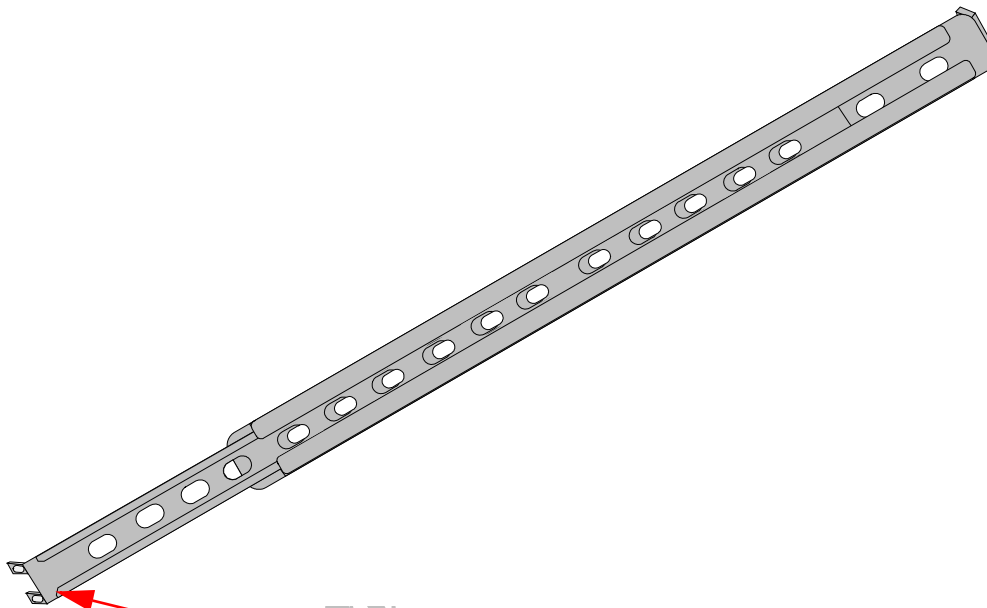


This side of the rail kit goes on the side of the rack you will slide the switch into. This is the same side of the switch that will be next to the vertical support.

10. Slide the switch into the rails.
11. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
12. Put the switch into place and screw the bolts into the nuts. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
13. Ground the switch.
14. Plug in the power cables.
15. Check the Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation.

> Warning: Any yellow or red status LEDs are cause for concern and must be dealt with immediately.
> It can take up to 5 minutes to boot up, during which time the status LED may indicate flashing green.

16. You can start connecting all of the cables to the switch.

## 4.6.2  Grounding the Switch

Check to determine if your local or national electrical codes require an external ground to all IT components. If so, connect a ground wire to one of the casing screws and connect the other end to a valid ground. If you choose to not use the ground screw, make sure that the rack is properly

grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.

> Some national and/or local codes may require IT components to be bonded and externally grounded (not including the power cord ground). You must follow all national and local codes when installing this equipment.

### 4.6.3 Power Connections and Initial Power On

The switch platform ships with one Power Supply Unit. The input voltage is auto-adjusting for 100 - 240 VAC, 50-60Hz power connections. The power cord should be standard 3-wire AC power cord including a safety ground and rated for 15A or higher.

> Caution: The switch platform will automatically power on when AC power is applied. There is no power switch. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

> Caution: After inserting a power cable and confirming the green system status LED light is on; make sure that the Fan Status indicator shows green.
> If the fan status indicator is not green then unplug the power connection and check that the fan module is inserted properly and that the mating connector of the fan unit is free of any dirt and/or obstacles.

> Caution: When turning off the switch, make sure to use the shut down procedure.

### 4.6.4 Extracting and Inserting the Power Supply Unit

> Power supply unit has directional air flow similar to the fan module. The Fan module airflow must coincide with the airflow of the PSU. If the PSU airflow direction is different from the fan module airflow direction the system will shut down.

**Figure 20: Power Supply Unit Extraction**



Latch Release
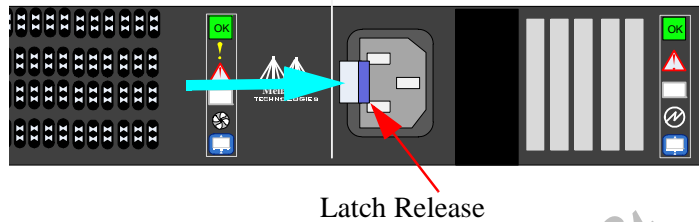
**Figure 21: PSU Pulled Out**

Power Side



Fan Unit
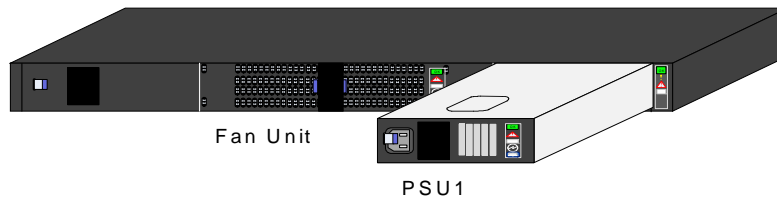
PSU1

To extract a PSU:

1. If possible, run the shut down procedure. See "Switch Shut Down Procedure" on page 49.
2. Remove the power cord from the power supply unit.
3. Grasping the handle with your right hand, push the latch release with your thumb while pull-ing the handle outward. As the PSU unseats, the PSU status indicators will turn off.
4. Remove the PSU.

To insert a PSU:

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.

> Do not attempt to insert a PSU with a power cord connected to it.

2. Insert the PSU by sliding it into the opening until a slight resistance is felt.
3. Continue pressing the PSU until it seats completely. The latch will snap into place confirm-ing the proper installation.
4. Insert the power cord into the supply connector.
5. Insert the other end of the power cord into an outlet of the correct voltage.

> The green PSU indicator should light. If not, repeat the whole procedure to extract the PSU and re-insert it.

### 4.6.5  Cable Installation

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The GREEN LED indicator, corresponding to each data port, will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made the yellow light will come on. When data is being transferred the green light will blink.

> Cables in the bottom row should be inserted up side down in relation to the how the cables are inserted in the top row.

*Figure 22: Top and Bottom Ports*
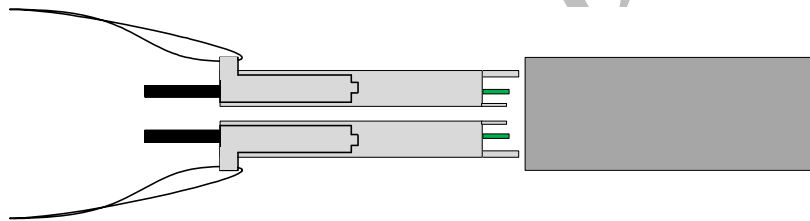


To remove, disengage the locks and slowly pull the connector away from the port receptacle. Both LED indicators will turn off when the cable is unseated.

Care should be taken not to impede the air exhaust flow through the ventilation holes next to the connector ports. Cable lengths should be used which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.

### 4.6.6  Extracting and Inserting the Fan Unit

This switch can operate indefinitely with one of the three fans in the fan module inoperable so long as the ambient temperature is below 45° Celsius.

> Operation without a fan unit should not exceed two minutes.
> During fan hot-swap, if both indicators are OFF then the fan unit is disconnected.

**Figure 23: Air Flow Labels**



These air flow labels must be the same
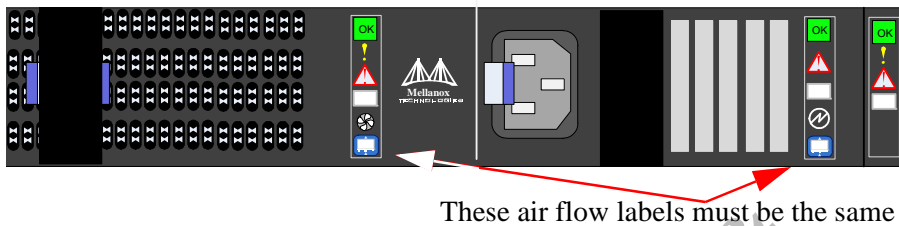
To extract a Fan Unit

1.  Using two fingers, push both latch releases towards each other simultaneously while pulling the fan module out of the switch. As the fan unseats, the fan status indicator will turn off.

**Figure 24: Fan Module Latches**
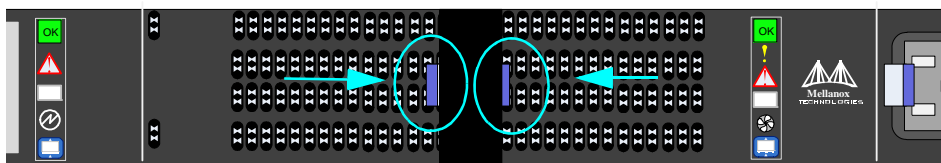


These two latches must be pushed towards each other at the same time while the module is pulled out.

To insert a FAN Unit:

1.  Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2.  Insert the fan unit by sliding it into the opening until slight resistance is felt. Continue pressing the fan unit until it seats completely.

> The green fan status indicator should light. If not, extract the fan unit and reinsert it. After two unsuccessful attempts to install the fan unit, power off the switch before attempting any system debug.

# 5 Installing the PCIE/1GbE Server Side board

The PCIE/1GbE server side board disables the internal Management capabilities and disconnects the management interfaces. When installed the system side board allows for direct contact with the SwitchX device for external management and SW development purposes. The PCIE/1GbE server side board allows for a direct connection of an external server directly to the SwitchX chip. It allows for a PCIE slot in the external server to be connected to a PCIE port in the SwitchX EVB. This will support a PCIE 2.0 1X connection.

An alternative is to select to use the RJ45 1GbE connection to the SwitchX EVB. The user can connect this RJ45 connector to any Ethernet 10/100/1000 port for management.

