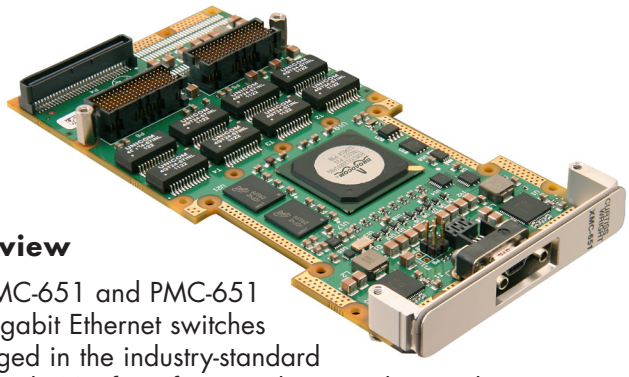
Data Sheet

XMC-651
PMC-651

5/7/8/12-Port Gigabit Ethernet Switch



Features

- 12-port Gigabit Ethernet switch
  - Supports 8-port 10/100/1000Base-T plus 4 ports 1000Base-X (SerDes)
  - Various port combinations supported for PMC and XMC mezzanine sites
- Non-blocking line-speed Ethernet switching
- Supports jumbo packets up to 9K bytes
- IEEE 802.3 compliant
- Managed Layer-2 features include VLAN, L2 multicast, QoS services
- Support for port mirroring and link aggregation
- Flexible I/O on Pn4 and Pn6
  - XMC or PMC with Pn4 I/O supports 8 ports Base-T
  - XMC with Pn6 I/O supports 5 ports Base-T or 3 ports Base-T plus 4 ports Base-X (SerDes)
  - XMC with Pn4/Pn6 I/O supports 8 ports Base-T on Pn4 plus 4 ports Base-X (SerDes) on Pn6
- No software required, only power and I/O from basecard
- Range of air and conduction-cooled ruggedization levels available

Overview

The XMC-651 and PMC-651 are Gigabit Ethernet switches packaged in the industry-standard XMC and PMC form factors. They are designed to support "in-chassis" networks with managed Layer-2 switching capabilities. Part of a family of Gigabit Ethernet switching/routing products from Curtiss-Wright Defense Solutions, the 651 family offers a zero-slot Ethernet switching solution that can be added to most basecards with an XMC or PMC mezzanine slot. These switches are designed for rugged applications with backplane I/O and are offered in a full range of ruggedized air- and conduction-cooled versions.

Ethernet Switching

Both the XMC-651 and PMC-651 implement Ethernet switching functions via Broadcom® 10th generation switching technology. A single integrated switching fabric provides non-blocking wire-speed Ethernet switching for up to 12 Gigabit Ethernet ports.

Ethernet Port Flexibility

The XMC-651 and PMC-651 both offer 8 ports of Gigabit Ethernet supporting tri-speed 10/100/1000Base-T with auto-negotiation and auto-MDI/MDIX crossover support. For some XMC variants, an additional 4 ports are offered, supporting 1000Base-X (SerDes) GbE, providing flexibility when connecting in-chassis devices.

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PMC-651

The PMC-651 model offers 8 ports of 10/100/1000Base-T through the PMC's Pn4 connector.

XMC-651

For XMC-651 models with only Pn4 for Ethernet I/O, the XMC-651 offers 8 ports of 10/100/1000Base-T through the Pn4 connector. For XMC modules with only Pn6, 5 Base-T ports are routed through the Pn6 connector. For mixed Base-T and Base-X systems, an XMC module with only Pn6 I/O is available with 3 ports Base-T plus 4 ports Base-X.

For XMC-651 configurations using both Pn4 and Pn6 for Ethernet I/O, a total of 12 ports are offered: 8 ports Base-T on Pn4, and 4 ports 1000Base-X (SerDes) on Pn6. This configuration is very useful when building systems populated with a mix of Base-T and Base-X (SerDes) payload modules, or for cascading multiple XMC-651 switches to architect a larger distributed switching system.

