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PCIe XMC Adapter

PCI Express XMC to PCI Express Adapter with J16 Connector Breakout

V 3.1

FEATURES

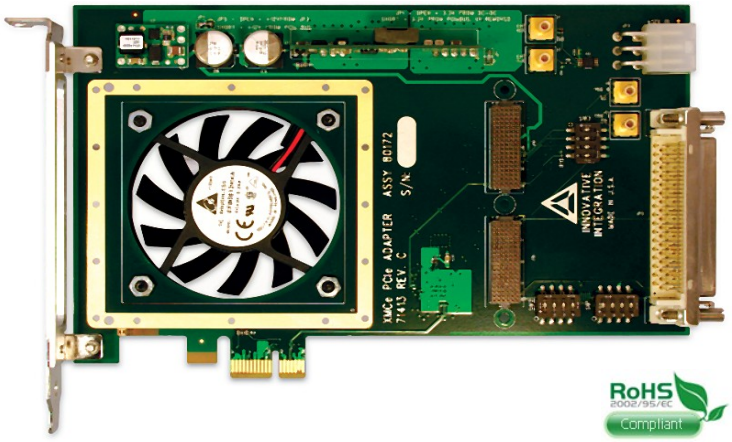
- Adapt one XMC.3 (PCI Express VITA 42.3) module to a PCI Express slot
- PCI Express x1 lane interface
- Active signal equalization and compensation for robust operation in any PC
- Transparent operation
- P16 connector breakout to MDR68
- Triggering and clocking support features for Innovative X3 IO modules
- IEEE 1384 XMC mechanicals
- >50W power provided to the module
- Optional connection to host power supply provides extended power capacity to the module
- 8 CFM fan (consumes 2nd slot)
- Conduction cooling (VITA20) for module
- ½ size PCI Express card

APPLICATIONS

- Add XMC modules to standard PCIe host systems
- Custom interfaces to XMC P16
- Multi-card system synchronization and control

SOFTWARE

- No software required



DESCRIPTION

The PCI Express to XMC adapter allows a single width XMC module to be used in a PCI Express slot. The XMC site is VITA 42.3 compatible and supports a single PCI Express lane.

The adapter is completely transparent to PCI Express. The adapter helps to compensate for poor system signal quality by providing adjustable signal equalization and compensation for the high speed PCI Express signals.

The P16 connector breakout provides convenient access to all P16 signals through an MDR 68 connector. Signals from P16 are routed as differential pairs to JP1 so that high speed IO standards can be used to the cable.

More power to the XMC module may be provide by using the optional power connector to the adapter card. The power connector provides +12V to the adapter and powers an on-card 3.3V module capable of 8A. The power connector is compatible with standard ATX power connectors in PC systems.

XMC module cooling is provided with a fan and also using conduction cooling per VITA standard 20. The bracket mates to standard PMC end brackets and supports an EMI gasket. All connectors from the XMC end bracket are fully accessible.

No software is required to operate the adapter.

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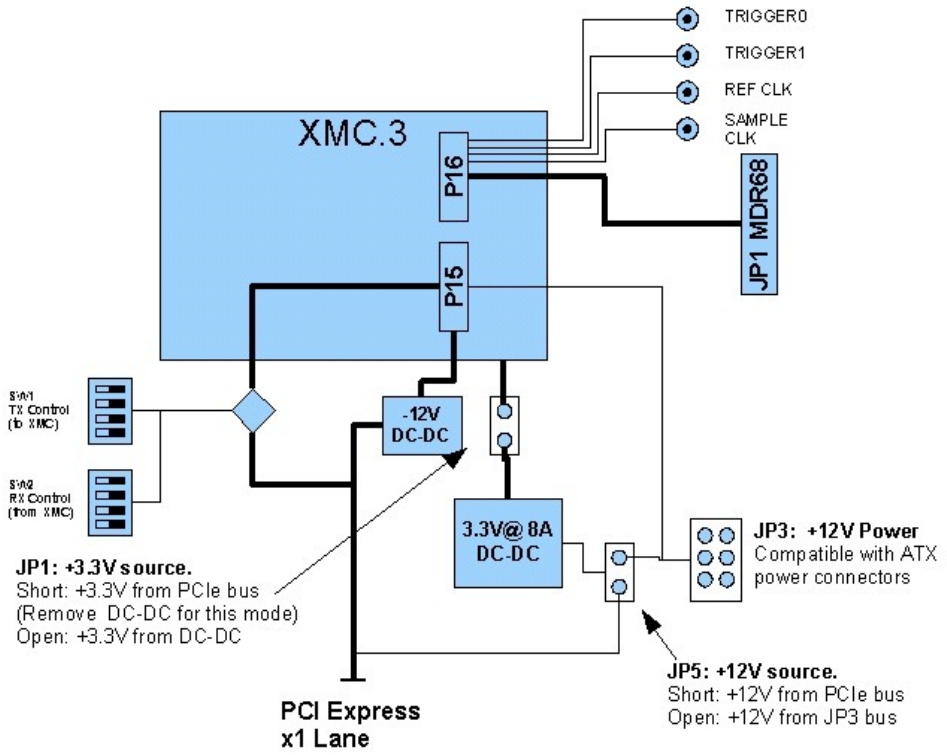
PCIe XMC Adapter

