**Description**

Acromag’s XMC-7K modules feature a high-performance user-configurable Xilinx® Kintex®-7 FPGA enhanced with high-speed memory and a high-throughput serial bus interface. The result is a powerful and flexible I/O processor module that is capable of executing custom instruction sets and algorithms.

The logic-optimized FPGA is well-suited for a broad range of applications. Typical uses include hardware simulation, communications, in-circuit diagnostics, military servers, signal intelligence, and image processing.

Both front and rear I/O is supported. Front I/O processing is supported with plug-in AXM mezzanine cards. A variety of AXM I/O cards are available to add the flexibility of a wide range of analog and digital I/O to your design.

The rear I/O provides an 8-lane high-speed serial interface on the P16 XMC port for customer-installed soft cores. P16 also supports 34 SelectIO channels. The P4 port adds another 60 SelectIO and global clock lines. SelectIO signals are Kintex-7 FPGA I/O pins that support single-ended I/O (LVCMOS, HSTL, SSTL) and differential I/O standards (LVDS, HT, LVPECL, BLVDS, HSTL, SSTL).

Two versions of the Kintex-7 are available, offering a choice of an FPGA device with 325k or 410k logic cells.

With Acromag’s Kintex-7 FPGA modules, you can greatly increase DSP algorithm performance for faster throughput using multiple channels and parallel hardware architectures. Free up CPU cycles by offloading algorithmic-intensive tasks to the FPGA co-processor.

These modules are ideal for high-performance customized embedded systems. Optimize your system performance by integrating high-speed programmable logic with the flexibility of software running on MicroBlaze™ soft processors.

Acromag’s Engineering Design Kit provides software utilities and example VHDL code to simplify your program development and get you running quickly. A JTAG interface enables on-board debugging. Additional Xilinx tools help finish your system faster. Maximize FPGA performance with Vivado® or ISE® Design Suite. And with ChipScope™ Pro tools, you can rapidly debug logic and serial interfaces.

**Key Features & Benefits**

- Reconfigurable Xilinx Kintex-7 FPGA with 325k or 410k logic cells
- 128M x 64-bit DDR3 SDRAM
- 32M x 16-bit parallel flash memory for MicroBlaze FPGA program code storage
- 8-lane high-speed serial interface on rear P15 connector for PCIe Gen 1/2 (standard), Serial RapidIO, 10Gb Ethernet, Xilinx Aurora
- 8-lane high-speed interfaces on rear P16 connector for customer-installed soft cores
- 60 SelectIO or 30 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P4 port
- 34 SelectIO or 17 LVDS pairs plus 2 global clock pairs direct to FPGA via P16 port
- DMA support provides data transfer between system memory and the on-board memory
- Support for Xilinx ChipScope™ Pro interface
XMC Modules

XMC-7K AX  User-Configurable Kintex-7 FPGA Modules w Plug-In I/O

Performance Specifications

- **FPGA**
  - FPGA device
  - Xilinx Kintex-7 FPGA.
  - Model XC7K325T FPGA with 326,080 logic cells and 840 DSP48E1 slices or Model XC7K410T with 406,720 logic cells and 1540 DSP48E1 slices.
  - FPGA configuration
  - Download via JTAG or flash memory.

- **Example FPGA program**
  - IP integrator block diagram provided for bus interface, front & rear I/O control, and SDRAM memory interface controller. See EDK kit.

- **I/O Processing**
  - Acromag AXM I/O Modules:
    - AXM modules plug into the XMC module’s front mezzanine for additional I/O lines. Analog and digital I/O AXM modules are sold separately.
    - Rear high-speed I/O
      - 12 high-speed serial lanes.
      - 8 lanes via P15 and 4 lanes via P16.
    - Rear user I/O
      - P16: 17 LVDS pairs (34 LVCMOS), 2 global clock pairs.
      - P4: 30 LVDS pairs (60 LVCMOS), 2 global clock pairs.

- **Engineering Design Kit**
  - Provides user with basic information required to develop a custom FPGA program. Kit must be ordered with the first purchase of a XMC-7K module (see www.acromag.com for more information).

- **XMC Compliance**
  - Complies with ANSI/VITA 42.0 specification for XMC module mechanicals and connectors.
  - Complies with ANSI/VITA 42.3 specification for XMC modules with PCI Express interface.
  - Electrical/Mechanical Interface: Single-Width Module.