Layer-2 Switching Functionality

The 651 family supports full wire-speed Ethernet switching performance on all ports and features an 8K entry MAC address table with automatic learning, advanced flow-control and head of line blocking prevention.

Figure 1: XMC/PMC-651 Block Diagram

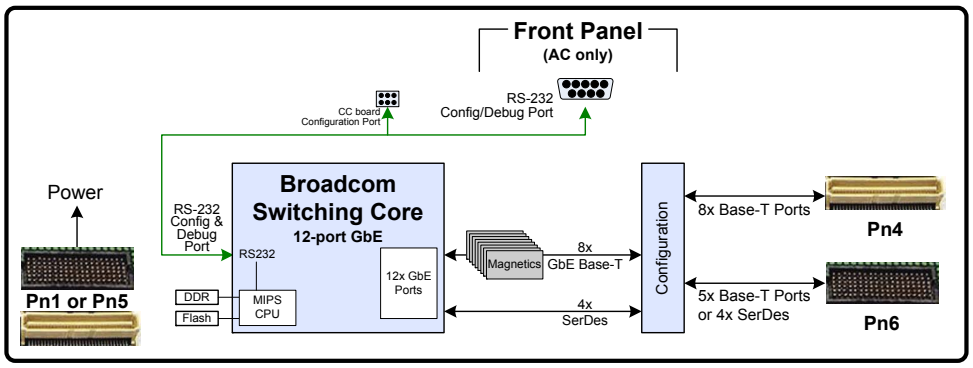
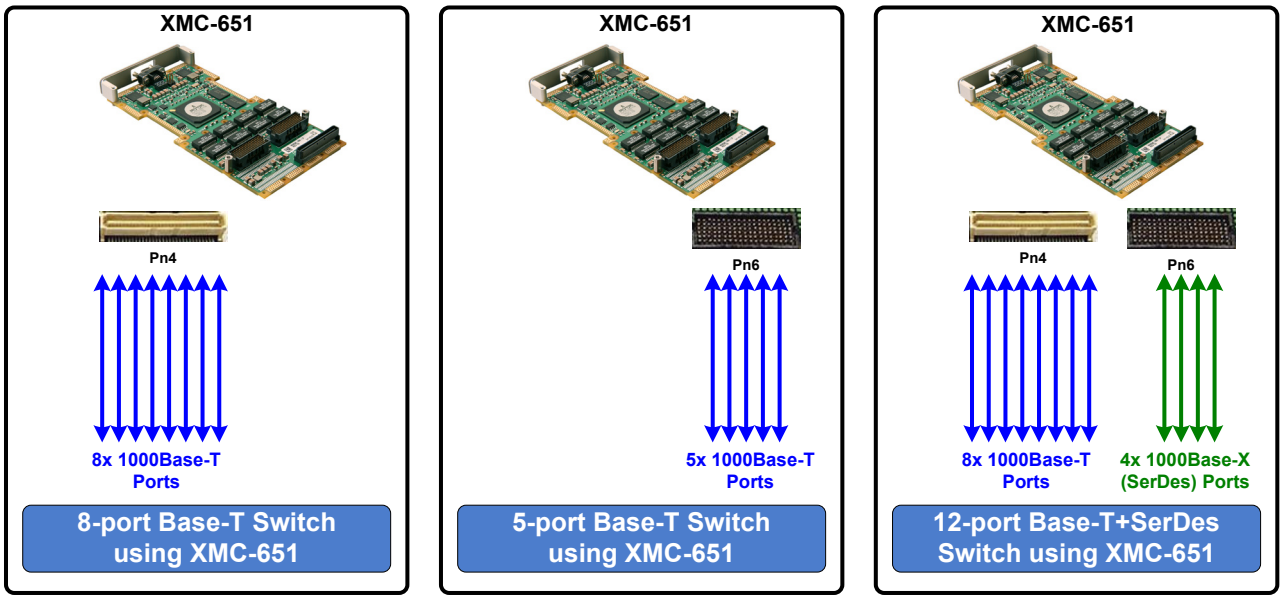


Figure 2: Ethernet Port Configurations of the 651 Switch Family



Virtual LANs (VLAN)

VLANs are supported, with standard IEEE 802.1Q support for VLANs. Automatic double-tagging is also supported.

