VXS-M16 Switch Module

Myri-10G 16-Port Switch

The VXS-M16 Switch Module is designed to support a small FastCluster 3000 SERIES 8-slot system (VXS collapsed dual-star architecture) with seven StarGate and XL-Gate payloads. The VXS Switch Module features a low power, high density, Myri-10G 16-port crossbar switch supporting up to 16 connections for processing nodes and I/O on the fabric. This system supports 20 GB/s of peak bi-section bandwidth (data rate of 10+10 Gbits/s per Myri-10G switch port) across the 7 VXS payloads and two optional connectors on the VXS Switch front panel. The switch module is available in two configurations: one has two plug-in XFP fiber connections, the other has two copper transceivers. In addition to Myri-10G, the VXS Switch module has a protocol agnostic serial crosspoint switch to configure direct point-to-point serial connections between the FPGA units on the XL-Gate VXS payload modules. Control and Management functions are performed by a control processor on the switch board enabling the static configuration of the crosspoint switch, the monitoring of the Myri-10G switch and the monitoring of vital signs (power and temperature) of the switch module.

VXS Switch Module usage with 8 Slot Chassis

9 Myri-10G serial connections (XAUI 4X each)

* Slots 4,5,6,7 can be configured for XL-Gate or StarGate payloads. Slots 1,2 & 3 support StarGate only.

20 protocol agnostic serial lanes, 1x each (transmit and receive), four lanes per P0 connector (A or B)
VXS-M16 Switch Module

Myri-10G 16-Port Switch
Each VXS switch board integrates a low power, high density Myri-10G 16-port serial crossbar switch. The Myri-10G switch leverages the XAUI Physical-layer de facto standard for 10-Gigabit/sec data rate communication. Each Myri-10G XAUI port (4 serial, 8b/10b-encoded links each way) delivers 12.5 Gbaud signaling rate \(4 \times 3.125\) and 10 Gigabit/sec data rate. The Myri-10G switch fabric implements byte-level flow control, source-based routing and cut-through switching.

Xilinx Serial Interconnect
In addition to the Myri-10G 16 port crossbar switch, each 3000 SERIES VXS Switch Module features a “protocol agnostic” serial crosspoint switch that can be used to implement point-to-point serial interconnect. The user configures the crosspoint switch to optimize the FPGA data flow across payloads, leveraging the Xilinx RocketIO ports without incurring the cost of a specific backplane design. Mesh or other point-to-point topologies can be configured as needed.

Fabric Management System
The FastCluster 3000 SERIES VXS Switch Module is designed with an Integrated Out-of-Band Control Plane and a Fabric Management System [FMS]. FMS is a collection of tools and processes used to manage the Myri-10G network. FMS provides centralized diagnostic monitoring of the Myri-10G fabric from a command-line interface. FMS consist of one FMS server process and many Fabric Management Agent (FMA) processes, one running on each Myri-10G node in the network.

The FMS/FMA system includes a mapping function.

FMS relies on a database which describes the network connections. Once this baseline description of the network is created, it is possible to monitor links and switches and report discrepancies between the observed network state and the desired network state. FMS can be configured either for queries or to automatically generate an alert when error conditions are detected in the Myrinet fabric. The FMS has connectivity to all the Myri-10G nodes in the FastCluster via an Ethernet control plane and has access to its database. Alerts are created when certain exception events occur, i.e., \{link_down\}, \{SRAM parity error on a NIC\}, \{switch_xbarport_disabled\}. 
## Technical Specifications

### SWITCH TECHNOLOGY
- **Myri-10G Crossbar Switch**: 16 Connections @ 10 Gb/s full duplex, non blocking
- **Serial Crosspoint Switch**: Serial links operating @ 3.125 Gbps NRZ Data Rate

### FRONT PANEL
(*The VXS-M16 comes in two versions: one supports fiber, the other supports copper*)
- **XFP Transceivers***: 2 (optional) Plug-in Modules with Myri-10G over Fiber
- **Copper Transceivers***: 2 (optional) with Myri-10G over Copper
- **Ethernet**: 10/100Base-T Ethernet RJ45 Connector

### CONTROL PROCESSOR
- **MPC8270**: Provides support for FMS

### BACKPLANE
- **VXS (VITA 41.x)**: Collapsed Dual-Star Switch Implementation

### ENVIRONMENTAL (Air-cooled)
- **Operating Temperature**: 0º C to +55º C (inlet air)
- **Ambient Air Relative Humidity**: up to 95% non-condensing
- **Maximum Altitude****: 10,000 ft. (3048 m)
- **Shock**: 20 Gs @ 11 ms half sine
- **Random Vibration**: 0.04 g²/Hz, 10 - 2000 Hz
- **Sinusoidal Vibration**: 4 G’s, 5-500 Hz, swept sine
- **Storage Temperature**: -40º C to +85º C

**Ambient Temperature, Airflow and Altitude parameters can be traded off among each other. Consult Factory for more information.**

### ELECTRICAL (Power Requirements)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>CX-4 Interfaces</th>
<th>XFP Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3 Volts</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>5.0 Volts</td>
<td>30 Watts</td>
<td>37 Watts (estimated)</td>
</tr>
<tr>
<td>12 Volts</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

### PHYSICAL DIMENSIONS
- **Packaging Standard**: 6U VME64 Extension (ANSI/VITA 1.1-1997) Form Factor
- **Height**: 9.2 inches (233.4 mm)
- **Depth**: 6.3 inches (160.0 mm)
- **Width**: 0.8 inches (19.8 mm)
- **Slot Pitch**: 0.8”
- **Weight (Copper)**: 1.15 lbs. (with CX-4 Interfaces)
- **Weight (Fiber)**: 1.43 lbs. (with Fiber XFP transceivers installed)
## Ordering Information

### PART NUMBERS (Air-Cooled Products)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100592-01</td>
<td>VXS Switch - Universal (VXS-M16). Air-Cooled 6U VXS Switch Module supporting up to two (2) optional transceivers on the front panel providing Myri-10G over XFP Fiber or Copper.</td>
</tr>
<tr>
<td>Consult Factory</td>
<td>VXS Switch Copper (VXS-M16/C). Air-Cooled 6U VXS Switch Module supporting 10GBase-CX4 copper on the front panel providing Myri-10G over copper.</td>
</tr>
</tbody>
</table>

### PART NUMBERS (Conduction-Cooled Products)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consult Factory</td>
<td>VXS Switch - Universal (VXS-M16). Conduction-Cooled 6U VXS Switch Module supporting up to two (2) optional transceivers on the front panel providing Myri-10G over XFP Fiber or Copper.</td>
</tr>
<tr>
<td>Consult Factory</td>
<td>VXS Switch Copper (VXS-M16/C). Conduction-Cooled 6U VXS Switch Module supporting 10GBase-CX4 copper on the front panel providing Myri-10G over copper.</td>
</tr>
</tbody>
</table>

### PART NUMBERS (Accessories)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>101002-xx</td>
<td>Fiber Cables. LC Fiber Cables (where -xx represents the length).</td>
</tr>
<tr>
<td>101003-xx</td>
<td>Copper Cables. CX4 Copper Cables (where -xx represents the length).</td>
</tr>
<tr>
<td>101000-01</td>
<td>Transceivers. 10G XFP Fiber LC Transceiver.</td>
</tr>
<tr>
<td>101001-01</td>
<td>Transceivers. 10G Copper CX4 Transceiver.</td>
</tr>
<tr>
<td>101004-01</td>
<td>Transceivers. 10G SFP+ Fiber LC Transceiver.</td>
</tr>
</tbody>
</table>