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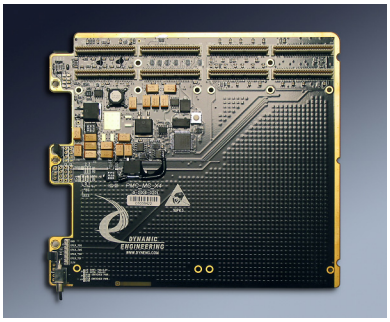
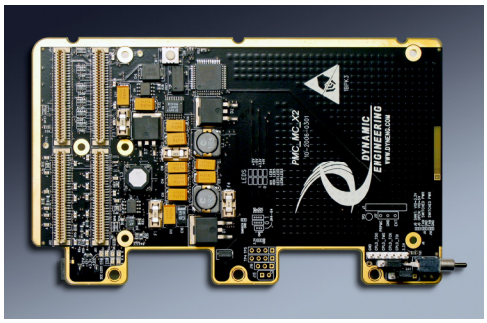
User Manual



PMC-MC-X2/X4

PMC Carriers With 2 or 4 positions



Revision B1
Corresponding Hardware:
10-2006-02/3 X2 Rev B,C
10-2006-02/3/4 X4 Rev B,C,D,E
Corresponding Firmware: Revision A

PMC-MC-X2
PMC-MC-X4
PMC Mini Carrier 2/4 Slots

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Product Description

For high density packaging the PMC-MC-X2 provides two PMC's sites, and the PMC-MC-X4 provides locations for 4 modules. The PMC-MC-X2 has one PMC card slot mounted front, and one on the rear to create a compact arrangement with 2 PMC slots. The PMC-MC-X4 has two PMC slots on the front, and two on the rear.

A complete solution based on the Mini Carriers can be provided with the PMC MC X2 or PMC MC X4 chassis. The Dynamic Data Sheet for the chassis is located at http://www.dyneng.com/pmc_mc_x2x4_chassis.html

Customer chassis solutions can be supported; the engineering kit contains dimensioned drawings of the X2 or X4.

The PCB and terminations are designed to support 32 and 64 bit operation. The trace lengths are designed to work with the layout concept, and matched to work with 33 or 66 MHz PCI rates. The clock rate is programmable with an on-board shunt.

An external 12V power supply [wall mount transformer or other] provides the reference voltage for the internal switching power supplies. +5, +3.3, and minus 12 are created with high efficiency industrial temp rated switching power supplies. The +12 comes from the external supply. The power rails are filtered, and fused to provide quiet protected power to the PMC slots.

An option to use 14-34V "28V" power is provided on the X4 model. The 28V option allows the use of higher voltage batteries or aircraft power. With this option the 12V PMC power is provided by the on-board power supply. With the higher input voltage more wattage is available to use with the internal supplies.

For example, with the 28V 5A supply more than twice the wattage is available compared to the 12V option [140W vs 60W]. If your application is close to 60W it is highly recommended to use the higher wattage capability of the 28V supply. With in-rush requirements, and potential for system updates it is best not to be at the edge of your power supply.

A 28V 5A wall mount transformer is available for boards with the 28V option.

Arbitration is accomplished with a CPLD mounted to the card. The CPLD also provides a selectable 66/33 MHz reference clock to be routed to each of the slots.

The PCI VIO is programmable allowing 5V or 3.3V PMCs to be used. The voltage select pins are not installed on the PMC-MC-X2/X4. Many PMCs are "universal" and can work with 3.3 or 5V IO backplanes. A shunt is provided for the user to select 5V or 3V operation.

The PMC-MC-X2/X4 follows the PMC specifications for maximum power consumption and heat dissipation. The power is routed from the power supplies to PMC connectors with mini-planes each of which is rated for more than the maximum PMC draw. 3.3, 5, VIO, +12, -12.

The total power dissipation is limited to the external power supply capabilities. Each rail can draw to the maximum to cover situations where the power utilization is not balanced. 8A max current on 5V, 8A max current on 3.3V, 4A max current on -12. 4A +12V. The mini-planes can handle more power than the supplies are set to. The 5 and 3.3 rails can be increased to 10A if required. Please contact Dynamic Engineering for this option.

