

XMC to Cabled PCIe Carrier



XMC module site to PCIe-over-cable Adapter card with Onboard DC-DC Power Supplies

FEATURES

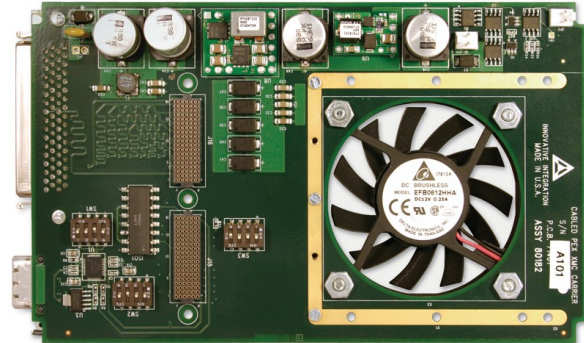
- Extremely Small Footprint: 80 x 160 mm
- Allows placement of XMC module near Unit Under Test to reduce noise pickup and simplify cabling
- Allows XMC module operation outside of noisy PC environment
- Configurable IO uses standard XMC IO modules. Add anything from RF receivers to industrial control modules.
- Rugged Enclosure with integrated cooling
- Tethered or Autonomous Operation
- AC or 12V DC-Only Operation
- PCI Express IO sites deliver sustained 220MB/s to Host CPU memory via cable
- Supports Innovative X3 and X5 IO module features for triggering and timing features

APPLICATIONS

- Distributed Data Acquisition
- Laboratory or factory instrumentation
- Stand-alone, embedded operation of Innovative X5-series flash-bootable XMC modules.

SOFTWARE

- OS-agnostic operation. Operates under Windows, Linux, VxWorks, etc
- Runs all standard XMC module application software
- Compatible with all VITA 42.3-compatible XMC modules. No custom device drivers or software required



DESCRIPTION

Carrier card featuring one VITA 42.3-compliant XMC module site supporting a PCI Express connection to host computer via a standard PCI Express external cable.

Communication at peak rates of 250 MB/s through cables up to ten meters in length to host computers equipped with a cabled PCIe interface are supported. Desktop PCs lacking this interface may use the optional desktop adapter card whereas laptop PCs may use the optional laptop adapter card to add cabled PCI Express bus capability.

Multiple carrier boards may be interfaced to a single PC using the PCIe-over-cable switch allowing virtually unlimited I/O expansion distributed over a local area network. Perfect for test equipment, laboratories and manufacturing hubs. Co-location of the XMC module and the unit under test (UUT) reduces cable lengths and noise susceptibility.

The carrier card may optionally be packaged in a small, rugged aluminum enclosure (1U x 1/4 rack width), providing conductive cooling for the XMC card complementing the carrier's fan to accommodate modules with high-power-dissipation.

Innovative X5-series XMC modules, which boot from flash, may operate using this carrier without any host cable connection whatsoever, creating an autonomous, FPGA-based digital signal processing node capable of real-time (servo) control or analog I/O subsystem.

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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Innovative Integration standard warranty. Production processing does not necessarily include testing of all parameters.

XMC to Cabled PCIe Carrier



This electronics assembly can be damaged by ESD. Innovative Integration recommends that all electronic assemblies and components circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ORDERING INFORMATION

Product	Part Number	Description
XMC to Cabled PCIe carrier board	80184-0	XMC to Cabled PCI Express Carrier
Aluminum enclosure	80185-0	Aluminum enclosure with front and back panels and bezel to accommodate any Innovative X-series XMC module, power switch, external power connector and PCI Express communications connector.
Desktop cabled PCIe Adapter	80181-0	Single-lane PCI Express Cable Adapter. Converts existing PCIe slot in desktop PC to PCIe-over-cable connection.
Laptop cabled PCIe Adapter	80186-0	Single-lane PCI Express Cable Adapter. Converts existing ExpressCard slot in laptop PC to PCIe-over-cable connection.
8:1 cabled PCIe switch	80187-0	Single lane PCI Express switch. Multiplexes single-lane connection from cabled PCIe adapter to up to eight carrier boards (80184-0) to allow for system expansion
PCI Express Cable	67058	Single-lane PCI Express Cable – 3 meters
	67057	Single-lane PCI Express Cable – 5 meters
	67059	Single-lane PCI Express Cable – 1 meter
Power Supply	80191-1	110/220 Vac to 12Vdc Power Supply with USA/Japan/Korea/Taiwan power cord.
Power Supply	80191-2	110/220 Vac to 12Vdc Power Supply with UK/Australia/India power cord.
Power Supply	80191-3	110/220 Vac to 12Vdc Power Supply with EU power cord.
SMB to BNC Cable	67021	50 Ohm SMB to BNC Cable
MDR 68 Cable	65057	MDR 68 Male to MDR 68 Male Cable – 4 feet
Screw Terminal Block and Cable	80116-1	68-pin MDR Cable and Screw Terminal Block