## 5.1 PCIE/1GbE Extender Kit parts

| Part | Quantity | For PCIE |
|------|----------|----------|
| PCB server board | 1 | Server side board |
| EVB Daughter board | 1 | System side board |
| MT-PCI-HS-QSFP | 2 | QSFP 26AWG 2m cable for the PCIE fabric |
| MCC4L30-002 | 1 | CX4 30AWG 2m cable for the PCIE clock and Reset |

The EVB daughter board has 4 interfaces three for PCIE and one for Ethernet use.

Do not use both PCIE and Ethernet at one time. You must select either the PCIE or the Ethernet connection.

The interfaces are:

| Interface | For PCIE |
|-----------|----------|
| CX4 | clocking and reset of the PCI Express |
| QSFP | for connection to the server side board |
| QSFP | for connection to the server side board |
| Interface | For Ethernet |
| RJ45 | for remote Ethernet connection |

**Figure 25: Server Side Card**
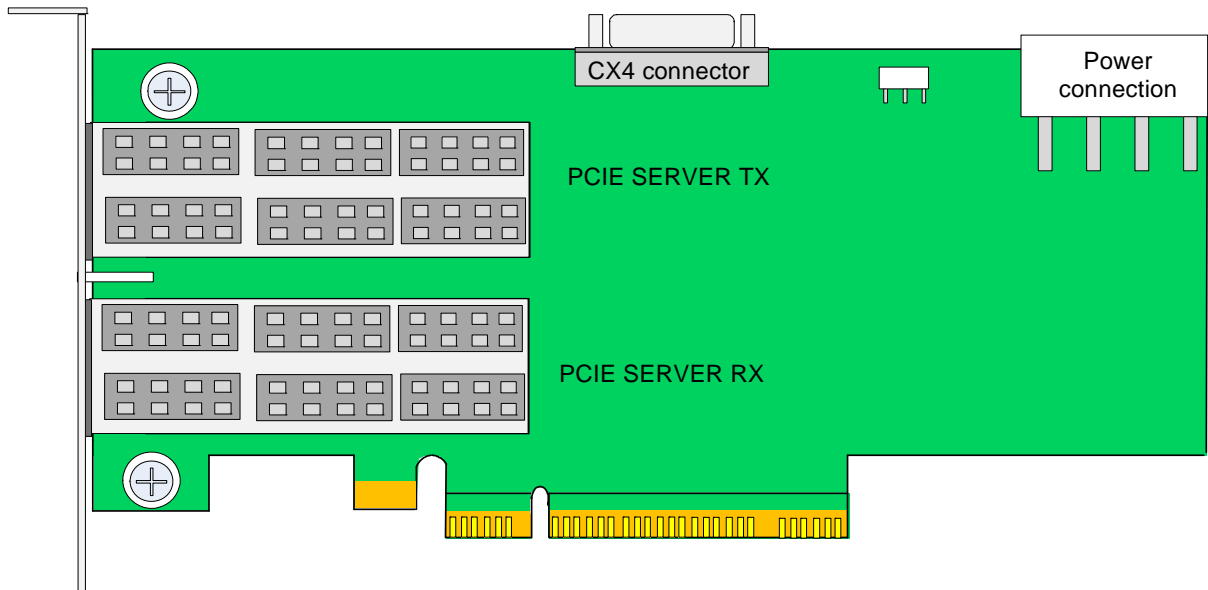


The PCB server board has 3 interfaces:

| Interface | For PCIE |
|---|---|
| CX4 | clocking and reset |
| QSFP | for connection to the server side board |
| QSFP | for connection to the server side board |

*Figure 26: PCIE/1GbE Extender*



RJ45 1GbE Connector for remote management

CX4 Clock and Reset Connector

QSFP RX Green Connector

QSFP TX Blue Connector
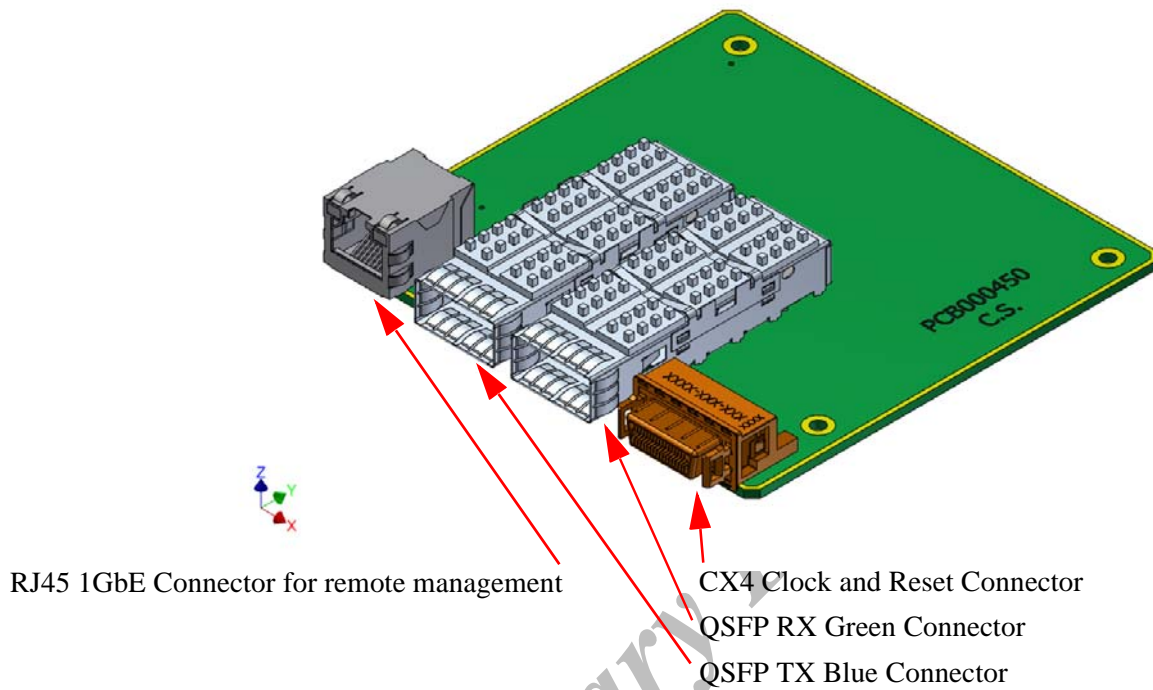
## 5.2   Removing the Top Cover

1.   Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2.   Remove the 6 screws from the power side of the top.
3.   Slide the top towards the power side.

> With the cover off you will need a clip on fan cooling the chip heat sink.

*Figure 27: Screw Locations*
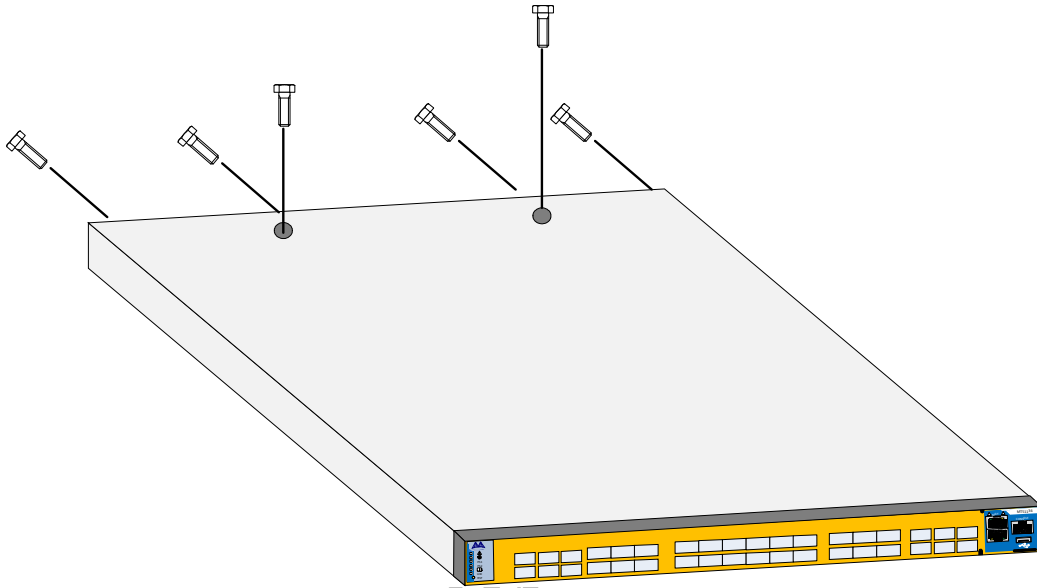
*Figure 28: Slide the Top*
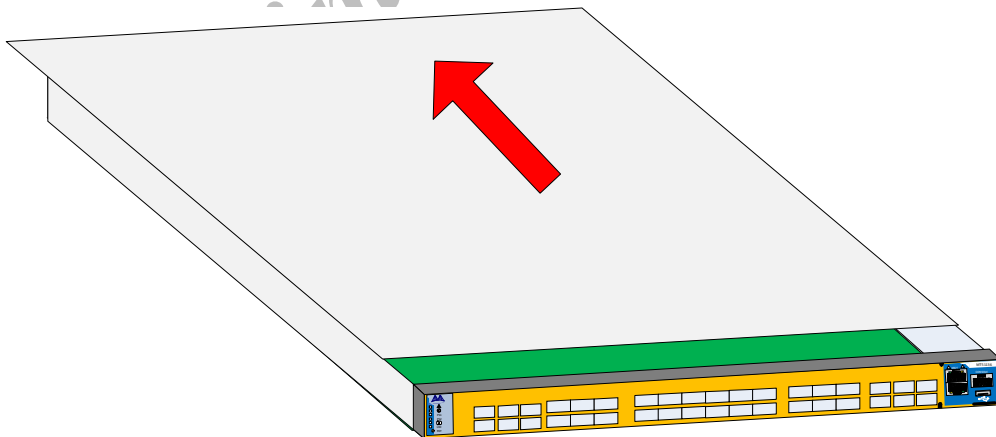
## 5.3    Removing the Management CPU