- **Ordering Information**
  - NOTE: XMC-7K-EDK is required to configure FPGA.

- **XMC Modules**
  - XMC-7K325AX-LF
    - User-configurable Kintex-7 FPGA, 325k logic cells with AXM support
  - XMC-7K410AX-LF
    - User-configurable Kintex-7 FPGA, 410k logic cells with AXM support

- **Accessories**
  - AXM-A75
    - 16 analog inputs, 8 analog outputs, and 16 digital I/O
  - AXM-A30
    - 2 analog input 100MHz 16-bit A/D channels.
  - AXM-D02
    - 30 RS485 differential I/O channels.
  - AXM-D03
    - 16 CMOS and 22 RS485 differential I/O channels.
  - AXM-D04
    - 30 LVDS I/O channels.
  - AXM-??
    - Custom I/O configurations available, call factory.

- **Software**
  - XMC-7KA-EDK
    - Engineering Design Kit (one kit required)
  - PCISW-API-VXW
    - VxWorks® 32-bit software support package
  - PCISW-API-WIN
    - Windows® DLL software support package
  - PCISW-LINUX
    - Linux™ support (website download only)

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XMC-7K325AX-LF shown with optional AXM-A75
Description

Acromag’s XMC-7K modules feature a high-performance user-configurable Xilinx® Kintex®-7 FPGA enhanced with high-speed memory and a high-throughput serial bus interface. The result is a powerful and flexible I/O processor module that is capable of executing custom instruction sets and algorithms.

The logic-optimized FPGA is well-suited for a broad range of applications. Typical uses include hardware simulation, communications, in-circuit diagnostics, military servers, signal intelligence, and image processing.

The rear I/O provides an 8-lane high-speed serial interface on the P16 XMC port for customer-installed soft cores. P16 also supports 34 SelectIO channels. The P4 port adds another 60 SelectIO and global clock lines. SelectIO signals are Kintex-7 FPGA I/O pins that support single-ended I/O (LVCMOS, HSTL, SSTL) and differential I/O standards (LVDS, HT, LVPECL, BLVDS, HSTL, SSTL)

Two versions of the Kintex-7 are available, offering a choice of an FPGA device with 325k or 410k logic cells.

With Acromag’s Kintex-7 FPGA modules, you can greatly increase DSP algorithm performance for faster throughput using multiple channels and parallel hardware architectures. Free up CPU cycles by offloading algorithmic-intensive tasks to the FPGA co-processor.

These modules are ideal for high-performance customized embedded systems. Optimize your system performance by integrating high-speed programmable logic with the flexibility of software running on MicroBlaze™ soft processors.

Acromag’s Engineering Design Kit provides software utilities and example VHDL code to simplify your program development and get you running quickly. A JTAG interface enables on-board debugging. Additional Xilinx tools help finish your system faster. Maximize FPGA performance with Vivado® or ISE® Design Suite. And with ChipScope™ Pro tools, you can rapidly debug logic and serial interfaces.

Key Features & Benefits

- Reconfigurable Xilinx Kintex-7 FPGA with 325k or 410k logic cells
- 128M x 64-bit DDR3 SDRAM
- 32M x 16-bit parallel flash memory for MicroBlaze FPGA program code storage
- 8-lane high-speed serial interface on rear P15 connector for PCIe Gen 1/2 (standard), Serial RapidIO, 10Gb Ethernet, Xilinx Aurora
- 8-lane high-speed interfaces on rear P16 connector for customer-installed soft cores
- 60 SelectIO or 30 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P4 port
- 34 SelectIO or 17 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P16 port
- DMA support provides data transfer between system memory and the on-board memory
- Support for Xilinx ChipScope™ Pro interface
- Extended temperature conduction-cooled
**XMC Modules**

**XMC-7K CC**  User-Configurable Conduction-Cooled Kintex-7 FPGA Modules

### Performance Specifications

- **FPGA**
  - FPGA device: Xilinx Kintex-7 FPGA.
  - Model XC7K325T FPGA with 326,080 logic cells and 840 DSP48E1 slices or Model XC7K410T with 406,720 logic cells and 1540 DSP48E1 slices.
  - FPGA configuration: Download via JTAG or flash memory.
  - Example FPGA program: IP integrator block diagram provided for bus interface, front & rear I/O control, and SDRAM memory interface controller. See EDK kit.

