



Innovative Integration

a **molex** company

Product Guide | Volume 25



DSP
Data Acquisition
Embedded Control

Welcome to Innovative Integration, a Molex Company,

Since 1988, Innovative Integration has grown to become one of the world's leading suppliers of DSP and data acquisition solutions. Innovative offers a product portfolio unrivaled in its depth and its range of performance and I/O capabilities.

Whether you are seeking a simple DSP development platform or a complex, multiprocessor, multichannel data acquisition system, Innovative Integration has the solution. To enhance your productivity, our hardware products are supported by comprehensive software libraries and device drivers providing optimal performance and maximum portability.

Innovative Integration's products employ the latest digital signal processor technology thereby providing you the competitive edge so critical in today's global markets. Using our powerful data acquisition and DSP products allows you to incorporate leading-edge technology into your system without the risk normally associated with advanced product development. Your efforts are channeled into the area you know best ... your application.

Here are a few, typical applications utilizing products within this catalog.

Application	Product
Medical Imaging	FMC-1000, FMC-250, FMC-310, FMC-500, X6-1000, X6-400M, XU-RT
Ophthalmological Scanning	XA-GSPS, XA-160
Wireless	FMC-1000, FMC-10GE, FMC-250, FMC-500, X3-10M, X3-A4D4, X3-DIO, X3-SD, X3-SD16, X3-SD, X3-TIMING, X6-1000M, X6-250M, X6-400M, X6-GSPS, X6-RX, XA-TX, XU-RT, XU-TX
Military Hardware	ALL X6, XU, XA and L4-ruggedized FMC modules
Quantum Computing	X6-1000, XU-RT
Industrial Control	Cardsharp+FMC-Servo, X3-Servo
Telecom/Intelligence	ALL DIGITAL TRANSCEIVER/RECEIVER INSTRUMENTS
Test & Measurement	PXIe-Adapter with all XMC cards, COPIous-PXIe with all FMC cards
High Speed Arbitrary Waveform Generation	XA-TX, X6-1000, XA-TX
Wireless MIMO transmitter	XU-TX, XA-TX, XA-RT, X6-1000
5G Radio Waveforms	XU-TX, XU-RT, XU-RX
Electronic surveillance and communications	ePC-K7, Mini-K7, FMC-250
LIDAR	XU-RT, X6-400M, XA-160, X6-1000M
RADAR	XU-RT, XU-TX, XU-RX, XA-160M, X6-RX, X6-GSPS, X6-400M, X6-1000M, FMC-500, FMC-250, FMC-1000
Optical Servo	XA-160, X6-1000M
Beamforming	X6-GSPS, X6-250

... real time solutions!



XMC Modules

Kintex UltraScale & Virtex Advantage



The integration and ease-of-use of XMC standard modules make them an ideal choice for introducing cutting-edge I/O without the increased investment and risk required to include such new technology in larger, fully custom products. Their small size and rugged form-factor make them ideal for a variety of applications.

Compatible with: Embedded computers such as ePC-Duo, ePC-nano, and VPXI-ePC. Adapters for PC desktop (PCIe), PXIe, cabled PCIe (CPEX) and VPX.

Kintex UltraScale Modules

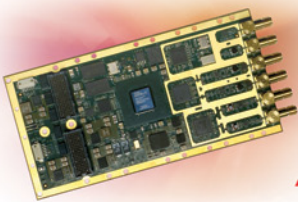
XU Series	4 GB component memory system Eight x 16 2400 MHz DDR4 SDRAM sync bandwidth of 20 GB/s!
XU-TX	5 GSPS • 2-channel 16-bit transmitter
XU-RX	4 GSPS • 2-channel 12-bit receiver
XU-RT	2.5 GSPS • 2-channel 14-bit transceiver

Virtex-6 Modules

X6-1000M	Two 1 GSPS 12-bit A/Ds Two 1 GSPS 16-bit DACs • 4 GB Memory
X6-250M	Eight 250 MSPS 14-bit A/Ds • 4 GB Memory
X6-GSPS	Two 1.8 GSPS 12-bit A/Ds • 4 GB Memory
X6-400M	Two 400/500 MSPS A/Ds Two 500 MSPS DACs • 4 GB Memory
X6-RX	Four 160 MSPS 16-bit A/Ds

Timing Modules

Atropos	Clock generation & distribution
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Artix-7 FPGA



XMC XA modules provide excellent value. The Artix-7 FPGA and dense channel count provides an economical choice for lab research, low-cost SDR, control applications, and acoustic monitoring.

