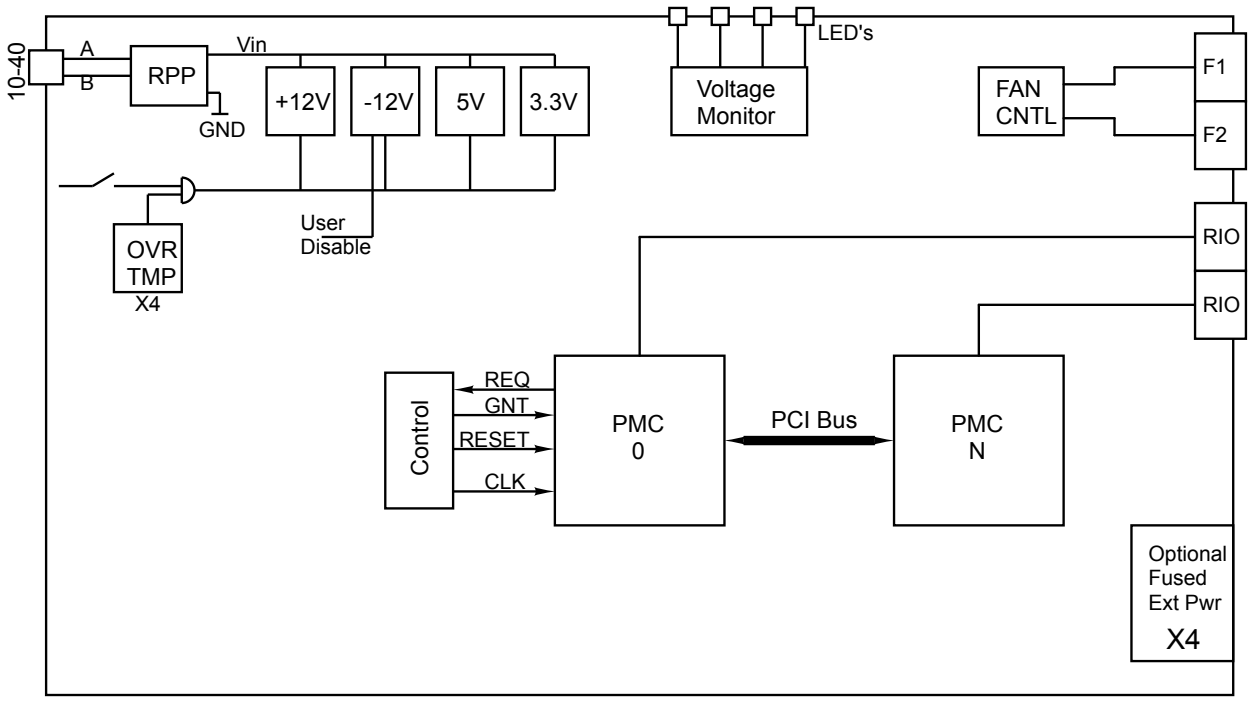
DYNAMIC ENGINEERING

150 DuBois St Suite C, Santa Cruz Ca 95060
831-457-8891 **Fax** 831-457-4793
http://www.dyneng.com
sales@dyneng.com
Est. 1988