Multicast

The 651 family supports Layer-2 multicast, where a single source device can send data to multiple destination devices. This technique is extremely powerful when distributing data such as video and telemetry information. The 651 supports hardware-based multicast, allowing a connected device to broadcast multicast packets to all other ports (multicast flooding). The 651 can also be configured with static multicast groups, where only pre-defined ports participate in multicast groups based on VLAN ID and multicast MAC address. Up to 255 static multicast groups can be configured.

Jumbo Frames

The 651 family offers full support for jumbo frames up to 9K bytes.

Quality of Service (QoS)

Packet classification is supported using IEEE 802.1p Quality of Service (QoS) or DiffServ/TOS priority queuing.

Link Aggregation

Link aggregation per IEEE 802.3ad provides increased bandwidth and link redundancy when used to connect multiple ports to the same endpoint device. This can also be used when cascading multiple 651 switches into a larger distributed switching system. For example, if two Ethernet ports are connected and aggregated between multiple 651's, this creates a single 2Gbps trunk which distributes the traffic load across both links. In the event of a link failure, the other link remains operational.

Port Mirroring

Port mirroring is also offered, allowing one monitoring port to receive a copy of all ingress, egress, or both from any or all other ports. This is an extremely powerful feature when used for system development, debug and diagnostics.

Switch Management

All 651 models provide a serial RS232 port for configuration. Air-cooled variants support a micro-DB9 serial connection on the front panel. Conduction-cooled variants provide serial port access using an innovative Back-Entry access header on the rear of the PWB using a serial cable available from Curtiss-Wright.

Base-card Compatibility

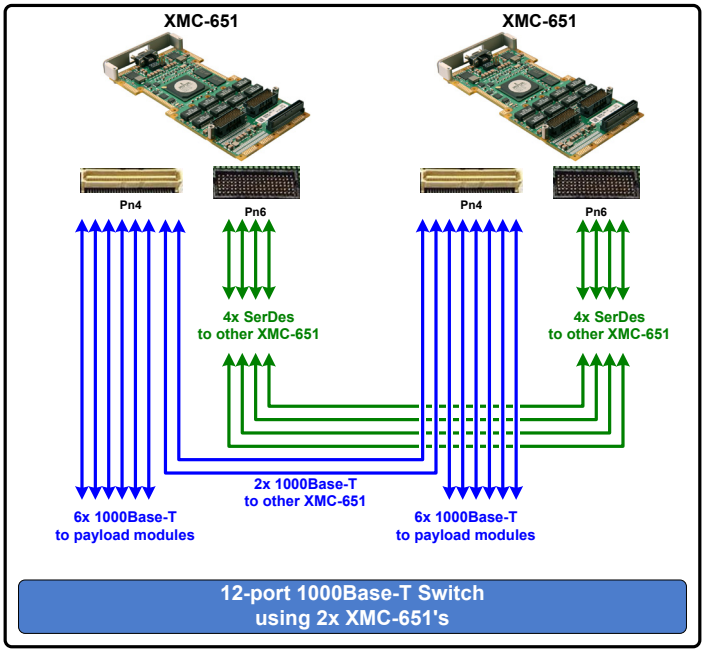
The 651 family connects only to the XMC and PMC connectors to obtain power and for Ethernet I/O connections. No software driver is needed.

Cascading 651 Switches

In order to create larger networks, multiple 651 switches can be connected to increase the system's available port count. Base-T or Base-X (SerDes) ports can be used between switches, and the ports can be Link Aggregated to operate as a single higher-capacity backbone interconnect.