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
PCIe-XMC Adapter	80172-0	PCIe-XMC Adapter
Breakout and Cable	80116-1	Screw terminal assembly and 36 inch (0.91 m) pleated foil flat ribbon MDR68 cable
MDR68 cable	65057	MDR68 male to male cable assembly, pleated foil shielded flat ribbon, 36 inches (0.91 m)



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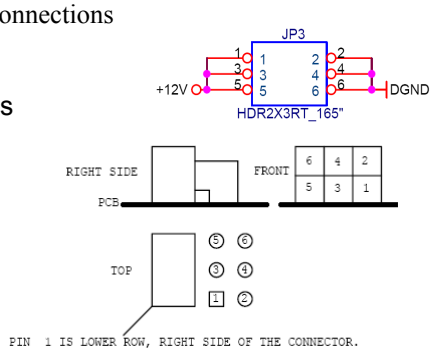
PCIe XMC Adapter

JP3 Auxiliary Power Connector
JP3 provides +12V to the XMC.

Pin	Power
1, 3, 5	+12V
2, 4, 6	Ground

Caution: incorrect connections may cause damage!

Mating connector is AMP 1586019-6 or equivalent.



Physicals	
Form Factor	PCI Express half card
Size	4.20 in x 6.49 in
Slots	Consumes 2 slots when fan is installed; single slot without fan
Weight	100g

XMC Site	
Form Factor	75x150 mm modules (IEEE 1386)
Mounting height	10mm for single slot
Specification	VITA 42

Power Capability Delivered to the XMC	
Volts	Amps
3.3V	Supplied by PCIe bus or DC-DC converter, as selected by JP1.
+12V	Supplied by JP3, a disk drive connector from the host computer
-12V	1A max (supplied by on-card DC-DC)

** XMC cooling may be required

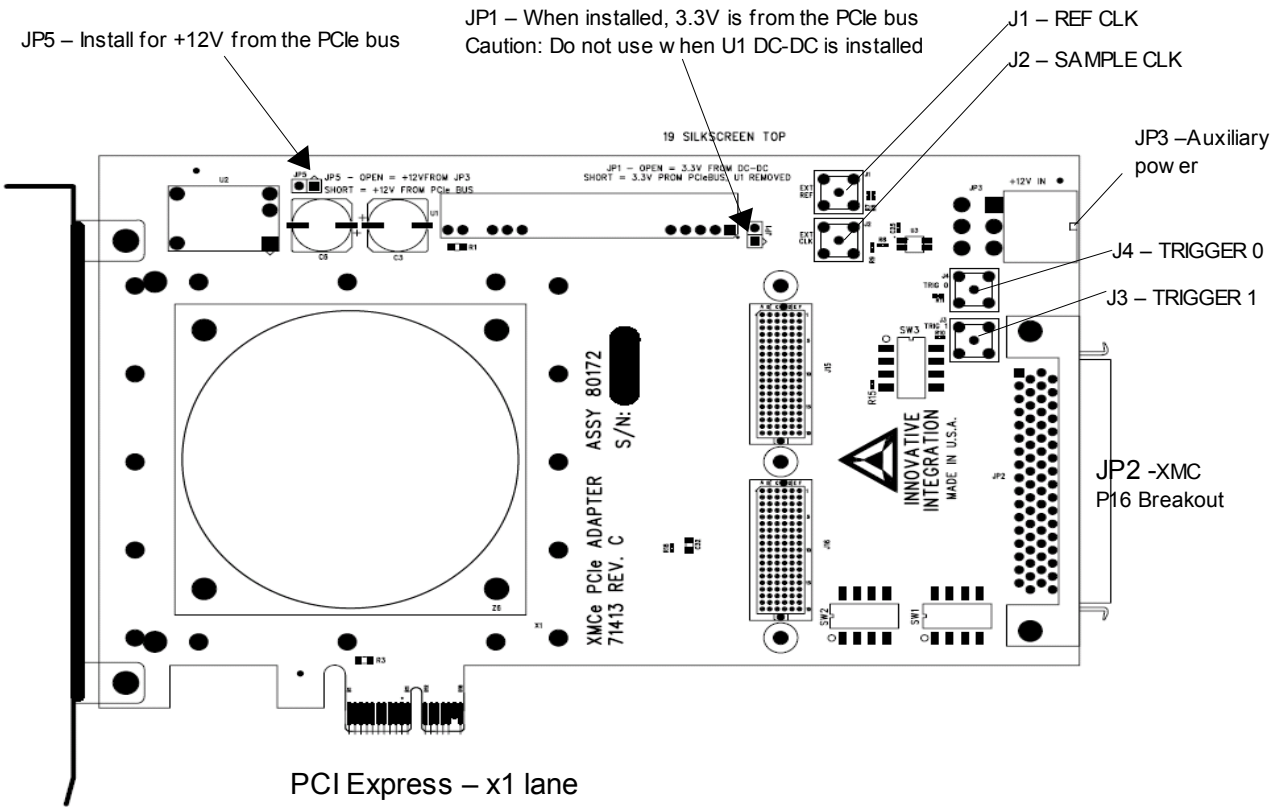
Specifications	
Power Consumption	3.3V @ 0.1A maximum (adapter only)