User Manual

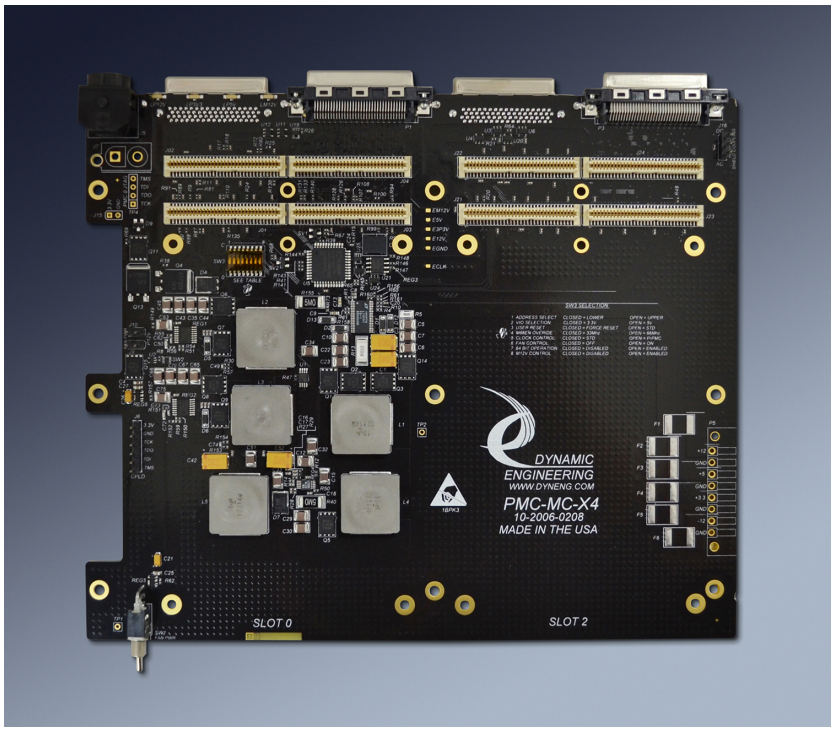
PMC-MC-X2/X4-RIO

PMC Mini Carrier with 2 or 4 positions
Pn4 IO supported

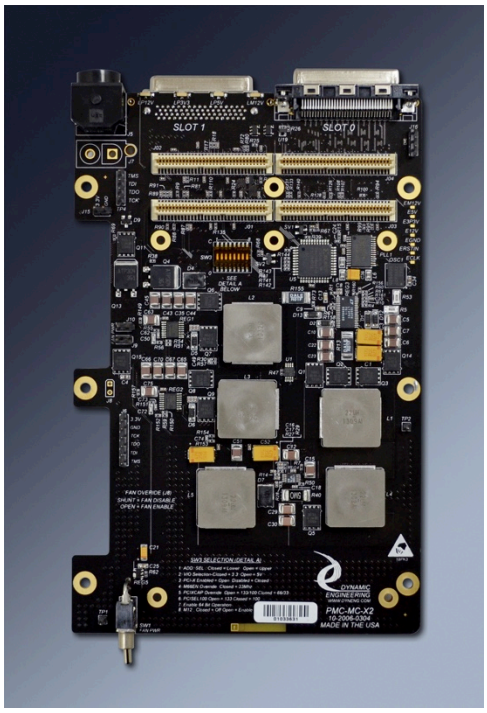


Revision B1 3/26/18
Corresponding Hardware:
10-2006-04 X2 Rev D
10-2018-0402 X4 Rev A,B
Current Firmware: X2: RevD X4: RevB

PMC-MC-X4-RIO



PMC-MC-X2-RIO



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

Dynamic Engineering
150 DuBois St. Suite C
Santa Cruz, CA 95060
831-457-8891
831-457-4793 FAX

Dynamic Engineering has made every effort to ensure that this manual is accurate and complete. Still, the company reserves the right to make improvements or changes in the product described in this document at any time and without notice. Furthermore, Dynamic Engineering assumes no liability arising out of the application or use of the device described herein.

The electronic equipment described herein generates, uses, and can radiate radio frequency energy. Operation of this equipment in a residential area is likely to cause radio interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

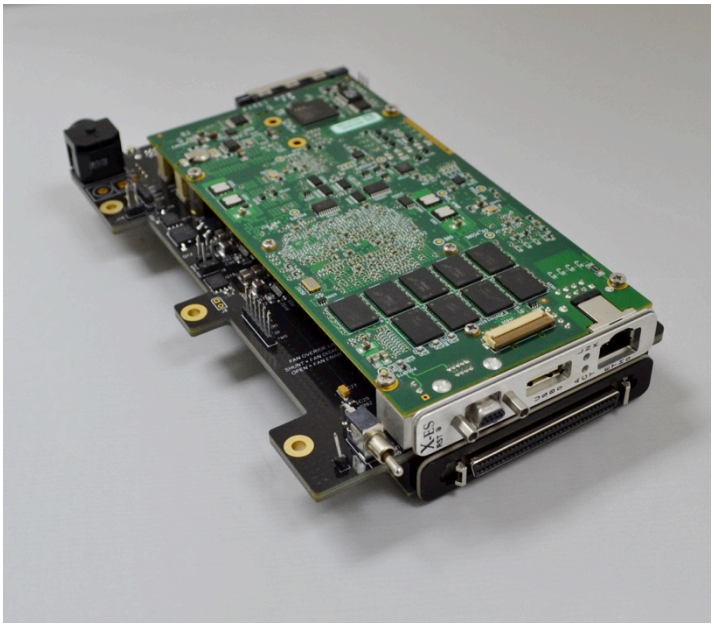
Dynamic Engineering's products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of Dynamic Engineering.

Connection of incompatible hardware is likely to cause serious damage.