The power to the PMC slots is fuse protected. Power is connected to the board through a standard 2.5 MM barrel connector. Each rail is over-voltage protected with a transorb.

The 28V option on the X4 allows for larger wattage inputs and higher dissipation at the PMCs. For maximum benefit the input power should be 20-28V.

LEDs are provided on the 12V, 5V, 3.3V and –12V plus one for each PMC slot illuminated when a PMC is "present" in that slot. The LED's are located after the fuses to show the PMC power is available.

An option on the X4 is the interconnection of the Pn4 "user IO" connectors. Matched length differential pairs can be selected using a resistor matrix located under slots 2 and 3. The signals are in groups of 4 allowing many combinations of connections for buses between the slots. All can be connected together or 2 of 3.

The PMC MC X2 and X4 are designed to allow two fans to be mounted within the cutouts on the side of the board. Power is available and power control from a user selected slot. Pin 55 on Pn4 can be used or the always on shunt installed. Please select the slot requested or the always on option with the table at the end of the manual.

Proper cooling will be required with larger power loads to handle the power dissipated by the PMC's and the power supplies. The X2 and X4 chassis have build in fans to blow air across the PMC's and X2 or X4 carrier.

A JTAG connector is tied to each of the PMC slots to allow hardware programming while PMCs are installed if the PMCs use the JTAG pins. An additional control pin can be connected to support boards with multiple devices sharing the JTAG connections. Pin 64 on each of the PMC's can be connected to a header on the carrier. Slot 0 is always connected. Slots 1,2,3 are optional. Please select with the table at the end of the manual.

Product Details

The X2 and X4 are designed for a PrPMC to be installed into slot 0. Slot 0 is the primary slot with the interrupts routed there for processing. Slot 0 is further supported with the ability to have a local secondary PCI address space decoded plus a local PCI interrupt, reference clock, reset and reset out.

The CPLD combines the PCI requests from all of the slots to generate the local Grant with a round robin style arbiter. The CPLD is reprogrammable with the JTAG connector to allow for customer "improvements".

The CPLD accepts RESET-OUT from slot 0, a power on reset signal [SW1], and a push-button reset input to create the PCI RST signal.

A 66 MHz reference clock is provided to the CPLD along with the M66EN signal. The CPLD divides the 66 MHz to create 33 when M66EN is set to '0' by shunt J8 [installed for 33, open for 66] or an installed PMC device. E1 is a testpoint tied to the clock buffer and is located on the edge of the card for scope reference when PMC's are installed. J17 selects the source for the clock buffer. When pins 1,2 have the shunt, the normal [factory default] operation of internally generated clock is provided. When 2,3 have the shunt the source is the clock from slot 0. The clock is buffered and re-driven to the other slots. The clock lines are equal length and matched to the overall PCI bus length.

J7 CPLD JTAG

1. 3.3V
2. TDI
3. TCK
4. TMS
5. TDO
6. GND

TP4 Slot 0 JTAG TP5 Slot 1 JTAG TP6 Slot 2 JTAG TP7 Slot 3 JTAG
1 – TCK
2 – TDO
3 – TDI
4 – TMS

J15 is supplied with pin 1 = 3.3V and 2 – GND to reference the JTAG programmer in use. The JTAG connections are routed to the JTAG pins on the individual PMC slots.

VIO is selected with J6. VIO is 3.3 with the shunt installed and 5V with it open.

SW2 is the power switch. With the 12V adapter plugged in [J5] and "turned on" the switch can be used to supply power to the board. All voltages are controlled with the single switch. Up is on and down is off. J5 is a 2.5mm female barrel style connector with a 16V, 5A rating. The center is +12 and the outer is ground to be compatible with

standard power supplies. 60W are available for the power supplies to generate 5V, 3.3V, and minus 12V. Each supply has a socketed fuse for protection. The 5V and 3.3V have 8A rated fuses. The ±12V has 4A rated fuses. It is up to the user to manage the total power consumption to be below the maximum of 60W.

Users with the –28 option will have potentially larger wattages to work with. The 5A rating is a constant. The higher voltage will translate into more input wattage to divide amongst the supplied power rails.

IDSEL, INTA, B, C, D, REQ/GNT 0..3 are routed with the convention of Slot 0,1,2,3 for the order of precedence.