- **I/O Processing**
  - Rear high-speed I/O
    - 16 high-speed serial lanes.
    - 8 lanes via P15 and 8 lanes via P16.
  - Rear user I/O
    - P15: 17 LVDS pairs (34 LVCMOS), 2 global clock pairs.
    - P4: 30 LVDS pairs (60 LVCMOS), 2 global clock pairs.

- **Engineering Design Kit**
  - Provides user with basic information required to develop a custom FPGA program. Kit must be ordered with the first purchase of a XMC-7K module (see www.acromag.com for more information).

- **XMC Compliance**
  - Complies with ANSI/VITA 42.0 specification for XMC module mechanicals and connectors.
  - Complies with ANSI/VITA 42.3 specification for XMC modules with PCI Express interface.
  - Electrical/Mechanical Interface: Single-Width Module.

- **Electrical**
  - XMC PCIe bus interface (P15 and P16)
    - One 114-pin male connector (Samtec ASP-103614-05 or equivalent).
    - P15 primary XMC connector
      - 8 differential pairs (PCIe standard, Serial RapidIO, 10-Gigabit Ethernet, or Xilinx Aurora). JTAG.
      - System Management (XMC provides hardware definition information read by an external controller using IPMI commands and I2C serial bus transactions.)
    - 3.3V power: 4 pins at 1A/pin.
    - 3.3V auxiliary power: 1 pin, powers volatile memory to store the bitstream encryption key. Variable power (5V or 12V): 8 pins at 1A per pin.
    - P16 XMC connector
      - 4 differential pairs (PCIe, Serial RapidIO, or Xilinx Aurora).
      - 17 LVDS pairs or 34 SelectI/O signals (differential pairs grouped per VITA 46.0 X38s).
      - 2 global clock pairs.
    - Vcco pins are powered by 2.5V and support the 2.5V I/O standards.
    - P4 PMC rear I/O connector
      - 64-pin female receptacle header (AMP 120527-1 or equivalent).
      - 64 I/O connections (30 LVDS pairs plus two global clocks).
    - Vcco pins powered by 2.5V and support the 2.5V I/O standards.

- **Environmental**
  - Operating temperature
    - XMC-7K325AX-LF: Conduction-cooled, -40 to 70°C.
    - XMC-7K410AX-LF: Conduction-cooled, -40 to 70°C.
  - Storage temperature
    - -55 to 125°C.
  - Relative humidity
    - 5 to 95% non-condensing.
  - Power
    - 3.3V (±5%): 7.8W typical.
    - 12V (±5%): 2.7W typical.
    - 3.3V AUX (±5%): 57µW
  - MTBF
    - Contact the factory.

### Ordering Information

**NOTE:** XMC-7K-EDK is required to configure FPGA.

- **XMC Modules**
  - XMC-7K325CC-LF
    - User-configurable Kintex-7 FPGA, 325k logic cells, conduction-cooled
  - XMC-7K410CC-LF
    - User-configurable Kintex-7 FPGA, 410k logic cells, conduction-cooled

- **Software**
  - XMC-7KA-EDK
    - Engineering Design Kit (one kit required)
  - PMCSW-API-VXW
    - VxWorks® 32-bit software support package
  - PCISW-API-WIN
    - Windows® DLL software support package
  - PCISW-LINUX
    - Linux™ support (website download only)

**XMC-7K325CC-LF shown with heatsink**
XMC-7K F  User-Configurable Kintex-7 FPGA Modules with Dual SFP+ Ports

**Description**

Acromag's XMC-7K modules feature a high-performance user-configurable Xilinx® Kintex®-7 FPGA enhanced with high-speed memory and a high-throughput serial interface. The result is a powerful and flexible I/O processor module that is capable of executing custom instruction sets and algorithms.

The logic-optimized FPGA is well-suited for a broad range of applications. Typical uses include hardware simulation, communications, in-circuit diagnostics, military servers, signal intelligence, and image processing.

Two versions of this module are available, offering a choice of an FPGA device with 325k or 410k logic cells.

Front I/O adds dual SFP+ ports and a VHDCR connector. The two SFP+ ports each provide a copper or fibre interface of up to 10.3125Gbps. They also support a Gigabit Ethernet interface. The VHDCR connector interfaces JTAG, USB, and 22 SelectIO.