Table of Contents

Product Description

High density packaging of your PMC's is accomplished with the "X2" and "X4" carrier designs. PMC-MC-X2 has one PMC card slot mounted top, and one on the bottom to create a compact arrangement with 2 PMC positions. Similarly PMC-MC-X4 has two PMC sites on the top, and two on the bottom.



The previous versions of X2 and X4 are available to clients wishing to continue using those models. The slightly different mechanical footprint, and other feature differences mean that previously integrated systems may wish to continue using the previous model.

The updated –RIO versions of the motherboards are covered in this manual. Please refer to the non-RIO manual for information on the originally released designs.

New features include:
•Updated Power Supply Designs
•Reverse Power Protection
•Temperature Controlled FAN speed
•Rear IO access via VHDCI connectors
•.125" Thick Motherboard for increased stiffness
•LED's visible through rear of chassis with power status

The Power Supplies have a wider range operating from 10⇔40V with hysteresis [down to 8V], more current (15A) for the 5V and 3.3V supplies, and higher efficiency with a single level architecture. All components are industrial temperature rated.

Power safety is important, and one crucial step is to provide reverse power protection. The input voltages are V_{inA} and V_{inB}. A combination of FET's is used to detect which input is ground and which is the reference rail. FET's are used instead of diodes in the design for greater efficiency.

Options for a locking PowerDin4 and vertical Molex connector are retained. PowerDin4 is the standard connector and is used with the chassis. The Molex connector is usually used when X2 or X4 is purchased separately and mounted within another system.

Rear IO is routed from Jn4 to VHDCI connectors with matched length, controlled impedance differential traces. Suitable for differential, and single ended applications.

The chassis is redesigned to provide access to the rear IO, LED status on the rear, larger 40 mm fans.

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

Photo of the PMC-MC-X2 and Render of X4 chassis, respectively.

Step files can be provided for our clients to help in system design. Available for both the chassis and PCB. Both chassis and motherboard designs are available now. Photos on the way for the X4 version.

The PCB and terminations are designed to support 32 and 64 bit operation. The trace lengths are designed to work with the layout concept, matched length and impedance controlled to work at standard PCI rates. The clock rate is programmable with a combination of the on-board DIPSWITCH and the automatic selections of M66EN etc. PMC-MC-X2 can operate at the higher PCI-X frequencies [100, 125]. PMC-MC-X4 is

rated for 33 and 66 MHz operation.

An external power supply [wall mount transformer or other] provides the reference voltage for the internal switching power supplies. +12, +5, +3.3, and minus 12 are created with high efficiency industrial temperature rated switching power supplies. The voltages are derived from an external 10-40V. Please note: this covers the range for "28V" aircraft supplies. 10V is the minimum guaranteed start-up voltage, some hysteresis is designed into the supplies to allow operation below 10V to approximately 8V on the +12V supply. The 5V, 3.3V, and -12V supplies all can operate at lower voltages. The +12V supply is a Buck-Boost design allowing true +12V power from a supply above, at or below the target level. Please note the 40V figure is a hard limit. If your system requires higher than 40V input power rails please contact Dynamic Engineering. De-rate based on reference supply noise/ripple level.

The power rails are filtered to provide quiet power to the PMC slots. 15A @5V, 15A @3.3V, 4A @-12V and 4A @12V are routed to the PMC positions. The reference supply will need sufficient wattage to handle the total load of the converted power taking into account the efficiency of the supplies.

Power entry to the carrier is accomplished with a PowerDin4 connector. The contacts are rated for 7.5A each for a total of 15A at the connector. An optional connector is available [Molex 15311026] with higher current rated pins. The Molex connector is vertical and sometimes more convenient when the X2 / X4 are embedded into a user system. Both connectors feature locking mechanisms.

When operating X2 with a +40V reference, 3.3, 5V, -12V, and +12V at the PMC will be converted from this supply. With 15A available a total of 600W can be received. The rails will have approximately 90% efficiency – higher at higher loads and lower at lower loads. With 15A @3.3, 15A @5V, 2A @-12 and 2A @+12V the load at the reference supply will be 55W + 83.3W + 26.67W + 26.67W = 191.67W => 4.8A. 4.8A is less than the connector maximum of 15A. The calculation is in terms of the power delivered from the on-board supplies. Some power is used by the FAN's, CPLD, terminations, etc. and will need to be taken into account if you use PMC based power calculations.

At 28V the math is similar but less power is available for a given current due to the lower voltage. The estimated reference load at full power would be scaled to 191.67W/28V. In this case resulting in 6.84A and is still within range of the base input connector.