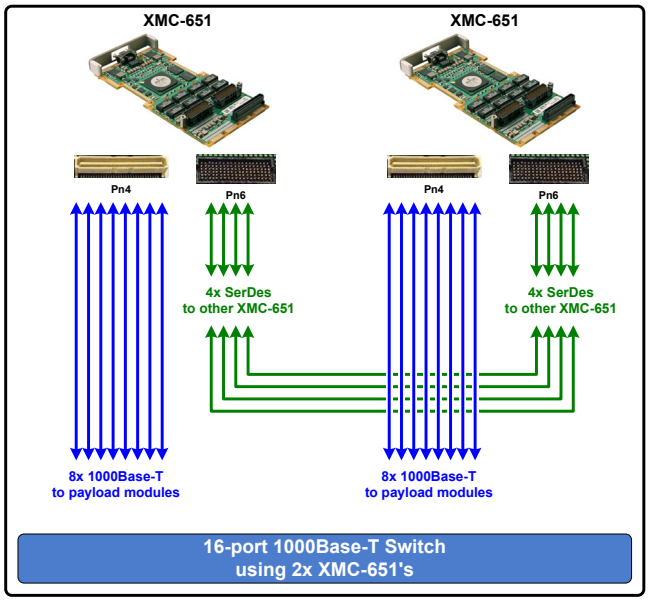
In Figure 3, two XMC-651 switches are cascaded to create a 12-port 1000Base-T switch. Six ports from each switch (two Base-T + four Base-X) are cross-connected between the switches, where they are link aggregated into a single logical 6Gbps connection. This is a fully non-blocked switch architecture, as all ports from both switches can communicate without bottlenecks or throughput limitations.

Figure 3: 12-Port 1000Base-T Switch using 2x Cascaded XMC-651 Switches



In Figure 4, only the four Base-X ports are cross-connected between the switches, resulting in a 16-port 1000Base-T switch architecture. In this example the switch-to-switch bandwidth is 4Gbps. This is a blocking architecture if traffic between switch #1 and switch #2 exceeds 4Gbps. In this case, the switch will drop excess packets. However, this architecture can satisfy a vast number of system configurations, if implemented with a careful understanding of the system communications throughput.

Figure 4: 16-Port 1000Base-T Switch using 2x Cascaded XMC-651 Switches



In Figure 5, a 24-port 1000Base-T switch is configured with 2Gbps interconnects between the switches. Again, this is a blocking architecture if data transfers between the switches exceeds 2Gbps.