The rear I/O provides an 4-lane high-speed serial interface on the P16 XMC port for customer-installed soft cores. P16 also supports 34 SelectIO channels. The P4 port adds another 60 SelectIO and global clock lines. SelectIO signals are Kintex-7 FPGA I/O pins that support single-ended I/O (LVCMOS, HSTL, SSTL) and differential I/O standards (LVDS, HT, LVPECL, BLVDS, HSTL, SSTL).

With Acromag's XMC-7 FPGA modules, you can greatly increase DSP algorithm performance for faster throughput using multiple channels and parallel hardware architectures. Free up CPU cycles by offloading algorithmic-intensive tasks to the FPGA co-processor.

These modules are ideal for high-performance customized embedded systems. Optimize your system performance by integrating high-speed programmable logic with the flexibility of software running on MicroBlaze™ soft processors.

Acromag's Engineering Design Kit provides software utilities and example VHDL code to simplify your program development and get you running quickly. A JTAG interface enables on-board debugging. Additional Xilinx tools help finish your system faster. With ChipScope™ Pro tools, you can rapidly debug logic and serial interfaces.

**Key Features & Benefits**

- Reconfigurable Xilinx Kintex-7 FPGA with 325k or 410k logic cells
- 128M x 64-bit DDR3 SDRAM
- 32M x 16-bit parallel flash memory for MicroBlaze FPGA program code storage
- 8-lane high-speed serial interface on rear P15 connector for PCIe Gen 1/2 (standard), Serial RapidI/O, 10Gb Ethernet, Xilinx Aurora
- 4-lane high-speed interfaces on rear P16 connector for customer-installed soft cores
- Dual SFP+ ports for Fibre Channel or 10GbE
- 60 SelectIO or 30 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P4 port
- 34 SelectIO or 17 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P16 port
- 22 SelectIO, 2 global clock pairs, JTAG, USB, and ground signals via front 36-pin connector
- DMA support provides data transfer between system memory and the on-board memory
- Support for Xilinx ChipScope™ Pro interface

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**XMC module with PCIe and SFP+/Aurora interface  Logic-optimized Kintex-7 FPGA  10-Gigabit Ethernet**

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**With Acromag's XMC-7K FPGA modules, you can greatly increase DSP algorithm performance for faster throughput using multiple channels and parallel hardware architectures. Free up CPU cycles by offloading algorithmic-intensive tasks to the FPGA co-processor.**

These modules are ideal for high-performance customized embedded systems. Optimize your system performance by integrating high-speed programmable logic with the flexibility of software running on MicroBlaze™ soft processors.

Acromag's Engineering Design Kit provides software utilities and example VHDL code to simplify your program development and get you running quickly. A JTAG interface enables on-board debugging. Additional Xilinx tools help finish your system faster. With ChipScope™ Pro tools, you can rapidly debug logic and serial interfaces.

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**Key Features & Benefits**

- Reconfigurable Xilinx Kintex-7 FPGA with 325k or 410k logic cells
- 128M x 64-bit DDR3 SDRAM
- 32M x 16-bit parallel flash memory for MicroBlaze FPGA program code storage
- 8-lane high-speed serial interface on rear P15 connector for PCIe Gen 1/2 (standard), Serial RapidI/O, 10Gb Ethernet, Xilinx Aurora
- 4-lane high-speed interfaces on rear P16 connector for customer-installed soft cores
- Dual SFP+ ports for Fibre Channel or 10GbE
- 60 SelectIO or 30 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P4 port
- 34 SelectIO or 17 LVDS pairs plus 2 global clock pairs direct to FPGA via rear P16 port
- 22 SelectIO, 2 global clock pairs, JTAG, USB, and ground signals via front 36-pin connector
- DMA support provides data transfer between system memory and the on-board memory
- Support for Xilinx ChipScope™ Pro interface
XMC Modules

XMC-7K F User-Configurable Kintex-7 FPGA Modules w Dual SFP+ Ports

Performance Specifications

- **FPGA**
  - FPGA device
  - Xilinx Kintex-7 FPGA.
  - Model XC7K325T FPGA with 326,080 logic cells and 840 DSP48E1 slices or Model XC7K410T with 406,720 logic cells and 1540 DSP48E1 slices.
  - Download via JTAG or flash memory.
  - Example FPGA program
    - IP integrator block diagram provided for bus interface, front & rear I/O control, and SDRAM memory interface controller. See EDK kit.