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Available XMC modules

X5-400M	80180-1	XMC module with Xilinx Virtex5 SX95, memory and 2 channels 400 MSPS, 14-bit input and 2 channels 500 MSPS DAC; 1GB/s PCIe interface
X5-210M	80190-0	XMC module with Xilinx Virtex5 SX95, memory and 4 channels 210 MSPS, 14-bit input; 1 GB/s PCIe interface
X3-SD	80168-0	XMC module with Xilinx Spartan3 1M gate FPGA, memory and 16 channels of 24-bit, 216 ksps A/D
X3-SDF	80175-0	XMC module with Xilinx Spartan3 1M gate FPGA, memory and 4 channels of 24-bit, 5MSPS A/D
X3-10M	80192-0	XMC module with Xilinx Spartan3A DSP 1.8M gate FPGA, memory and 8 channels of 16-bit, 10 MSPS A/D
X3-25M	80176-0	XMC module with Xilinx Spartan3A DSP 1.8M gate FPGA, memory and 2 channels of 16-bit, 80 MSPS A/D, and 2 channels of 16-bit 50 MSPS DAC
X3-Servo	80179-0	XMC module with Xilinx Spartan3A DSP 1.8M gate FPGA, memory and 12 channels of 16-bit, 250 ksps A/D, and 12 channels of 16-bit 2 MSPS DAC
X3-A4D4	80177-0	XMC module with Xilinx Spartan3A DSP 1.8M gate FPGA, memory and 4 channels of 16-bit, 4 MSPS A/D, and 4 channels of 16-bit 50 MSPS DAC
X3-DIO	80178-0	XMC module with Xilinx Spartan3A DSP 1.8M gate FPGA, memory and 64 bits of digital IO

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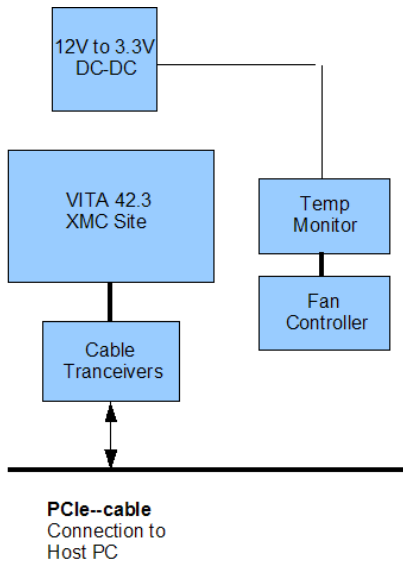


Figure 1. Block Diagram of XMC to cabled PCIe adapter



Figure 2. Optional Aluminum Enclosure, P/N 80185-0



Figure 4. Desktop PCIe to cabled PCI Express adapter, P/N 80181-0



Figure 5. Laptop ExpressCard to cabled PCIe adapter, P/N 80186-0



Figure 3. 1, 5, 10m interconnect for cabled PCI Express, P/N 67057/8/9

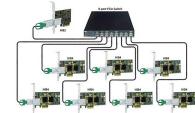


Figure 6. 8:1 switch connects host to up to eight XMC modules/carriers, P/N 80187-0

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ABSOLUTE MAXIMUM RATINGS				
!Exposure to conditions exceeding these ratings may cause damage!				
Parameter	Min	Max	Units	Conditions
Power Supply Voltage	+110	+230	Vac	
Operating Temperature	0	70	C	Non-condensing, forced air cooling required
Storage Temperature	-65	+150	C	
ESD Rating	-	1k	V	Human Body Model
Vibration	-	5	g	9-200 Hz, Class 3.3 per ETSI EN 300 019-1-3 V2.1.2 (2003-04)
Shock	-	40	g peak	Class 3.3 per ETSI EN 300 019-1-3 V2.1.2 (2003-04)
Forced Air Cooling	2**	5	CFM	** All systems should be characterized to determine the cooling requirements

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PRELIMINARY

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Architecture and Features

The carrier architecture integrates all necessary power supplies to support Innovative X-series XMC modules or modules from other third-party suppliers using a single 12Vdc supply. This DC voltage must be supplied to the card via a two-wire user-supplied wire connection.