Trigging and Clocking Features	
Trigger inputs	2, single-ended, >1M, to J16 pins
Clock Inputs	2, single-ended, 50 ohm, converted to LVDS differential pairs connected to J16
Clock levels	0 = <0.7V, 1 = >2.4V -0.3V min, 3.6V
Connector	SMB female, vertical

Cooling	
Fan	~8 CFM
Conduction Cooling	Conduction cooling from module to adapter and chassis
Specifications	VITA 20 Conduction Cooling

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PCIe XMC Adapter



Applications Information

Hosting XMC Modules in PCI Express Systems

The adapter is used to host PCI Express XMC modules in desktop PCI Express slots. A single lane of PCI Express connection is provided.

The adapter card has a single XMC module site conforming to VITA 42.3 Express, with standard IEEE 1386 mechanicals. The module is the same size as older PMC modules. The module has a 10mm mounting height. If the fan is mounted to the adapter, the assembly consumes two slots. If the fan is removed, the adapter with a module mounted on it fits in a single PCI Express slot.

PCI Express Compatibility

The adapter uses a Pericom PI2EQX4401 re-driver between the PCI Express host bus and XMC PCI Express interface. This re-driver chip buffers the PCI express lanes and clock signals. The equalization and signal amplification are programmable using the DIP switches on the card. This allows the card to be tuned to operate in adverse conditions where the PCI Express signals weak or distorted. The re-driver supports 1 active lane and is compatible with *PCI Express Base Specification* Rev 1.0a. The PCI Express lane operates at 2.5 Gbps.

Multiple lane PCI Express modules are also compatible with the adapter.

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PCIe XMC Adapter

The signal equalization and amplification can be set using the two DIP switches. These switches must be set when power to the card is off.

DIP Switch	Controls
SW1	Transmit (PCIe to XMC)
SW2	Receive (XMC to PCIe)

Switch	Settings (ON = 0, OFF = 1)
2:1	Equalization [ON ON] (00) = no equalization [DEFAULT] [ON OFF] (01) = [0:2.5dB] @ 1.25 GHz [OFF ON] (10) = [2.5:4.5dB] @ 1.25 GHz [[OFF OFF] (11) = [4.5:6.5dB] @ 1.25 GHz
3	Output Swing Control ON = 1x [DEFAULT] OFF = 1.2x
4	De-emphasis ON = 0 dB [DEFAULT] OFF = -3.5 dB

In general, the default settings work best in most systems. If adjustment is required, then first adjust the host side parameters first: equalization on SW1 (switches 1 and 2), and deemphasis and output swing control on SW2 (switches 3 and 4).