- **I/O Processing**
  - Front high-speed I/O
    - Two x1 lanes via SFP+ connectors for Gigabit Ethernet and Fibre Channel interface.
  - Front user I/O
    - 36-pin connector provides JTAG connection, USB signals, 2 global differential clock pairs, 11 LVDS signal pairs, and 2 ground signals.
  - Rear high-speed I/O
    - 12 high-speed serial lanes.
    - 8 lanes via P15 and 4 lanes via P16.
  - Rear user I/O
    - P16: 17 LVDS pairs (34 LVCMOS), 2 global clock pairs.
    - P4: 30 LVDS pairs (60 LVCMOS), 2 global clock pairs.

- **Engineering Design Kit**
  - Provides user with basic information required to develop a custom FPGA program. Kit must be ordered with the first purchase of a XMC-7K module (see www.acromag.com for more information).

- **XMC Compliance**
  - Complies with ANSI/VITA 42.2 specification for XMC module mechanicals and connectors.
  - Complies with ANSI/VITA 42.3 specification for XMC modules with PCI Express interface.
  - Electrical/Mechanical Interface: Single-Width Module.

- **Electrical**
  - XMC PCIe bus interface (P15 and P16)
    - One 114-pin male connector (Samtec ASP-103614-05 or equivalent).
    - P15 primary XMC connector
      - 8 differential pairs (PCIe standard, Serial RapidIO, 10-Gigabit Ethernet, or Xilinx Aurora), JTAG.
      - System Management (XMC provides hardware definition information read by an external controller using IPMI commands and I2C serial bus transactions.)
      - 3.3V power: 4 pins at 1A/pin.
      - 3.3V auxiliary power: 1 pin for system management.
      - Variable power (5V or 12V): 8 pins at 1A per pin.
    - P16 XMC connector
      - 4 differential pairs (PCIe, Serial RapidIO, or Xilinx Aurora).
      - 17 LVDS pairs or 34 SelectI/O signals (differential pairs grouped per VITA 46.0 X38s).
      - 2 global clock pairs.
      - Vcco pins are powered by 2.5V and support the 2.5V I/O standards.
    - P4 PMC rear I/O connector
      - 64-pin female receptacle header (AMP 120527-1 or equivalent).
      - 64 I/O connections (30 LVDS pairs plus two global clocks).
      - Vcco pins powered by 2.5V and support the 2.5V I/O standards.
    - VHDCR connector
      - 36-position connector (Samtec VHDCR-36-01-M-RA) mates with industry-standard VHDCI cable assemblies.
    - SFP+ host connector
      - SFP transceiver signals route directly to Kintex-7 FPGA.
      - 10.3125Gb/s maximum data rate.
      - SFP+ copper (Gigabit Ethernet) or fibre optic modules available from Acromag.

- **Environmental**
  - Operating temperature
    - XMC-7K325F-LF: -40 to 50°C.
    - XMC-7K410F-LF: -40 to 40°C.
  - Storage temperature
    - -55 to 125°C.
  - Relative humidity
    - 5 to 95% non-condensing.
  - Power
    - 3.3V (±5%): 7.8W typical.
    - 12V (±5%): 2.7W typical.
    - 3.3V AUX (±5%): 57µW typical.
  - MTBF
    - Contact the factory.

Ordering Information

NOTE: XMC-7K-EDK is required to configure FPGA.

- **XMC Modules**
  - XMC-7K325F-LF
    - User-configurable Kintex-7 FPGA, 325k logic cells plus SFP front I/O
  - XMC-7K410F-LF
    - User-configurable Kintex-7 FPGA, 410k logic cells plus SFP front I/O

- **Accessories**
  - 5025-921
    - Cable, VHDCI 36-pin to SCSI-2, 6 feet long.
  - 5028-449
    - Cable, copper twin-ax, SFP to SFP, 1 meter long.
  - 5028-455
    - Transceiver, 10/100/1000BASE-T copper SFP, up to 1.25Gb/s bi-directional data links.
  - 5028-452
    - Transceiver, short-wavelength SFP, up to 2.125Gb/s bi-directional data links.

- **Software**
  - XMC-7KA-EDK
    - Engineering Design Kit (one kit required)
  - PMCSW-API-VXW
    - VxWorks® 32-bit software support package
  - PCISW-API-WIN
    - Windows® DLL software support package
  - PCISW-LINUX
    - Linux™ support (website download only)

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XMC-7K325F-LF shown with heatsink