*Figure 29: Management Board Installed*
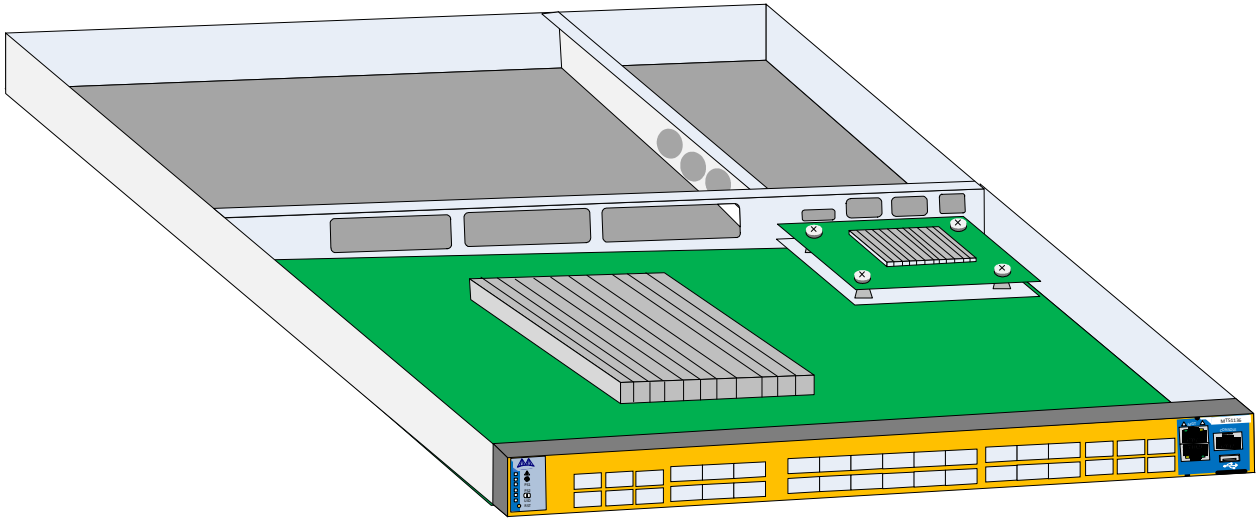
*Figure 30: Unscrew the Management Board*
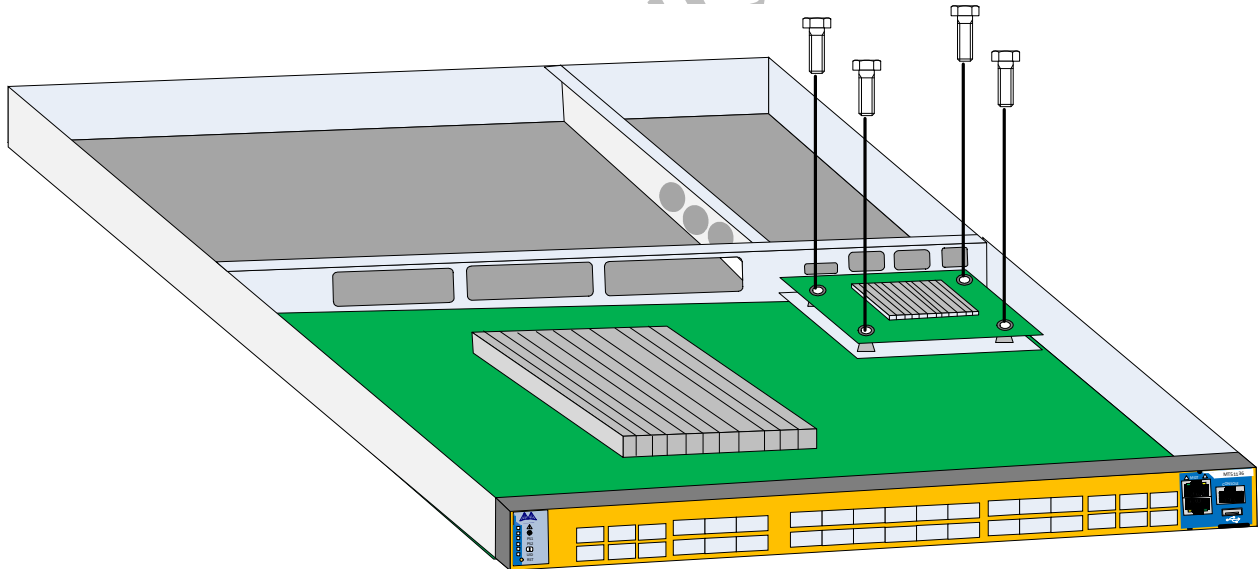
*Figure 31: Remove the Management Board*
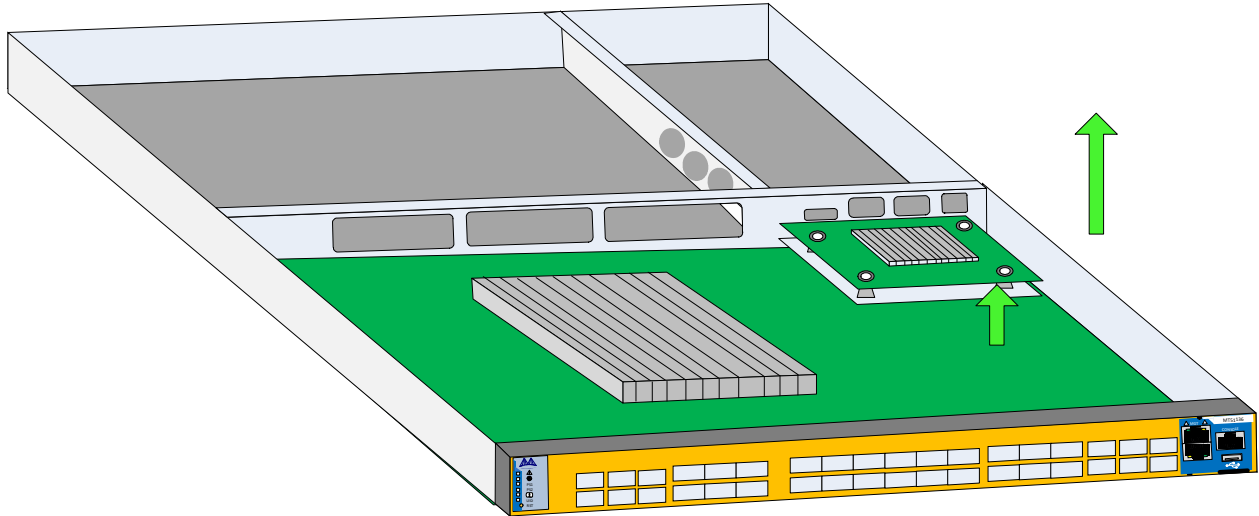
Pull up the management
card.

## 5.4    Installing the PCIE/1GbE Extender

1.  Place the ESD mat on the floor where you will be working and put on the ESD strap. Make
    sure the ESD strap is touching your skin and that the other end is connected to a verified
    ground.
2.  Put the connectors for the extender daughter board through the holes in the frame.

*Figure 32: Holes for the Extender Board Interfaces*
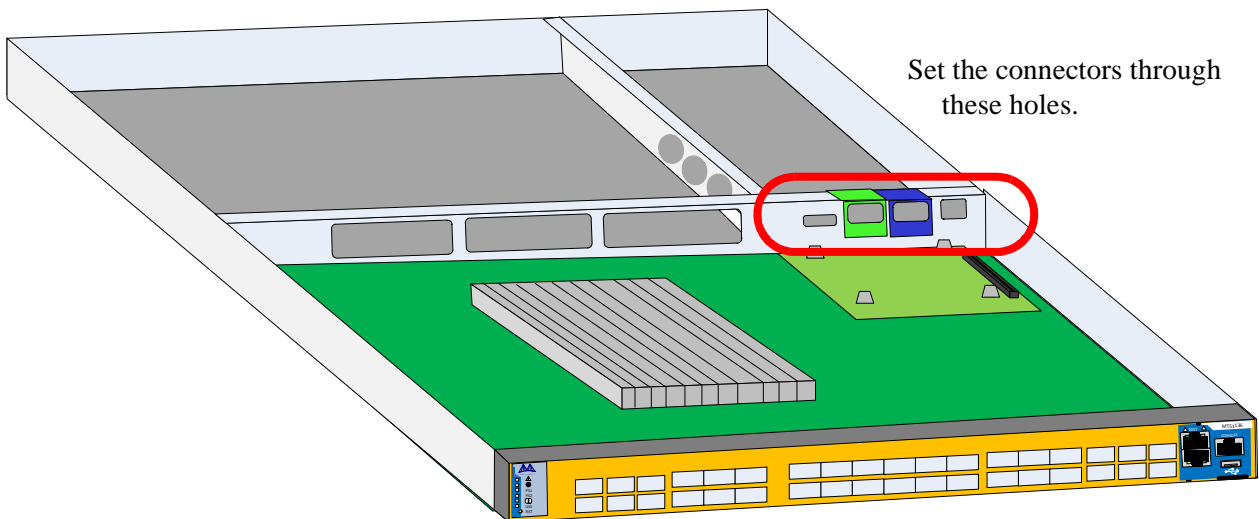
Set the connectors through
these holes.