Figure 5: 24-Port 1000Base-T Switch using 3x Cascaded XMC-651 Switches

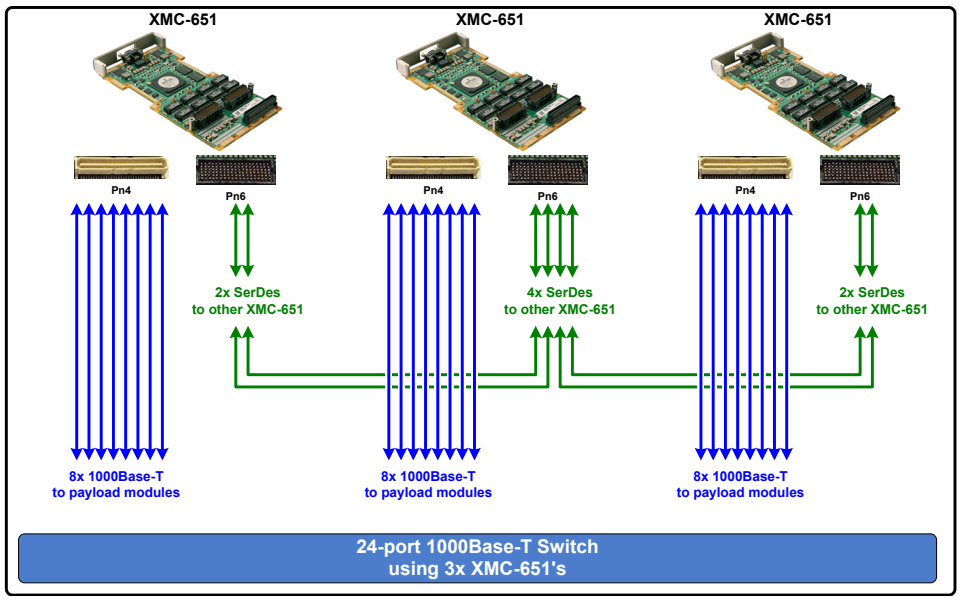




Table 1: Hardware Specifications

Feature		Description
Switching Fabric		Broadcom BCM5331x Switching Processor
Management/Control Processor		Integrated 32-bit MIPS processor for management functions
Ethernet Port Specifications		• 5 or 8 ports 10/100/1000Base-T - 10Base-T interfaces per IEEE 802.3 - 100Base-TX interfaces per IEEE 802.3u - 1000Base-T interfaces per IEEE 802.3ab - Tri-speed auto-negotiation - Auto MDI/MDIX crossover - Max 100m segment length • Optional 4 ports 1000Base-X (SerDes) per IEEE 802.3ap on some variants
Maintenance Ports		• Front panel serial RS-232 on micro-DB9 (AC models only) • Back-entry access via rear-board header for serial RS-232 also available on all models
Layer-2 Switching Performance		Non-blocking wire-speed performance on all ports
Capacity		• 512KB packet buffer memory with dynamic buffer management • Support for Jumbo Packets up to 9K bytes • Up to 8K Layer-2 MAC addresses • Up to 1024 VLANs • Up to 255 Layer-2 Multicast groups
Layer 2 Switching Features		• VLAN routing and support • VLAN broadcast, 802.1Q VLAN tagging and double-tagging • Priority Based Switching (802.1p) • Link Aggregation (802.3ad, 802.1ax) for increased bandwidth and load sharing • Port mirroring • Packet or byte-based rate limiting on a per-port basis • IEEE 802.3x flow control and back-pressure support • Broadcast Storm Control
Other Features		• Ethernet switch configuration save and restore • Management by CLI (serial port) with context-sensitive help • User Privileges and Login Authentication • Declassification (secure memory/configuration erase and restore to factory defaults)
Built-in Test		PBIT for powerup self-test
Power	PMC-651 (8-port)	• +5.0 VDC, +/- 5% • Typical power: 6.2 watts • Maximum power: 7.3 watts
	XMC-651 (12-port)	• +5.0 or +12 VDC, +/- 5% • Typical power: 6.4 watts • Maximum power: 7.5 watts

Feature	Description
Form Factor	• Air-cooled: per IEEE 1386.1 • Conduction-cooled: per IEEE 1386.1, VITA 20-199x
Environmental	• Convection (air-cooled): Available in Ruggedization Levels 0 (AC L0) and 100 (AC L100) • Required airflow is 15 CFM at sea level • Conduction-cooled: available at Ruggedization Level 200 (CC L200) *Unless otherwise noted, Environmental Specifications are defined in Curtiss-Wright's Ruggedization Guidelines factsheet.*
Weight	• Air-cooled L0: 111 g • Air-cooled L100: 137 g • Conduction-cooled L200: 116 g

Part Number

Ordering information for the XMC-651 and PMC-651 is provided below.