Power to the XMC Module

The XMC site provides +3.3V, +12V and -12V to the module. The power can be sourced from either the PCIe bus slot or by using an auxiliary power connection to J3. Jumpers are used to select the power source as shown in the following table.

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Jumper	Function	Settings	Notes
JP1	Selects either 3.3 V to the XMC from the PCIe bus or the DC-DC converter.	Short: 3.3V is from the PCIe bus. Open: 3.3V is from the DC-DC converter (default configuration)	** For 3.3V from the PCIe bus, the DC-DC **MUST** be removed. ** DC-DC provides 8A maximum. PCIe bus slot can provide from 2 to 10A depending on slot power capacity.
JP5	Selects the +12V source for the XMC and adapter.	Short: +12V is from the PCIe bus. Open: +12V is from JP3.	Most PCIe bus slots provide 1-2A for 12V. It is not recommended to plug JP3 when JP5 is shorted.

The adapter can source power from either the PCIe slot or from the auxiliary power connector JP3. Since many PCIe slots have low power capacity in desktop PCs, the auxiliary power connector is used if the PCIe slot cannot supply enough power to the XMC module. As delivered the card is configured to use power from the PCIe bus. To change the power source to JP3, remove the jumper JP5.

DO NOT HOT PLUG THE JP3 POWER CONNECTOR! Damage may occur!

J16 Breakout to JP2

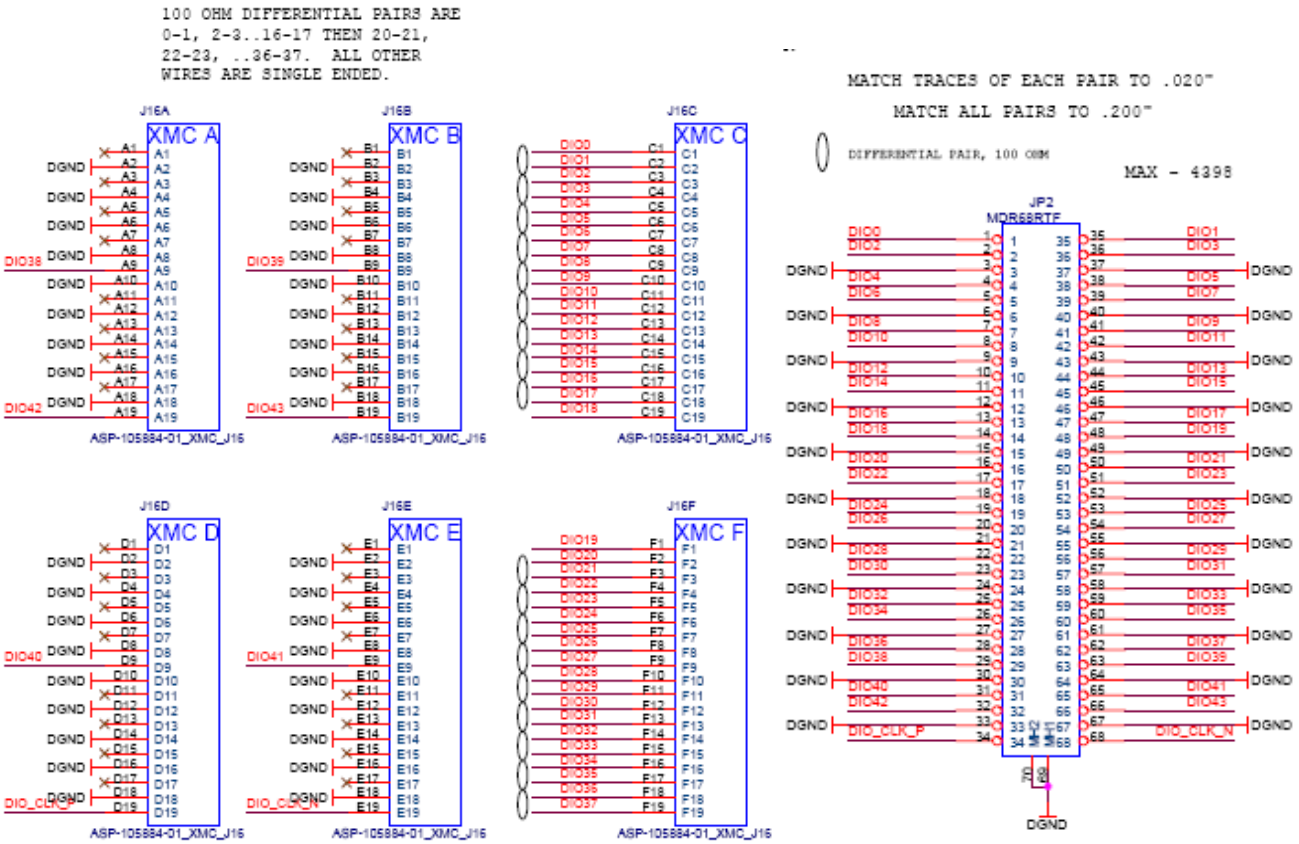
The P16 connector from the XMC module is connected to JP2 according to the schematic shown. There are 46 signals routed to the connector, most of them as signal pairs (100 ohm differential impedance, 50 ohm single ended). The signals pairs are well suited for use as LVDS or LVPECL differential pairs. All signal pairs are matched to within 0.020 inches. Signal pairs are denoted by the circled wires on the following schematic.