*Figure 33: Install the Extender Board*
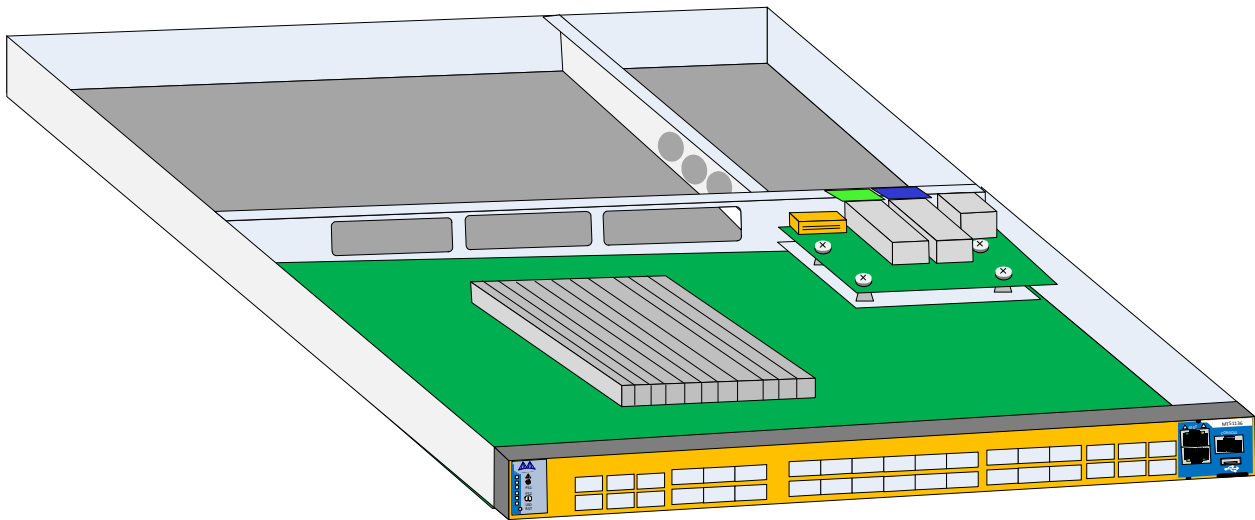


3. Push the daughter board down into the board connector.
4. Screw in the four screws.
5. Remove the blank panel from the power side of the EVB.
6. Put the wire ties onto the bottom of the case.
7. Run the cables through the power side end of the EVB. The cables are:

   ▪for 10/100/1000Mb Ethernet management

   ◆ RJ45 Ethernet cable — Connect the RJ45 cable to a switch or server Ethernet port. This is 10/100/1000Mb interface.

   ▪For PCIE control

   ◆ 1 CX4 cable
   ◆ 2 QSFP cables blue to blue and green to green

Connect all 3 connectors blue, green, and Clock from the Extender to the Server.

Select only one of these two options. Either use the RJ45 Ethernet connection option or the PCIE option.
DO NOT TRY AND USE BOTH OPTIONS AT THE SAME TIME!

When running the SwitchX EVB without the top cover use portable fans to keep the heat sinks cool.

## 5.5    Installing the Server Side Board

1.    Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.

2.    Insert the server side board into a X8 or X16 PCIE slot in the server.

*Figure 34: Connecting the EVB to the Server Side Board*
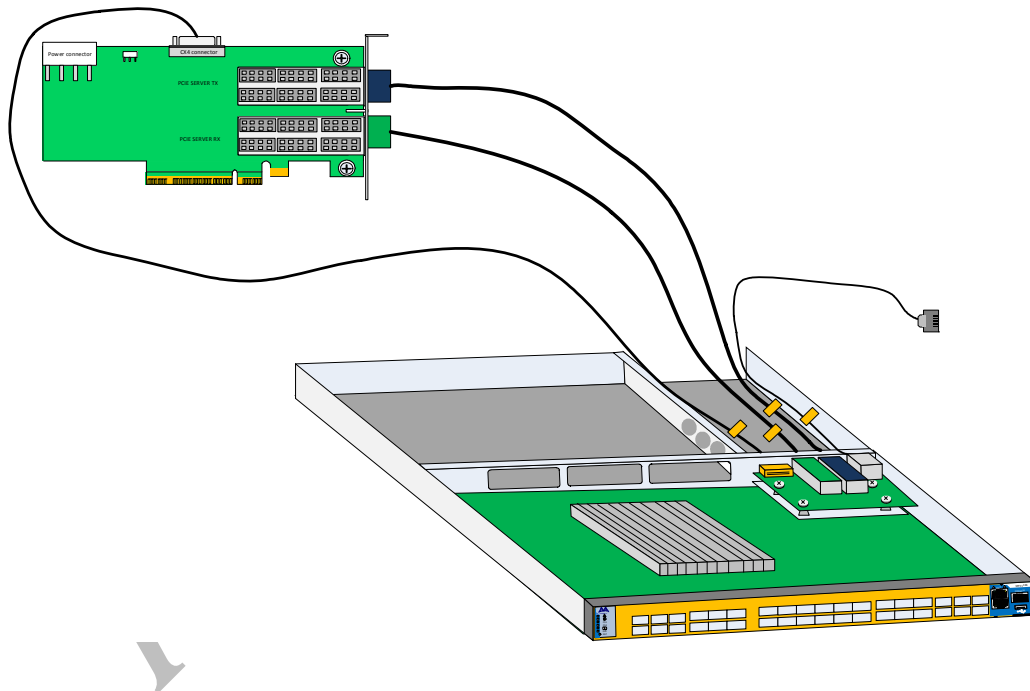


3.    Connect the QSFP cables from the daughter board to the server board. connect green to green and blue to blue.

4.    Connect the CX4 cable from the daughter board to the server board.

5.    Tie down the cables using the cable ties in the EVB.

## 5.6 Board Connectors Numbering and Locations

*Figure 35: EVB Board Connections View 1*
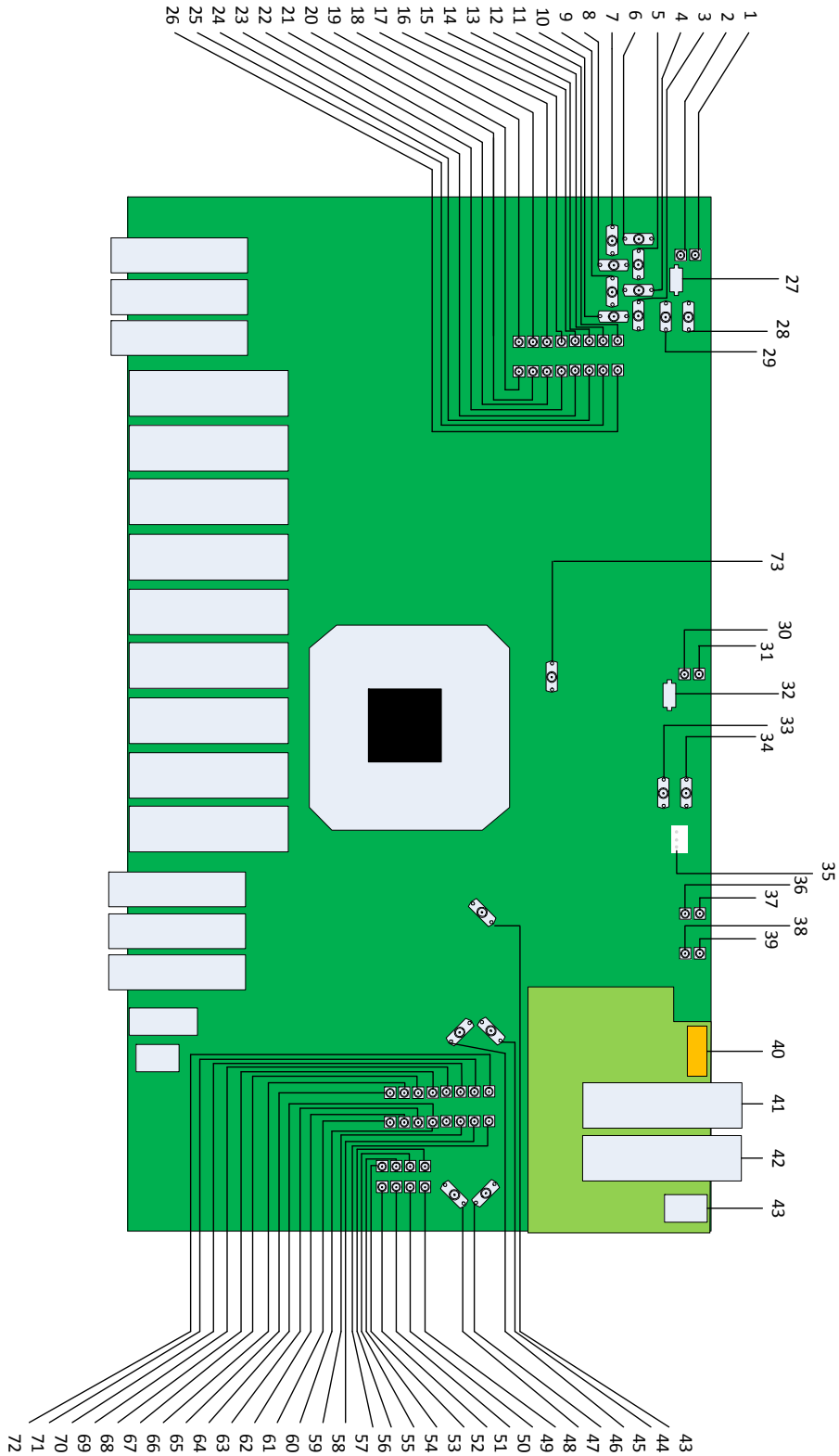
*Table 7 - Port Connector Numbering   (Sheet 1 of 3)*

| Connector # | Type | Signal | Description |
|---|---|---|---|
| 1 | Mini SMP | Calibration | Calibration of length 2X |
| 2 | Mini SMP | Calibration | Calibration of length 2X |
| 3 | SMA | Reference | Connects to Port 2, Ref to compliance port 4 |
| 4 | SMA | Reference | Connects to Port 2, Ref to compliance port 4 |
| 5 | SMA | Reference | Connects to Port 1, Ref to compliance port 2 |
| 6 | SMA | Reference | Connects to Port 1, Ref to compliance port 2 |
| 7 | SMA | Reference | Connects to Port 1, Ref to compliance port 2 |
| 8 | SMA | Reference | Connects to Port 1, Ref to compliance port 2 |
| 9 | SMA | Reference | Connects to Port 2, Ref to compliance port 4 |
| 10 | SMA | Reference | Connects to Port 2, Ref to compliance port 4 |
| 11 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 12 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 13 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 14 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 15 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 16 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 17 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 18 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 19 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 20 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 21 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 22 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 23 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 24 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 25 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 26 | Mini SMP | Data | Connects to HW port 27 on SwitchX |
| 27 | | | 12V PS1 |