SLOT 0	0B	1	2	3
INTA		INTB	INTC	INTD
INTB		INTC	INTD	INTA
INTC		INTD	INTA	INTB
INTD		INTA	INTB	INTC
REQ0	REQ0B	REQ1	REQ2	REQ3
GNT0	GNT0B	GNT1	GNT2	GNT3
	A20	A21	A22	A23

On the X4 (only) an alternate set of IDSEL definitions exists to move to AD16-19. INTA on Slot 0 is connected to INTB on slot 1 and INTC on slot 2 and INT D on slot 3 etc. Slot 0B is the secondary PCI accessible port on Slot 0 as defined in the PrPMC specification. Slots 2,3 are only present on the X4 model.

Pn4 pin 55 on each slot is tied via a resistor to a transistor pair used to control 5V to external fans (if used). Slot 0 is the default slot to be connected to the power switch. When the control signal is high the fan is on. If your PMC's do not have the ability to control this signal, an optional resistor can be installed to turn the fan on at all times. 1.5A at 5V is the switch rating. J9 and J10 are the headers used to connect to the fan(s). Pin 1 = GND, and 2 = 5V when enabled.

Pn4 pin 64 on each slot is tied to a header to allow for inter-board communication or for external events to be connected. The header can also be used to control which device is programmed when PMCs have multiple JTAG devices to program. This feature is primarily to support the PMC XM. Please use the table at the end of the manual to make your selections [if any].

X4	X2
Slot 0 – TP8-1	Slot 0 – J16 - 1
Slot 1 – TP8-2	Slot 1 – J16 - 3
Slot 2 – TP8-3	GND - J16 - 2
Slot 3 – TP8-4	

The X4 supports the interconnection of the Pn4 “user IO” connectors. The option is accomplished by routing with matched length differential pairs from each of the Pn4 connectors for slots 1-3 to a common location where resistor jumpers can be installed.

The resistors are located in close proximity to make a no stub connection for connectors not selected. The signals are routed as differential pairs using the Dynamic Engineering standard for PMC differential pairs. The pairs are matched, paired, spaced, and referenced to allow high-speed connections. Single ended signals can be used without issue. The resistors are 4 to a pack meaning that each connector has 16 options to install or not. The table at the end of this manual can be used to select the connections between the slots that you want.

Interfacing

Some general interfacing guidelines are presented below. Do not hesitate to contact the factory if you need more assistance.

ESD

Proper ESD handling procedures must be followed when handling the PMC-MC-X2/X4. The card is shipped in an anti-static, shielded bag. The card should remain in the bag until ready for use. When installing the card the installer must be properly grounded and the hardware should be on an anti-static work-station.

Watch the system grounds. All electrically connected equipment should have a fail-safe common ground that is large enough to handle all current loads without affecting noise immunity. Power supplies and power consuming loads should all have their own ground wires back to a common point.

Within the PMC-MC-X2/X4 the power switch, and single source [12V/28V] power accomplish common timing and ground. External connections to the PMC's may damage the PMC's if the installed hardware is not rated for hot insertion. Please consult the PMC manufacturers documentation for the specifics on your system.

Construction and Reliability

PMC Modules were conceived and engineered for rugged industrial environments. The PMC-MC-X2/X4 is constructed out of 0.090 inch thick high temp FR4 material.

Surface-mount components are used. The PMC connectors are rated at 1 Amp per pin, 100 insertion cycles minimum. These connectors make consistent, correct insertion easy and reliable.

The PMC is secured against the carrier with four screws attached to the 2 stand-offs and 2 locations on the front panel. The four screws provide significant protection against shock, vibration, and incomplete insertion. Please note that special standoffs are required to mount the PMC's due to the common hole from front to rear side. The supplied mounting hardware includes the required attachment devices.

Thermal Considerations

The PMC-MC-X2/X4 design consists of CMOS circuits. The power dissipation due to internal circuitry is very low. It is possible to create higher power dissipation requirements with the installed PMC's.

With the PMC-MC-X2/X4 typically mounted within a small enclosure and using a potentially high powered PrPMC the use of fans within the chassis is recommended.