Compatible with: Embedded computers such as ePC-Duo, ePC-nano, and VPXI-ePC. Adapters for PC desktop (PCIe), PXIe, cabled PCIe (CPEX) and VPX.

Artix-7 Modules

XA-160M	Two 160 MSPS 16-bit A/Ds Two 615 MSPS 16-bit DACs
XA-RX	Eight 125 MSPS 16-bit A/Ds
XA-TX	Eight 300 MSPS, 16-bit DACs
XA-SD	Sixteen 24-bit ADCs with PGA @ ≥ 192 kHz
XA-DS	Sixteen 24-bit DACs @ ≥ 192 kHz
XA-DIO	32 differential DIO + clock + trigger
XA-SDF	Four 32-bit ADC+DAC



FMC Modules



FMC modules were created to provide a standard mezzanine card form factor, connectors, and modular interface to an FPGA located on a base board (carrier card). Decoupling the I/O interfaces from the FPGA in this manner simplifies I/O interface module design while maximizing module reuse.

Compatible with: SoC computers: Cardsharp, COPIOUS-PXIe, COPIOUS-PCIe. Embedded PCs: ePC-K7, Mini-K7. FPGA Carriers: PEX6-COP, PEX7-COP.

Module	A/D	D/A	COMM
FMC-1000	2x1000MSPS 14-bit	2x1250MSPS 16-bit	
FMC-500	2x500MSPS 14-bit	2x615MHz 16-bit	
FMC-310	4x310MSPS 16-bit		
FMC-250	2x250MSPS 16-bit	2x615MHz 16-bit	
FMC-Servo	8x500KSPS 16-bit	8x500KSPS 16-bit	
FMC-SFP+			4xSFP+ Ports
FMC-QSFP			2xQSFP Ports
FMC-SDF	4x625KSPS 24-bit	4x625KSPS 18-bit	
FMC-10GE			2x10Gbe (ePC-K7 only)



System on a Chip



A System-on-a-Chip combines multiple ARM processors and user-programmable FPGA fabric coupled to an FMC I/O module to address low-latency, real-time control and portable instrumentation applications.

Compatible with: All HPC and LPC FMC Modules.

System on a Chip	
Cardsharp	Combines a Zynq Z7045 SoC with FMC IO module in a compact, stand alone design
LVDT-Servo	4 channel LVDT Signal Conditioner and Embedded Controller
COPIOUS-PXIe	Zynq-based coprocessor + FMC carrier



Data Loggers



Ultra-performance data recording and playback systems which exploit a multitude of analog/digital I/O interfaces available via XMC modules. Turnkey functionality -- no custom device drivers or software required.

Compatible with: All Innovative XMC modules.

Data Logger	
Andalé	Turnkey, Wideband Recording and Playback 1-32 Channels, DC-5GHz • Optional down/up conversion • Rugged portable, ATX Mid Tower, or Rackmount configurations



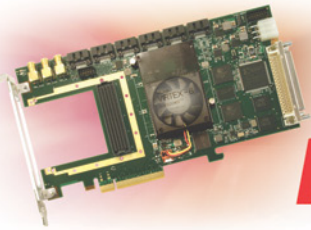
PXIe Cards



PXI Express is an ideal platform for complex RADAR/LIDAR, wireless communications, or automated test systems. Each chassis combines an multi-core Intel CPU running Windows/Linux with a backplane providing four or eight-lane high-bandwidth PCI Express connections to each payload slot, capable of sustained 3400-7000 MB/s data flow. Consequently, PXIe systems can run the identical application software, drivers and operating-systems as desktop or industrial PCs.

Compatible with: All XMC and FMC module types.

PXIe Cards	
PXIe-XMC Adapter	Adapts any XMC module to PXIe for ultra-performance, low-latency DSP
COPious-PXIe	Plug-in Zynq Z7045 SoC coprocessor/ FMC Carrier for PXI Express chassis



PCIe Plug-in Cards



Products for use within desktop and industrial PCs. Combine any FMC module with the PEX7-COP or any XMC module with the PCIe-XMC adapter to add low-latency, deterministic and autonomous processing to any platform running Linux or Windows. Labview/Matlab drivers available.