*Table 7 - Port Connector Numbering  (Continued) (Sheet 2 of 3)*

| Connector # | Type | Signal | Description |
|---|---|---|---|
| 28 | SMA | Calibration | Calibration of length 2X |
| 29 | SMA | Calibration | Calibration of length 2X |
| 30 | Mini SMP | Calibration | Calibration of length X |
| 31 | Mini SMP | Calibration | Calibration of length X |
| 32 | | | Fans |
| 33 | SMA | Calibration | Calibration of length 2X |
| 34 | SMA | Calibration | Calibration of length 2X |
| 35 | | | Main I2C |
| 36 | Mini SMP | Calibration | Calibration of length 2X |
| 37 | Mini SMP | Calibration | Calibration of length 2X |
| 38 | Mini SMP | Calibration | Calibration of length X |
| 39 | Mini SMP | Calibration | Calibration of length X |
| 40 | CX4 | | Clock and Reset |
| 41 | QSFP RX | | Data |
| 42 | QSFP TX | | Data |
| 43 | SMA | Clock | Option for ext. clock - 106.25MHz |
| 43 | RJ45 | | Ethernet management conncetion |
| 44 | SMA | Calibration | Calibration of length X |
| 45 | SMA | Calibration | Calibration of length X |
| 47 | SMA | Calibration | Calibration of length X |
| 48 | SMA | Calibration | Calibration of length X |
| 49 | Mini SMP | Reference | Connects to Port 35, Ref to compliance port 33 |
| 50 | Mini SMP | Reference | Connects to Port 35, Ref to compliance port 33 |
| 51 | Mini SMP | Reference | Connects to Port 36, Ref to compliance port 34 |
| 52 | Mini SMP | Reference | Connects to Port 36, Ref to compliance port 34 |
| 53 | Mini SMP | Reference | Connects to Port 36, Ref to compliance port 34 |
| 54 | Mini SMP | Reference | Connects to Port 36, Ref to compliance port 34 |
| 55 | Mini SMP | Reference | Connects to Port 35, Ref to compliance port 33 |
| 56 | Mini SMP | Reference | Connects to Port 35, Ref to compliance port 33 |

*Table 7 - Port Connector Numbering  (Continued) (Sheet 3 of 3)*

| Connector # | Type | Signal | Description |
|---|---|---|---|
| 57 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 58 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 59 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 60 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 61 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 62 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 63 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 64 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 65 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 66 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 67 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 68 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 69 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 70 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 71 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 72 | Mini SMP | Data | Connects to HW port 36 on SwitchX |
| 73 | SMA | Clock | Option for ext. clock - 156.25MHz |

## 5.7  Switch Shut Down Procedure

To shut down the switch run the command:

```
Reload halt [noconfirm]
```

**The switch cannot be restarted remotely!**
To restart the switch you must physically go to the switch and unplug and replug in all of the power cords to the chassis.

## 5.8  Disassembly of the Switch from the Rack

To disassemble the switch from the rack:

1.    Unplug and remove all connectors.

2.  Unplug all power cords.
3.  Remove the ground wire.
4.  Unscrew the 2 bolts from the side of the switch with the bracket.

> Support the weight of the switch when you remove the screws so that the switch does not fall.

5.  Slide the switch from the rack.
6.  Remove the rail slides from the rack.
7.  Remove the eight caged nuts.

## 5.9  Disposal
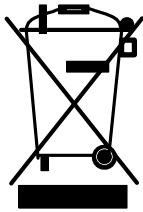
> According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.
> Dispose of this product and all of its parts in a responsible and environmentally friendly way.

Follow the instructions found in the Mellanox Web site at mellanox.com for proper instructions to disassemble and dispose of the Switch according to the WEEE directive.

## 5.10  Resetting the Switch

Should the switch stop working, try resetting the switch. On the connector side panel under the system LEDs is a reset button. This reset button requires a tool to be pressed.

*Figure 36: Reset Button*

Press the rest button.
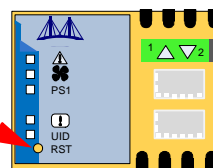


This button resets the switch when the button is pushed. A quick push of this button resets the whole switch.When the button is held down for 15 seconds the switch is reset and the password is deleted. The LEDs will flicker for a fraction of a second to indicate reset is occurring. You will then be able to enter without a password and make a new password for the user admin.

# 6    Management and Tools Overview

The switch to be managed either remotely, or Out-of-Band using MLNX-OS.

## 6.1    Chassis Management Using the MLNX-OS Stack

The EVB comes standard with a management software module for chassis management called Mellanox Operating System (MLNX-OS). MLNX-OS is installed on all SwitchX based managed switch systems. There is no need for a license or a key for IB SM functionality. MLNX-OS also includes a CLI, WebUI and chassis management features (Fan status, PS status, temp, etc) by default.

> The Ethernet ports for remote management connect to Ethernet switches. These switches must be configured to 10M/100M/1G auto-negotiation.

switch EVB support up to 648 nodes. If there is a need to support more than 648 nodes, a license for Unified Fabric Manager™ (UFM™) is needed.

Management modules have the capability to allow remote monitoring and remote management of the chassis from any host connected to the fabric.

The managed switch system includes a CPU which contains:

• embedded OS, secure in-band, out-band access
• chassis manager and system BIST
• SNMP agent, 3rd party tool integration
• GUI
• subnet manager

The chassis manager will give the user access to:

• switch temperatures
• power supply voltages
• fan unit information
• power unit information
• Flash memory

The manager also has the ability to burn new firmware on the switch.

## 6.2    Network Management and Clustering Software

Download and install, on all nodes, the Mellanox OpenFabric software package for Linux, Windows, or other operating systems from the Mellanox software website:

http://www.mellanox.com.=> Downloads => InfiniBandAdapter Ethernet SW/Drivers.

This software package provides connectivity for server and storage systems utilizing High Performance Computing (HPC) or enterprise data center (EDC) applications across a fabric. It also provides a subnet manager for simple network configuration and network administration and diagnostic tools for network management.

## 6.3    Chassis Management

The chassis management features include:

- upgrading drivers
- upgrading software
- monitoring of:
    - AC power to the PSUs
    - DC power out from the PSUs
    - board temperature
    - fan module unit
    - failure in the switch system
    - system failure in the switch system
- querying for board serial numbers and their revisions

In addition, the tools enable firmware management capabilities such as:

- querying for existing firmware versions
- burning new firmware (from scratch or for recovery from damaged firmware)
- querying for and changing system GUIDs
- checking for duplicate or bad GUIDs

### 6.3.1  Open SM

To manage the Mellanox switch system using OFED, download Mellanox Open Fabrics from http://www.mellanox.com > Downloads > InfiniBand SW /Drivers.

Be sure to read and follow all of the instructions regarding the installation and use of these tools.

Each subnet needs one subnet manager to discover, activate and manage the subnet.

Each network requires a Subnet Manager to be running in either the switch itself (switch based) or on one of the nodes which is connected to the fabric (host based).

The subnet manager (OpenSM) assigns Local IDentifiers (LIDs) to each port connected to the fabric, and develops a routing table based on the assigned LIDs.

A typical installation using the OFED package will run the OpenSM subnet manager at system start up after the OpenIB drivers are loaded. This automatic OpenSM is resident in memory, and

sweeps the fabric approximately every 5 seconds for new adapters to add to the subnet routing tables.

> No more than two subnet managers are recommended for any single fabric.

## 6.4  Fabric Management with UFM

For an added licensing fee you can purchase Mellanox's Unified Fabric Manager™. UFM™ is a powerful platform for managing scale-out computing environments. It enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization.

All fabric diagnostics capabilities are provided via UFM.  There are two options for UFM (Advanced and Standard).  Advanced and Standard run on hosts only and includes advanced fabric management and diagnostics. UFM Diags provides IBDiagnet-like functionality and runs as a "plug-in" module to MLNX-OS on the embedded processor for managed SX based switches.

A license is required for all three UFM options. To purchase UFM Diags, enter a key into the MLNX-OS dashboard of the managed switch to activate the feature.

UFM Provides a central management console including the following main features:

• Fabric Dashboard including Fabric Congestion Map
• Advanced Fabric-wide Real-time and History Monitoring
• Quality of Service
• Traffic Aware Routing Algorithm (TARA)
• Central Device Management
• Task automation
• Threshold based alerts
• Fabric segmentation/isolation
• Subnet Manager Configuration
• Logging
• High-Availability

## 6.5 Configuring the Switch for the First Time

> When the Power PC is removed the switch/EVB becomes unmanaged and does NOT need Initial configuration.