XMC-651- UVWXYY
SPMC-651- UVWXYY
DPMC-651-UVWXYY

YY = Total number of Ethernet ports
- 05: 5 ports Base-T
- 08: 8 ports Base-T
- 07: 3 ports Base-T + 4 ports Base-X
- 12: 8 ports Base-T + 4 ports Base-X

X = Number of Base-T ports

W = Connector option
- 1: PMC connectors Pn1/4
- 2: XMC connectors Pn5/6
- 3: XMC connectors Pn4/5
- 4: XMC connectors Pn4/5/6
- 5: PMC connectors Pn1/4 (PMC-650 pinout)

V = Ruggedization Level
- 0: Level 0, 0 to +50°C
- 1: Level 100, -40 to +71°C
- 2: Level 200, -40 to +85°C

U = Cooling method
- A: Air-cooled
- C: Conduction-cooled



Table 2: Recommended PMC Variants

Part Number	Ruggedization	Connectors Installed	Description
SPMC-651-A01808	AC L0	Pn1, Pn2, Pn4	8-port PMC Mezzanine Ethernet switch module, 8 ports 10/100/1000Base-T on Pn4, Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring.
SPMC-651-A11808	AC L100		
DPMC-651-C21808	CC L200		

Table 3: Recommended Variants

Part Number	Ruggedization	Connectors Installed	Description
XMC-651-A02505	AC L0	Pn5, Pn6	5-port XMC Mezzanine Ethernet switch module, 5 ports 10/100/1000Base-T on Pn6 Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring.
XMC-651-A12505	AC L100		
XMC-651-C22505	CC L200		
XMC-651-A02307	AC L0	Pn5, Pn6	7-port XMC Mezzanine Ethernet switch module, 3-ports 10/100/1000Base-T plus 4 ports 1000Base-X on Pn6 Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring.
XMC-651-A12307	AC L100		
XMC-651-C22307	CC L200		
XMC-651-A03808	AC L0	Pn4, Pn5	8-port XMC Mezzanine Ethernet switch module, 8 ports 10/100/1000Base-T on Pn4 Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring.
XMC-651-A13808	AC L100		
XMC-651-C23808	CC L200		
XMC-651-A04812	AC L0	Pn4, Pn5, Pn6	12-port XMC Mezzanine Ethernet switch module, 8 ports 10/100/1000Base-T on Pn4 plus 4 ports 1000Base-X (SerDes) on Pn6 Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring.
XMC-651-A14812	AC L100		
XMC-651-C24812	CC L200		
SPMC-651-A01808	AC L0	Pn1, Pn2, Pn4	8-port PMC Mezzanine Ethernet switch module, 8 ports 10/100/1000Base-T on Pn4 Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring.
SPMC-651-A11808	AC L100		
DPMC-651-C21808	CC L200		
SPMC-651-A05808	AC L0	Pn1, Pn2, Pn4	8-port PMC Mezzanine Ethernet switch module, 8 ports 10/100/1000Base-T on Pn4. Layer-2 managed features: VLAN, QoS, L2 multicast, link aggregation, port mirroring. Ethernet pinout matches PMC-650 for migration compatibility.
SPMC-651-A15808	AC L100		
DPMC-651-C25808	AC L200		



Table 4: Cables and Support

Part Number	Description
CBL-651-BEN-000	Back-Entry serial port cable for PMC/XMC-651. Approx 0.5m length. Back-Entry header to the 651 and female DB9 for RS-232 port on the other end. For use with AC or CC modules. Lab use only.
CBL-651-FPL-000	Front panel serial port cable for PMC/XMC-651. Approx 1m length. Male micro-DB9 to the 651 and female DB9 for RS-232 port on the other end. For use with AC modules only. Lab use only.
CBL-651-RTM-000	Breakout cable assembly for 185/187 RTM. Connects to 185/187 RTM's PMC/XMC I/O connector and brings out 8 ports 1000Base-T to RJ45 jacks. Approx 0.5m length. For lab use only.
17B539-503-LF	Meritec VPX cable, odd wafer thin-pipe to RJ45, 18" length. For use with PMC/XMC-651 mounted on 215 or similar module with VITA 46.9 compliant pin mappings for 1000Base-T on thin-pipe.

Warranty

This product has a one year warranty.

Contact Information

To find your appropriate sales representative:
Website: www.curtisswrightds/sales
Email: defensesales@curtisswright.com

Technical Support

For technical support:
Website: www.curtisswrightds.com/support
Email: support@curtisswright.com

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