Warranty and Repair

Please refer to the warranty page on our website for the current warranty offered and options.
http://www.dyneng.com/warranty.html

Service Policy

Before returning a product for repair, verify as well as possible that the suspected unit is at fault. Then call the Customer Service Department for a RETURN MATERIAL AUTHORIZATION (RMA) number. Carefully package the unit, in the original shipping carton if this is available, and ship prepaid and insured with the RMA number clearly written on the outside of the package. Include a return address and the telephone number of a technical contact. For out-of-warranty repairs, a purchase order for repair charges must accompany the return. Dynamic Engineering will not be responsible for damages due to improper packaging of returned items. For service on Dynamic Engineering Products not purchased directly from Dynamic Engineering contact your reseller. Products returned to Dynamic Engineering for repair by other than the original customer will be treated as out-of-warranty.

Out of Warranty Repairs

Out of warranty repairs will be billed on a material and labor basis. The current minimum repair charge is $130. Customer approval will be obtained before repairing any item if the repair charges will exceed one half of the quantity one list price for that unit. Return transportation and insurance will be billed as part of the repair and is in addition to the minimum charge.

For Service Contact:

Customer Service Department
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Specifications

Interface:	32/64 -bit PCI bus routed to PMC sites
Clock rates supported:	33/66 MHz
Software Interface:	PrPMC installed into Slot 0.
Initialization:	Hardware reset Software reset via “Reset OUT” signal on Slot 0
Access Modes:	All PCI modes supported by PrPMC installed in Slot 0
Interrupt:	Interrupts routed to each slot with standard rotating assignment.
IDSEL:	AD20-23 or AD16-19[X4 only]
Dimensions:	X2 – slightly larger than two Single PMC Modules stacked. X4 – slightly larger than two PMC’s side by side and stacked Dimensioned drawings available as part of engineering kit.
Construction:	High temp FR4 Multi-Layer Printed Circuit, Surface Mount Components
Power:	12V/28V in. 5V, 3.3V, +12, -12 supplied to PMC slots. Fused power to slots, over voltage protected at input max of 60W aggregate. [see –28 option for larger power budgets]
User	PCI clock speed select, PCI VIO select, Clock source select

Order Information

PMC-MC-X2	http://www.dyneng.com/pmc_mc_x2.html Standard version with two PMC positions.
PMC-MC-X4	http://www.dyneng.com/pmc_mc_x4.html Standard version with four PMC positions.
PMC-MC-X4-28	Standard version with 28V power supply option
PMC-MC-X4-Pn4XX	Part number assigned for customer specific Pn4 bus routing. Please see the following table to define your interconnections.

Please note that options can be mixed, -28 and –Pn4 can both be selected.

PMC-XM-Eng-1	Engineering Kit for the PMC-MC-X2/X4 Board-level schematics (PDF), and Detailed dimensions.

Pn4 Interconnection Selection Table

Please fill out the table by circling the requested connections and fax to Dynamic Engineering 831.457.4793. A part number will be assigned for your configuration to allow PO order control. Applies to X4 only.

Pin Groups	Slot 0	Slot 1	Slot 2	Slot 3
1,3,2,4	-	A	A	A
5,7,6,8	-	B	B	B
9,11,10,12	-	C	C	C
13,15,14,16	-	D	D	D
17,19,18,20	-	E	E	E
21,23,22,24	-	F	F	F
25,27,26,28	-	G	G	G
29,31,30,32	-	H	H	H
33,35,34,36	-	I	I	I
37,39,38,40	-	J	J	J
41,43,42,44	-	K	K	K
45,47,46,48	-	L	L	L
49,51,50,52	-	M	M	M
53,55,54,56	-	N	N	N
57,59.58,60	-	O	O	O
61,63,62,64	-	P	P	P
55	FC	FC	FC	FC
64	PC	PC	PC	PC

Pins 1,3 and 2,4 etc. are routed differentially. The signals are matched length for each connector to form matched length pairs between any of the connectors. At least two of the same group have to be selected to form a connection between the slots for those pin pairs.

Two pins have dual functions: Fan and Programming Control. Usually slot 0 will be selected, or the always on shunt installed for the Fan Control. The Programming control selection ties pin 64 to a JTAG header on an independent pin to support the PMC MC XM. For non XM slots or for cards without this programming option pin 64 can be used as part of the interconnection bus. Please note that Slot 0 is hardwired for this options.