**Step 1.** Connect the host PC to the CONSOLE (RJ-45) port of the switch system using the supplied cable. The CONSOLE ports for the EVB is shown below.

*Figure 37: Management Interfaces*
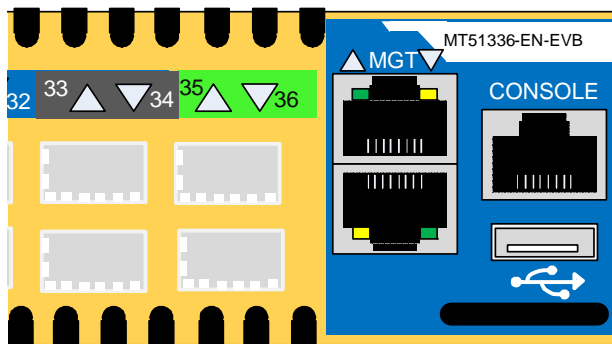


> Make sure to connect to the CONSOLE RJ-45 port of the switch and not to the (Ethernet) MGT port.

> No remote IP connection is available at this stage.

**Step 2.** Configure a serial terminal program (for example, HyperTerminal, minicom, or Tera Term) on your host PC with the settings described in Table 8.

*Table 8 - Serial Terminal Program Configuration*

| Parameter | Setting |
| --- | --- |
| Baud Rate | 9600 |
| Data bits | 8 |
| Stop bits | 1 |

*Table 8 - Serial Terminal Program Configuration  (Continued)*

| Parameter | Setting |
|---|---|
| Parity | None |
| Flow Control | None |

**Step 3.** Login (from a serial terminal program) as *admin* and use *admin* as password. This starts the Mellanox configuration wizard.

**Step 4.** Go through the Mellanox configuration wizard. Table 9 shows an example of a wizard session.

*Table 9 - Configuration Wizard Session - IP Configuration by DHCP  (Sheet 1 of 2)*

| Wizard Session Display (Example) | Comments |
|---|---|
| Mellanox configuration wizard<br>Do you want to use the wizard for initial configuration?  yes | You must perform this configuration the first time you operate the switch or after resetting the switch. Type 'y' and then press <Enter>. |
| **Step1:** Hostname? [switch-1] | If you wish to accept the default hostname, then press <Enter>. Otherwise, type a different hostname and press <Enter>. |
| **Step 2:** Use DHCP on mgmt0 interface? [yes] | Perform this step to obtain an IP address for the switch. (mgmt0 is the management port of the switch.)<br>If you wish the DHCP server to assign the IP address, type 'yes' and press <Enter>.<br><br>If you type 'no' (no DHCP), then you will be asked whether you wish to use the 'zeroconf' configuration or not. If you enter 'yes' (yes Zeroconf), the session will continue as shown in Table 10.<br><br>If you enter 'no' (no Zeroconf), then you need to enter a *static* IP, and the session will continue as shown in Table 11. |
| **Step 3:** Admin password (Press <Enter> to leave unchanged)? <new_password><br>Step 4: Confirm admin password? <new_password> | To avoid illegal access to the machine, please type a password and then press <Enter>. Then confirm the password by re-entering it.<br><br>Note that password characters are *not* printed. |

*Table 9 - Configuration Wizard Session - IP Configuration by DHCP  (Sheet 2 of 2)*

| Wizard Session Display (Example) | Comments |
|---|---|
| You have entered the following information:<br><br>　1. Hostname: \<switch name\><br>　2. Use DHCP on mgmt0 interface: yes<br>　3. Admin password (Enter to leave unchanged): (CHANGED)<br><br>To change an answer, enter the step number to return to.<br>Otherwise hit \<enter\> to save changes and exit.<br><br>Choice: \<Enter\><br><br>Configuration changes saved.<br>To return to the wizard from the CLI, enter the "configuration jump-start" command from configuration mode. Launching CLI...<br><br>\<switch name\> [\> | The wizard displays a summary of your choices and then asks you to confirm the choices or to re-edit them.<br><br><br>Either press \<Enter\> to save changes and exit, or enter the configuration step number that you wish to return to.<br><br><br>Note:<br>To run the command "configuration jump-start" you must be in Config mode. |

*Table 10 - Configuration Wizard Session - IP Zeroconf Configuration*

| Wizard Session Display - IP Zeroconf Configuration (Example) |
| --- |
| Mellanox configuration wizard<br><br>Do you want to use the wizard for initial configuration? y<br><br>Step 1: Hostname? [switch-112126]<br>Step 2: Use DHCP on mgmt0 interface? [no]<br>Step 3: Use zeroconf on mgmt0 interface? [no] yes<br>Step 4: Default gateway? [192.168.10.1]<br>Step 5: Primary DNS server?<br>Step 6: Domain name?<br>Step 7: Admin password (Enter to leave unchanged)?<br><br>You have entered the following information:<br><br>  1. Hostname: switch-112126<br>  2. Use DHCP on mgmt0 interface: no<br>  3. Use zeroconf on mgmt0 interface: yes<br>  4. Default gateway: 192.168.10.1<br>  5. Primary DNS server:<br>  6. Domain name:<br>  7. Admin password (Enter to leave unchanged): (unchanged)<br><br>To change an answer, enter the step number to return to.<br>Otherwise hit <enter> to save changes and exit.<br><br>Choice:<br><br>Configuration changes saved.<br><br>To return to the wizard from the CLI, enter the "configuration jump-start"<br>command from configure mode.  Launching CLI...<br><br>switch-1 > |

*Table 11 - Configuration Wizard Session - Static IP Configuration*

| **Wizard Session Display - Static IP Configuration (Example)** |
|---|
| Mellanox configuration wizard<br><br>Do you want to use the wizard for initial configuration? y<br><br>Step 1: Hostname? [switch-112126]<br>Step 2: Use DHCP on mgmt0 interface? [yes] n<br>Step 3: Use zeroconf on mgmt0 interface? [no]<br>Step 4: Primary IP address? 192.168.10.4<br>Mask length may not be zero if address is not zero (interface mgmt0)<br><br>Step 5: Netmask? [0.0.0.0] 255.255.255.0<br>Step 6: Default gateway? 192.168.10.1<br>Step 7: Primary DNS server?<br>Step 8: Domain name?<br>Step 9: Admin password (Enter to leave unchanged)?<br><br>You have entered the following information:<br><br>  1. Hostname: switch-112126<br>  2. Use DHCP on mgmt0 interface: no<br>  3. Use zeroconf on mgmt0 interface: no<br>  4. Primary IP address: 192.168.10.4<br>  5. Netmask: 255.255.255.0<br>  6. Default gateway: 192.168.10.1<br>  7. Primary DNS server:<br>  8. Domain name:<br>  9. Admin password (Enter to leave unchanged): (unchanged)<br><br>To change an answer, enter the step number to return to.<br>Otherwise hit \<enter\> to save changes and exit.<br><br>Choice:<br><br>Configuration changes saved.<br><br>To return to the wizard from the CLI, enter the "configuration jump-start"<br>command from configure mode.  Launching CLI...<br><br>switch-1 > |

**Step 5.** Before attempting a remote (for example, SSH) connection to the switch, check the mgmt0 inter-
face configuration. Specifically, verify the existence of an IP address. To check the current
mgmt0 configuration, enter the following commands:

```
sx-43 [standalone: master] > enable

sx-43 [standalone: master] # show interfaces mgmt0
```

The following is an example of the output:

```
Interface mgmt0 state

   Admin up:            yes

   Link up:             yes

   IP address:          192.168.10.43

   Netmask:             255.255.255.0

   Speed:               1000Mb/s (auto)

   Duplex:              full (auto)

   Interface type:      ethernet

   Interface source:    physical

   MTU:                 1500

   HW address:          00:02:C9:11:2A:AE

   Comment:


   RX bytes:         1343502058          TX bytes:
        313920869

   RX packets:       17589211           TX packets:      992717

   RX mcast packets: 0                   TX discards:     0

   RX discards:      0                   TX errors:       0

   RX errors:        0                   TX overruns:     0

   RX overruns:      0                   TX carrier:      0

   RX frame:         0                   TX collisions:   0

                                         TX queue len:    1000
```

# 7    Connecting to the Switch Platform

> When the Power PC is removed the switch/ EVB becomes externally managed (unmanaged) and can only be managed through the host server management or through the remote Ethernet connector.

## 7.1    Starting an SSH Connection to the Switch (CLI)

**Step 1**    Set up an Ethernet connection between the switch and a local network machine ("the remote machine" henceforth) using a standard RJ-45 connector.

**Step 2.** Connect to the remote machine (*rem_mach1* is used as an example).

**Step 3.** Start a remote shell to the switch using the following command: `<switch_IP_address>` is the IP address of the switch or its DNS name.

```
rem_mach1 >  ssh -l <username> <ip address>


Mellanox MX-OS Switch Management


Password:
Last login: Thu Apr 28 11:24:13 2011 from 192.168.10.1


Mellanox Switch


sx-43 [standalone: master] >
```

**Step 4.** You can enter any supported command now.

## 7.2    Starting a WebUI Connection to the Switch

**Step 1**    Set up an Ethernet connection between the switch and a local network machine ("the remote machine" henceforth) using a standard RJ-45 connector.

**Note:** The Ethernet supported link speeds are 10/100 Mbps.

**Step 2.** Start a Web browse – Google Chrome, Microsoft Internet Explorer 7.0 or Mozilla Firefox 3.0.

Make sure the screen resolution is set to 1024*768 or higher.

**Step 3.** Enter as URL the following: http://<switch_IP_address> where <switch_IP_address> is the IP address of the switch or its DNS name.

On Ethernet systems, log into the BIP if you configured it for your system. For information on how to configure the BIP see "Box IP Centralized Location" section in the SW user manual.