Connector is 3M 10268-55H3VC or equivalent. Mating connector is 3M 10168-6010EC or equivalent.

Signal Pair	J16 pins	JP2 pins	Signal	J16 pin	JP2 pin
DIO0/DIO1	C1/C2	1/35	DIO22/DIO23	F4/F5	17/51
DIO2/DIO3	C3/C4	2/36	DIO24/DIO25	F6/F7	19/53
DIO4/DIO5	C5/C6	4/38	DIO26/DIO27	F8/F9	20/54
DIO6/DIO7	C7/C8	5/39	DIO28/DIO29	F10/F11	22/56
DIO8/DIO9	C9/C10	7/41	DIO30/DIO31	F12/F13	23/57
DIO10/DIO11	C11/C12	8/42	DIO32/DIO33	F14/F15	25/59
DIO12/DIO13	C13/C14	10/44	DIO34(Trig 1)/DIO35	F16/F17	26/60

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DIO14/DIO15(Trig 0)	C15/C16	11/45	DIO36/DIO37	F18/F19	28/62
DIO16/DIO17	C17/C18	13/47	DIO38/DIO39	A9/B9	29/53
DIO18	C19	14	DIO40/DIO41	D9/E9	31/65
DIO19	F1	48	DIO42/DIO43	A19/B19	32/66
DIO20/DIO21	F2/F3	16/50	DIG_CLKP/ DIG_CLKN	D19/E19	34/68



Triggering and Clock Inputs for Innovative X3 Family of I/O Modules

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The adapter has special support for Innovative's X3 family of XMC IO modules that provides two trigger and two clock inputs. These signals can be used to for system synchronization and triggering such as simultaneous sampling across many modules.

Connector	Signal	Direction	Termination	P16 Connection	Use
J1	EXT REF	Input	50 ohms	D9(+)/E9(-)	Reference clock input. X3 modules can use this signal as a reference to their PLL for sample rate generation.
J2	EXT CLK	Input	50 ohms	A9(+)/B9(-)	Sample clock input. X3 modules can use this signal, a or 1 to 32 division of it, as a sample clock.
J4	TRIG 0	I/O	>1M ohm	C16	Trigger input 0. X3 modules can use this signal as a trigger input or output.
J3	TRIG 1	I/O	>1M ohm	F16	Trigger input 1. X3 modules can use this signal as a trigger input or output.

Cooling the XMC Module

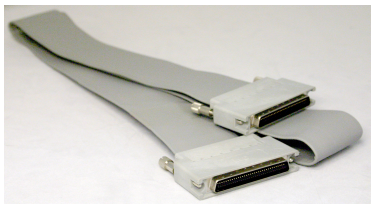
Many XMC modules will require forced air cooling. The adapter has a large opening under the XMC module for air flow.

The module site supports conduction cooling per VITA standard 20. The conduction areas are connected a thermal plane in the adapter that spreads the heat through the card and to the front panel bracket, providing greater cooling capacity to the module. The thermal plane is NOT connected to the electrical ground, but rather chassis ground.

The through holes for cooling bars are for a 2mm screw.

Software Driver:
No software is required.

Cables
The P16 breakout uses a pleated foil ribbon cable assembly mating to the JP2 connector. Innovative offers a cable assembly (P/N 65057) and screw terminal assembly for convenience (P/N 80116-1).



The cable assembly generally offers performance up to >50 MHz when differential signaling such as LVDS is used. Single ended signals are limited to about 10 MHz.

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PCIe XMC Adapter

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