Compatible with: All XMC and FMC module types.

PCIe Cards	
PEX7-COP	PCIe plug in-half card with 325/410T2 FPGA, HPC FMC site. Allows use of all FMC modules
PCIe-XMC x8 Adapter	Adapts XMC Module to desktop x8 PCIe slot with up to Gen3 Speed



Embedded PC

Windows & Linux Embedded Computer Solutions

ePC-nano

User customized, turnkey, embedded instruments that include an ultra-small form-factor, full-featured Windows/Linux PC and supports a wide assortment of XMC or FMC modules. A variety of solutions for Embedded Instrumentation, Remote, Autonomous IO, Mobile Instrumentation, and Distributed Data Acquisition.

Compatible with: All XMC and FMC module types.

Embedded PCs		Module
ePC-nano	XMC IO Site and 1 GbE Link	XMC
ePC-nano Interposer	Adds 2x 10GE ports to ePC-nano system	
Mini-K7	Kintex-7 FPGA • FMC I/O Site Integrated Timing Support	FMC
ePC-Duo	Dual XMC IO Sites Integrated Timing Support	XMC
ePC-K7	Kintex7 FPGA • Dual FMC IO Sites Integrated Timing Support	FMC
VPXI-ePC	Air Cooled 4U 1/2 Rack OpenVPX with Four Peripheral/Payload Slots	XMC
PXIe-ePC	Air cooled, 3U, 18 slot chassis for wide channel-count inst. apps	XMC



Transceiver Products

Digital Transceiver

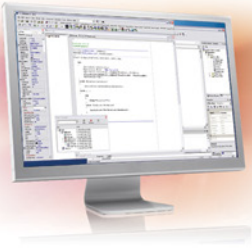
Digital Transceiver Instrumentation Series

The Digital Transceiver products are turnkey solutions providing integrated data logger, digital down conversion (DDC), digital up conversion (DUC), and a spectrum analyzer (FFT) in a compact system.

Compatible with: Innovative XMC or FMC modules.

Digital Transceiver	
V61x Series (Air Cooling)	Dual XMC I/O Module Sites Xilinx Virtex-6 SX475T-2 FPGA
V615 & V616	Intel i7 Quad Core • 16GB RAM • SSD
Digital Receiver	
V61x Series (Air Cooling)	Dual XMC I/O Module Sites Xilinx Virtex-6 SX475T-2 FPGA Intel i7 Quad Core • 16GB RAM • SSD
K70x Series (Conduction Cooling)	Dual FMC I/O Module Sites Xilinx Kintex-7 XC7K410T-2 FPGA Intel i7 Quad Core • 16GB RAM • SSD

... real time solutions!



Software

Malibu

Malibu is a powerful, feature-rich software library designed to meet the challenge of developing software capable of high-speed data flow and real-time signal analysis on an embedded PC or Zynq SoC. Malibu adds high performance data acquisition and data processing capabilities to MSVC, Embarcadero, QtCreator or GNU C++ applications with a complete set of functions that solve data movement, analysis, viewing, logging and fully take advantage of the object-oriented nature of C++.

Software

Malibu	Rapid Application Development Libraries for Data Acquisition and DSP
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FrameWork Logic

FrameWork Logic

The FrameWork Logic tools provide comprehensive support for FPGA signal processing development in MATLAB and RTL for Innovative Integration products. The logic development cycle is shortened by building application logic within the FrameWork Logic hardware layer using pre-written and verified IP cores.

FPGA Firmware Development

FrameWork Logic	Development Tools for High Speed Signal Processing in FPGAs
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Our Architectures at Work

Applications integrating Innovative Integration Boards

- Medical Imaging
- OEM Instruments
- Bio-Medical
- SONAR Hydrophone transient detection
- Wireless
- Military Hardware
- Research & Development
- Industrial Control
- Telecom/Intelligence
- Test & Measurement

In-house Capabilities

- Manufacturing
- Test & Inspection
- PCB & Substrate Layout
- Advanced SMT
- Design
- 3D & Advanced IC Packaging
- Connector MFG
- FPGA & Memory Systems
- High Performance Connectors



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