**Step 4.** You will receive the login window for remote management of the switch. The following figure shows an example. Note that the default username is *admin.*

### 7.2.1  Managing the System

For information and instructions regarding the use of the Embedded Management Tools see the Embedded Management Tools User Guide on the enclosed CD.

### 7.2.2  I2C Connector

The I2C connection provides access to Flash and EEPROMs. This connection allows access to the switch for updating firmware when in-band firmware updating is impossible.

Note: The RJ45 to DB9 harness 22 in the box with the switch, is for use with the MTUSB-1 adapter. This is necessary only when updating firmware cannot be updated in-band.

**This interface is for Debug and Troubleshooting only.** This interface is for FAEs and advanced users only.

When you install the switch, it comes with the latest firmware burned on the board. All firmware updates should be done in-band. This is only done when you receive an e-mail that a newer firmware version for your switch is available.

Download the latest firmware from
http://www.mellanox.com => Downloads => Firmware.

For instructions on downloading firmware see
http://www.mellanox.com => Downloads => Firmware Tools.

Be sure to download the user manual appropriate to your OS. Read the instructions in the User manual for the firmware update procedure.

### 7.2.3  How to Get Mellanox Firmware Tools (MFT)

Mellanox Firmware Tools (MFT) and documentation are available for download via
http://www.mellanox.com > Downloads > Firmware Tools.

The MFT kit includes:

- mlxburn
- flint
- spark
- debug utilities

See "Related Documentation" on page 7.

## 7.3    Updating Firmware

When you buy the switch, it comes with the latest firmware burned on the board. All firmware updates should be done through the management software. Go to the Mellanox Website and confirm that the firmware is the latest. If not reburn the latest firmware from the download site. New firmware versions will be posted on the Mellanox firmware download page:
http://www.mellanox.com => Support > Download Center.

You will need the MLNX-OS package or Mellanox UFM™ to update firmware for this switch. The MLNX-OS package can be downloaded from:
http://www.mellanox.com. => Products > Management Software > MLNX-OS.

You will also need to download and unzip the firmware binary image. This is provided in the Mellanox Web site at:  http://www.mellanox.com  =>  Support > Download  Center and  go  to  the SwitchX Switch systems. Click in the Table for the firmware image that you need.

The Mellanox UFM Management software is also an option to more closely manage your fabric, switches and nodes.

Be sure to read and follow all of the instructions regarding the updating of the firmware on your switch system. Firmware for the HCA cards connected to this switch system can be downloaded from the same site.

# 8    Troubleshooting

As soon as a switch is plugged in make sure that the green power LEDs on the PSUs are on.

**Status LED and or Status Health LED**

If either of these two LEDs is **red** unplug the switch and call your Mellanox representative.

**Power supply unit:**

If the LED on the PSU is not lit or is red, check that the power cable is plugged into a working outlet.

1.    Check that the power cable has a voltage within the range of 100 - 240 volts AC.
2.    Check that the air flow direction of the PSUs are consistent with the Fan module air flow.
3.    Remove and reinstall the power cable.
4.    Remove and reinstall the PSU.

**The power LED for the switch shuts off:**
1.    Check that the there is adequate ventilation. Are the fan LEDs showing that the fans are all up and running?
2.    Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
3.    If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.

**The green power LED for the fans does not come on:**

1.    Check that the Power LEDs are on.
2.    Remove and reinstall the fan unit. Make sure the mating connector of the new unit is free of any dirt and/or obstacles. See Section 4.6.6, "Extracting and Inserting the Fan Unit," on page 36.

> Caution: Do not run the switch if the System Status LED for the Fans is Yellow!

**The link LED for the connector does not come on:**
1.    Check that both ends of the cable are connected.
2.    Check that the locks on the ends are secured.
3.    Make sure that the latest firmware version is installed on both the HCA and the switch.
4.    If media adapters are used, check that the all connections are good, tight, and secure.

**The activity LED does not come on:**

Check that the Subnet Manager has been started.

**The switch is off:**

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, Use the MLNX-OS management CLI or Web GUI to determine the cause of the Shutdown.
6. Check the temperature.
7. Check the Fan status.

**The switch is not working and unresponsive:**

1. Reset the switch.

If resetting the switch does not work:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, use the MLNX-OS management CLI or Web GUI to determine the cause of the shutdown.

**The last software update did not succeed:**

1. Connect the RS232 connector (CONSOLE) to a laptop.
2. Push the reset button on the switch or management module.
3. You will have ~ 5 seconds to stop the U-Boot by pressing Control-B.
4. Choose the image to upload. Only use image 1 or image 2.

```
U-Boot 2009.01-mlnx1.4 (May 12 2010 - 14:08:15)


CPU:   AMCC PowerPC 460EX Rev. A at 1000 MHz (PLB=200, OPB=100,
       EBC=100 MHz)

       Security/Kasumi support

       Bootstrap Option H - Boot ROM Location I2C (Addr 0x52)

       Internal PCI arbiter disabled

       32 kB I-Cache 32 kB D-Cache
Board: Mellanox PPC460EX Board
FDEF:  No
I2C:   ready
DRAM:  2 GB (ECC enabled, 400 MHz, CL3)
```

```
        FLASH: 16 MB

        NAND:  1024 MiB

        PCI:   Bus Dev VenId DevId Class Int

        PCIE0: link is not up.

        PCIE1: successfully set as root-complex

                01  00  15b3  bd34  0c06  00

        Net:   ppc_4xx_eth0, ppc_4xx_eth1

        Hit Ctrl+B to stop autoboot:  0


        Mellanox MLNX-OS


        Boot Menu:

          1. EFM_PPC_M460EX EFM_1.1.1000 2010-06-24 16:32:03 ppc

          2. EFM_PPC_M460EX EFM_1.1.1200  2010-06-25  18 :00:03 ppc

          3. U-Boot prompt

          Choice:
```

5.   Select the image to boot.

# Appendix A: Specifications

## A.1 EMC Certification Statements

Table 12 lists the approved certification status per card in different regions of the world.

*Table 12 - Adapter Cards Certification Status*

| Adapter Card P/N | FCC | VCCI | EN | ICES | CE | CB | cTUVus | KCC |
|---|---|---|---|---|---|---|---|---|
| MT51336-EN-EVB | YES | YES | YES | YES | YES | YES | YES | YES |
| MT51336-VPI-EVB | YES | YES | YES | YES | YES | YES | YES | YES |

### A.1.1 FCC Statements (USA)

Class A Statements:

#### § 15.19(a)(4)

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

#### § 15.21

Statement

**Warning!**

Changes or modifications to this equipment not expressly approved by the party responsible for compliance (Mellanox Technologies) could void the user's authority to operate the equipment.

#### §15.105(a)

Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### A.1.2 EN Statements (Europe)

**EN55022 Class A Statement:**

**Warning**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## A.1.3    ICES Statements (Canada)

**Class A Statement:**

"This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."**Class B Statement:**

## A.1.4    VCCI Statements (Japan)

**Class A Statement:**

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

(Translation - "This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.")

## A.1.5    KCC Certification (Korea)

Korea's "Regulation for Certification of Information and Communication Equipment," requires EMC testing and certification for many electronic products. Korean EMC certifications are issued by Radio Research Laboratory (RRL), which is organized under the Ministry of Information and Communications (KCC). EMC testing includes electromagnetic emissions (EMI) and susceptibility (EMS). Certified equipment is labeled with the KCC mark and certification number.

| Device | User's information |
|---|---|
| A급 기기<br><br>(업무용 방송통신기기) | 이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다. |
| **CLASS A device**<br><br>(commercial  broadcasting and communication equipmen) | This device has been approved by EMC registration. Distributors or users pay attention to this point . This device is usually aimed to be used in other area except at home . |

● Remark

Class A device:  operated in a commercial area.

Translation:

Class A Device    This device is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type.

## A.2    MT51336 Specifications

*Table 13 - Specifications for MT51336-NUDT*

| Physical | | Power and Environmental | |
|---|---|---|---|
| Size L x W x H: | 629 mm x 428 mm x 43.6 mm<br>24.76 in x 16.85 in x 1.71 in | Voltage: | 12V, 3.3V |
| Weight: | 9.31kg 20.52 lbs | Typ@Typ 50%:<br>40GigE | |
| Air Flow: | 62CFM | Active Cables: | 182W – 5W/port |
| | | Passive cables: | 100W – 2.8W/port |
| | | Typ@Typ:<br>40GigE | |
| | | Active Cables: | 186W – 5.2 W/port |
| | | Passive cables: | 104W – 2.9 W/port |
| | | Max@Max:<br>40GigE | |
| | | Active Cables: | 224W – 6.2 W/port |
| | | Passive cables: | 119W – 3.3W/port |
| | | Temperature: | 0°C to 45°C |
| **Protocol Support** | | **Regulatory** | |

*Table 13 - Specifications for MT51336-NUDT*

| Physical | | Power and Environmental | |
|---|---|---|---|
| PCI Express: | 2.0 SERDES @ 5.0GT/s | EMC: | FCC 47 CFR part 15:2006, subpart B, class A<br>ICES-003:2004 Issue 4, class A<br>VCCI V-3/2007.04, class A<br>EN 55022:1998+A1:2000+A2:2003 class A,<br>EN 61000-3-2:2000+A2:2005,<br>EN61000-3-3:1995+A2:2005,<br>EN 55024:1998 + A1:2001+A2:2003 standards, harmonized under EMC Directive 2004/108/EC Article 6(2); AS/NZS 3548 |
| | | Safety: | IEC/EN 60950-1:2006<br>ETSI EN 300 019-2-2<br>IEC 60068-2- 64, 29, 32 |
| | | RoHS: | RoHS-R5 |

# Appendix B: Transferring the Power Cord

To use the rail kit to transfer the power cord from the connector side to the power side follow these directions. Do you want to install power cords on both sides of the switch or only one side? For each power cord you want to transfer:

1. Once you have decided which side of the switch will be next to the vertical support?

2. Make sure that you place the cord so that the correct end of the cord will be at the power side of the switch. This will depend on which of the four mounting options you choose.