Mechanical

The carrier includes mounting holes to allow assimilation into custom chassis and OEM systems. The aluminum enclosure accommodates this mounting pattern.

Temperature Monitoring

Provisions for cooling the module passively via conduction and actively using an integrated fan are included. The carrier incorporates temperature monitoring circuitry designed to insure safe, reliable, long-term XMC module operation. An on-board LM56CIM device continuously monitors the temperature of the carrier card. When the carrier temperature exceeds 55C, the fan circuit is enabled in order to maintain the temperature of the daughter module. The aluminum enclosure includes provisions to allow airflow throughout the chassis as a consequence of the onboard carrier fan. If developing a custom enclosure for the carrier, be sure to provide unimpeded air circulation to the fan assembly to avoid module overheating.

PCI Express Host Interface

The PCI Express interface is implemented in the XMC module FPGA using one rocket I/O port for X3 modules and eight rocket IO ports for X5 modules. However, the carrier implements only a single lane for host communications. Consequently, the maximum communications rate for modules mounted to this carrier is 2.5 Gbps, full duplex. Data encoding and protocol limit practical in-system data rates to about 200 MB/s per lane. Since PCI Express is not a shared bus, but rather a point-to-point channel, system architectures can achieve high sustained data rates between devices – resulting in higher system-level performance and lower overall cost.

Systems may employ switch 80187-0 to allow creation of complex systems employing multiple carrier cards and modules and multiple hosts. However, in that event, the bus bandwidth described above is shared amongst all devices

Cabling

The carrier and the optional 80181-0 PCIe-cabled PCIe adapter incorporate equalization circuitry to allow reliable, transmission of data across cables up to 10m in length. Despite validation testing at the factory, each installation may require manual training of the equalization settings needed to insure reliable communications between the PCIe host and the adapter. A four-position DIP switch provides control over the equalization settings.

Software Tools

The carrier and the optional adapter are completely transparent, from a software perspective. Software drivers provided by the XMC module vendor will operate without change. There is no performance deterioration due to operation of the XMC module compared to operation in a native single-lane XMC module site.

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XMC Modules

Plug XMC modules into the eInstruments carrier to build your custom, turnkey embedded instrument. Innovative Integration offers an array of ultra-performance, PCI Express XMC modules to create your solution.

X5-400M - (2) 400 MSPS, 14-bit A/Ds and (2) 500 MSPS, 16-bit DACs, Virtex5 FPGA, 1GB Memory



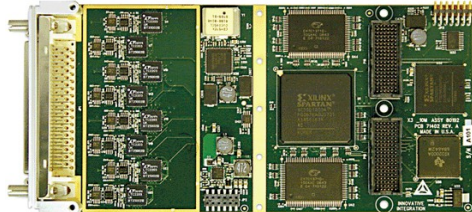
X5 400m
PCI Express XMC Module

X5-210M - (4) 210 MSPS 14-bit A/Ds, Virtex5 FPGA, DDR2/QDR-II Memory



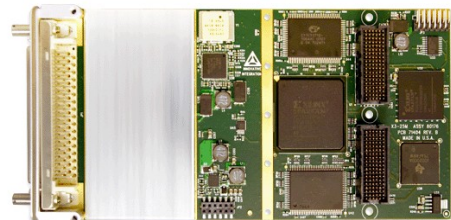
X5 210m

X3-10M - 8 simultaneous channels of 25 MSPS 16-bit A/D and 1.8M FPGA with DSP



X3 10m

X3-25M - Two 25 MSPS A/Ds, Two 50 MSPS DACs and 1M FPGA

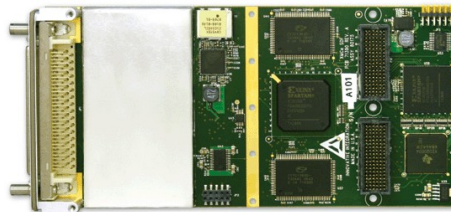


X3-SD - 16-Channels, 24-bit, 216kSPS, Simultaneous Sampling, >110 dB A/Ds, 1M FPGA and 4 MB Memory



X3 SD

X3-SDF - 4-Channels of 24 bit, Fast Sigma-Delta A/D >110 dB, 1M FPGA, 4 MB Memory



X3 SDF

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