**AXM Series**
Digital I/O Extension Modules for PMC FPGA Boards

**Description**
AXM Series extension modules offer numerous I/O options for Acromag’s PMC modules with configurable FPGAs. These extension modules plug into the front mezzanine on Acromag’s PMC-LV5X (Virtex®-4 FPGA), PMC-VLX/VSX/ VFX (Virtex-5 FPGA) modules, and PMC-SLX (Spartan-6 FPGA) modules.

**AXM-D01 LV TTL I/O**
This module provides 64 LV TTL I/O channels for straight though I/O. Custom options are available for optional pull-ups, pull-downs, JTAG, and fuses for front I/O use.

**AXM-D02 RS-485 Differential I/O**
This module provides 30 differential I/O channels. Data direction, either input or output, on each channel is independently controlled. Eight of the channels support programmable change-of-state interrupts.

**AXM-D03 CMOS and RS-485 Differential I/O**
Same as AXM-D03 above except 16 CMOS and 24 RS-485 differential I/O channels. Provides a replacement for legacy PMC-DX503/2003 FPGA modules when used with PMC/XMC-SLX.

**AXM-D04 LVDS**
This module provides 30 channels of low voltage differential signaling with independently configured direction. Interrupts are programmable on eight of the channels for any bit change of state. JTAG option.

**Key Features & Benefits**
- Various modules allows users to select the Front I/O required for their application.
- Differential RS485/RS422 can be configured for input or output with independent direction control.
- Interface with 5V compliant input/output CMOS channels which can be configured as input or output with independent direction control.
- Low voltage differential signaling can be configured for input or output with independent direction control.
- The EDK board provides the standard Xilinx JTAG interface to allow direct programming of the FPGA and an interface with ChipScope®.
- Example code provides interrupts that are software programmable for any bit Change-Of-State or level on 8 channels.
- Example Design – The example VHDL design, provided in the base board EDK, includes control of all I/O, and eight Change-Of-State interrupts.
PMC Modules

**AXM Series** Digital I/O Extension Modules for PMC FPGA Boards

### Performance Specifications

**AXM-D01**
- Channel configuration: 64 channel bi-directional LVTTL signals are independently direction controlled.
- LVTTL I/O characteristics: all I/O characteristics are determined by the FPGA.

**AXM-D02**
- Channel configuration: 30 bi-directional differential signals with independently configured direction.
- Channels to the FPGA are buffered using EIA RS485/RS422 line transceivers. Optional JTAG access via front connector.
- Differential driver output voltage: 1.5V minimum, 3.3V maximum with 54 ohm load.

**AXM-D03**
- Channel configuration: 16 bi-directional CMOS transceivers (input/output direction controlled as pairs of channels) and 22 bi-directional differential signals with independently configured direction.
- Differential channels: Same as AXM-D02.
- CMOS I/O electrical characteristics:
  - V<sub>oh</sub>: 3.8V minimum
  - I<sub>oh</sub>: -32.0mA
  - V<sub>oh</sub>: 3.5V minimum
  - I<sub>oh</sub>: -32.0mA

**AXM-DX03**
- Same as AXM-D03 except 16 CMOS and 24 RS-485 differential I/O channels. Provides a replacement for legacy PMC-DX03/2003 FPGA modules when used with PMC-XMC-SLX.

**AXM-D04**
- Channel configuration: 30 channels of low voltage differential signaling with independently configured I/O direction. Optional JTAG access via front connector.
- LVDS I/O electrical characteristics:
  - LVDS driver output voltage: 247mV min., 454mV max.
  - Common mode output voltage: 1.37 V max.
  - LVDS Input Threshold Voltage: -50mV min., 50mV max.

### Physical Dimensions

- Size: 11.5 mm high x 31.0 mm deep x 74.0 mm wide (0.453 inches x 1.220 inches x 2.913 inches)
- Stacking height: 8.0 mm (0.315 inches).
- **PMI Compliance**
  - AXM-D01
  - AXM-D02: 3,559,276 hours
  - AXM-D03: 3,921,522 hours
  - AXM-DX03: TBD
  - AXM-D04: 6,534,197 hours

### Ordering Information

**AXM Plug-In I/O Modules**
- AXM-D01
  - 64 bi-directional LVTTL I/O channels
- AXM-D02
  - 30 RS-485 Differential I/O channels
- AXM-D02-JTAG
  - Same as AXM-D02 plus JTAG support.
- AXM-D03
  - 16 CMOS and 22 RS485 differential I/O channels
- AXM-DX03
  - 16 CMOS and 24 RS485 differential I/O channels
- AXM-D04
  - 30 LVDS I/O channels
- AXM-D04-JTAG
  - Same as AXM-D04 plus JTAG support.

**PMC Modules**
- For more information, see individual data sheets PMC-LX, PMC-SX, PMC-VLX, PMC-VSX, PMC-VFX

**Software**
- (see software documentation for details)

**Accessories**
- (see accessories documentation for details)