*Figure 38: Transfer Power Cord*
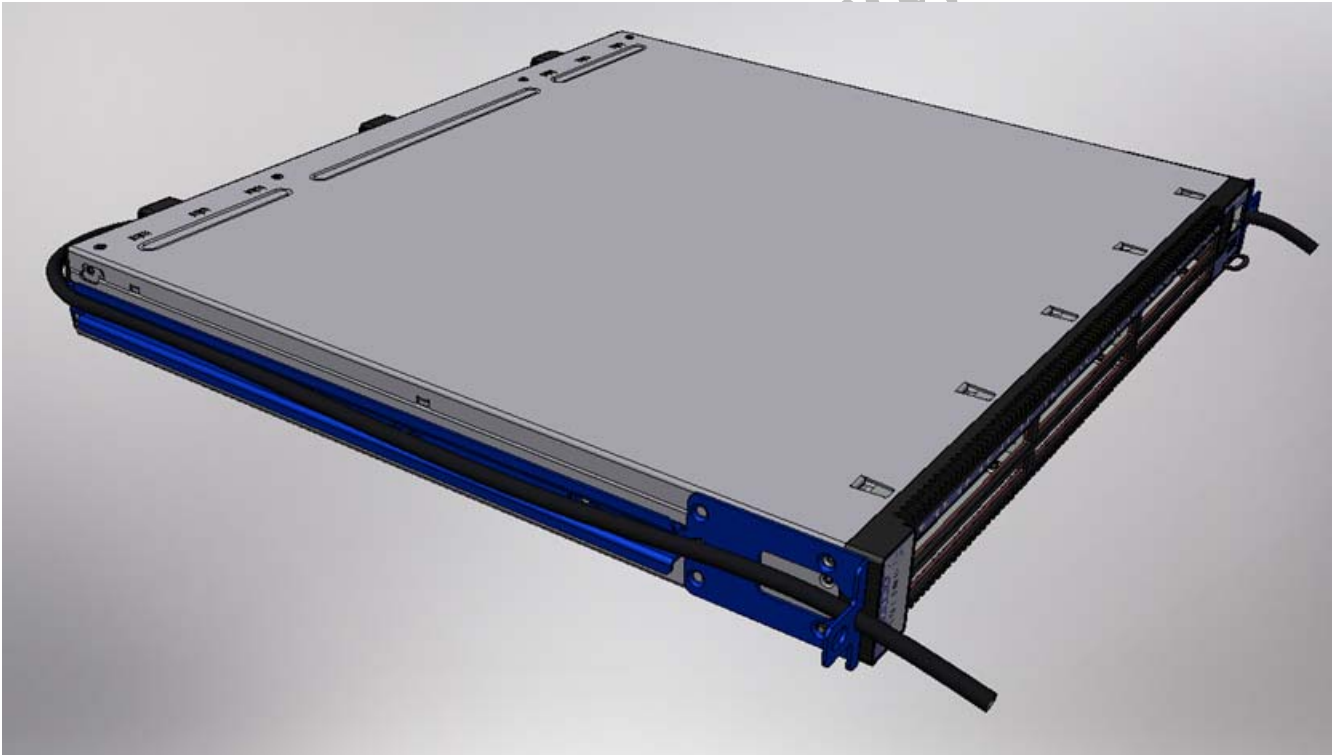


3. Put the power cord in the switch slide channel.

4. Push the cord end through the hole in the switch slide. Leave ~ 7" of cord hanging out from the hole.



5. Screw the switch slides to the switch. Make sure to use two cord clamps per switch slide. These will be needed to hold the cord during the switch installation process.

*Figure 39: Install the Power Cord Clip*



6. Push the power cord into the cord clamps.

*Figure 40: Transfer Power Cord Finished*



7. Return to step 4 on page 29 and continue the installation.

# Appendix C: Samtec Connector Pinout
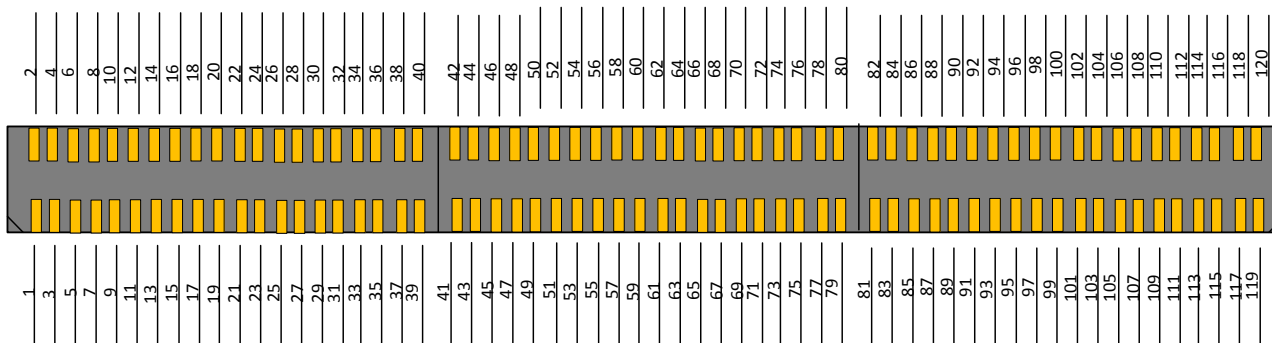
*Figure 41: Connector Pinout*



*Table 14 - Connector Pinout*

| Pin number | Signal | Pin number | Signal | Pin number | Signal | | |
|---|---|---|---|---|---|---|---|
| 1 | x | 31 | JTAG_VREF | 61 | GND | 91 | PCIe1_Rx3_p |
| 2 | 12V | 32 | RS232_CTS | 62 | GND | 92 | PCIe1_Tx3_p |
| 3 | x | 33 | CPU_TRST# | 63 | GBE1_MDI1-/RX0- | 93 | PCIe1_Rx3_n |
| 4 | 12V | 34 | RS232_R1 | 64 | GBE0_MDI1-/RX0- | 94 | PCIe1_Tx3_n |
| 5 | x | 35 | GND | 65 | GBE1_MDI1+/RX0+ | 95 | GND |
| 6 | 12V | 36 | GND | 66 | GBE0_MDI1+/RX0+ | 96 | GND |
| 7 | factory restore | 37 | I2C1_CLK | 67 | GND | 97 | PCIe1_Rx2_p |
| 8 | x | 38 | I2C0_CLK | 68 | GND | 98 | PCIe1_Tx2_p |
| 9 | GP_LV | 39 | I2C1_DAT | 69 | GBE1_MDI0-/TX0- | 99 | PCIe1_Rx2_n |
| 10 | 3.3V | 40 | I2C0_DAT | 70 | GBE0_MDI0-/TX0- | 100 | PCIe1_Tx2_n |
| 11 | GP_HV | 41 | PWR_OK | 71 | GBE1_MDI0+/TX0+ | 101 | GND |
| 12 | 3.3V | 42 | USB_0_OC# | 72 | GBE0_MDI0+/TX0+ | 102 | GND |
| 13 | x | 43 | GND | 73 | GND | 103 | PCIe1_Rx1_p |
| 14 | 3.3V | 44 | GND | 74 | GND | 104 | PCIe1_Tx1_p |
| 15 | Sys_Err | 45 | INT1# | 75 | 2.5VA_GBE | 105 | PCIe1_Rx1_n |
| 16 | x | 46 | USB0- | 76 | 2.5VA_GBE | 106 | PCIe1_Tx1_n |
| 17 | x | 47 | INT2# | 77 | GBE1_ACT# | 107 | GND |
| 18 | x | 48 | USB0+ | 78 | GBE0_ACT# | 108 | GND |
| 19 | CPU_TDO | 49 | GND | 79 | GBE1_LINK# | 109 | PCIe1_Rx0_p |
| 20 | RS232_DCD | 50 | GND | 80 | GBE0_LINK# | 110 | PCIe1_Tx0_p |
| 21 | CPU_TD1 | 51 | GBE1_MDI3- | 81 | INT3# | 111 | PCIe1_Rx0_n |
| 22 | RS232_RX | 52 | GBE0_MDI3- | 82 | CPU_Present# | 112 | PCIe1_Tx0_n |
| 23 | GND | 53 | GBE1_MDI3+ | 83 | GND | 113 | GND |

*Table 14 - Connector Pinout*

| Pin number | Signal | Pin number | Signal | Pin number | Signal | | |
|---|---|---|---|---|---|---|---|
| 24 | RS232_TX | 54 | GBE0_MDI3+ | 84 | GND | 114 | GND |
| 25 | CPU_TCK | 55 | GND | 85 | PCIE_CLK_REF1+ | 115 | PCIe0_Rx0_p |
| 26 | RS232_DTR | 56 | GND | 86 | PCIE_CLK_REF0+ | 116 | PCIe0_Tx0_p |
| 27 | CPU_TMS | 57 | GBE1_MDI2- | 87 | PCIE_CLK_REF1- | 117 | PCIe0_Rx0_n |
| 28 | RS232_DSR | 58 | GBE0_MDI3- | 88 | PCIE_CLK_REF0- | 118 | PCIe0_Tx0_n |
| 29 | SYS_HALT# | 59 | GBE1_MDI2+ | 89 | GND | 119 | GND |
| 30 | RS232_RTS | 60 | GBE0_MDI3+ | 90 | GND | 120 | GND |