Solving for the minimum reference voltage to allow maximum current results in 191.67W/15A => 12.78V. Below this level full power on the PMC power rails would result in too much current at the DIN4 connector. Most PMC installations will not need this much current. Many do not use the -12V at all. The -12V supply can be disabled to remove the inrush and static current requirements for higher overall efficiency. It is

recommended to disable the -12V with the dipswitch if that rail is not required.

With the X4 the +/- 12V load can be up to 4A and changes the math somewhat. Many PMC's do not use +/-12V, which pushes the numbers in a favorable direction. It is recommended that your estimated loads and reference voltage data is used to check for safe operation. In most cases the robust large capacity supplies will be more than sufficient. ***Higher input voltages reduce the current load at the connector and are recommended***.

An excel spread sheet is available to aide in calculation of the input current required at whatever reference is to be used in your system.

The power supplies use industrial grade or better devices, footprints with low theta's, ceramic and tantalum capacitors. For example the PowerPak SO8 footprints are used for the FET's to achieve a low theta of 1-2 degrees junction to case with the case soldered to the board. Care was taken in layout to make sure the parts in the power train are properly connected for both electrical and thermal requirements.

Arbitration is accomplished with a CPLD mounted to the card. The PMC's Request signal is tied to the CPLD where the arbiter determines the current master and sets the Grant for that PMC. Please see additional information in the switch setting section of this manual.

The CPLD and clock circuitry work together to provide 33/66 on the X4 and the standard PCI and PCI-X frequencies for the X2. The DIPswitch settings can be used on the X2 to select the secondary frequencies – 50 instead of 66 for example.

The CPLD also provides reset for the system. Reset is asserted based on the power supplies coming to valid levels and then being asserted. The 3.3 and 5V rails have voltage detector circuits attached for this purpose. In addition if the PrPMC asserts Reset Out the board level reset is asserted. An EPAD is provided for engineers who want an external reset capability. ERSTIN is the label. A 4.7K ohm pull-up to 3.3V is provided on the board. X4 has a dipswitch (3) to control this signal.

PCI VIO is programmable allowing 5V or 3.3V PMC's to be used. The voltage select pins are optionally installed on the PMC-MC-X2/X4. The default is not installed. The positions are provided to allow for the keys to be installed by the user or special request. Many PMC's are "universal" and can work with 3.3 or 5V IO backplanes. The DIPSwitch is used to select 5V or 3V operation. If your application requires 3.3V only we can supply boards hardwired to 3.3V VIO [remove the user selection option].

PMC-MC-X4 has an option to mount a secondary power connector. The secondary power connector provides fuse protected local power supply power plus grounds to allow other embedded equipment to use power from the X4 for operation. The fuses

are self healing. The locking header is mounted on the edge of the X4 allowing all 4 PMC's to be installed plus the header.

For example, the X4 and another device could be mounted within a chassis to form a complete end-point. The other equipment needs any of 5V, 3.3V, +/-12V to operate it can save a second power supply => smaller chassis and lower cost. One client is mounting a LASER along with a PrPMC and local interface to the LASER within a small enclosure.

For an embedded solution, a wide range of I/O buses are available for communications purposes. The buses can be tied directly to the processor [PrPMC] or via installed PMC's. For example Ethernet and serial ports are common on PrPMC's while SpaceWire, 1553 etc. usually require an installed PMC.

Dynamic Engineering is actively developing applications based on this architecture. To date HDLC, SDLC, and SpaceWire devices have been integrated along with software to allow operation with GUI [chrome etc.] control over port mapping, data steering, inter-chassis forwarding etc. The inter-chassis link can be across the internet allowing truly remote operation or across the manufacturing floor. Look for more information on the Dynamic Engineering Website or call to discuss your application with an engineer.

LED's are provided on the 12V, 5V, 3.3V and –12V. Voltage monitor circuits detect under and over-voltage situations and illuminate the LED when the voltage is within the specified range. The window is set to 5% plus an allowance for parts tolerances. The LED's are located on the rear of the motherboard and show through labeled holes on the chassis.

An option with X2 and X4 is Rear IO. The Jn4/Pn4 "user IO" connectors are routed to VHDCI connectors at the rear of the motherboard. Each PMC position has matched length impedance controlled differentially routed connections. VHDCI can be used directly and has cabling options to convert to SCSI etc. HDEterm68 is compatible with the VHDCI⇔SCSI cable available from various manufacturers. Available from Dynamic Engineering as a convenience. The trace and space are optimized for 100 ohms. Suitable for both differential, and single ended systems. Please see the pinout table at the rear of this document for connection details.

PMC-MC-X2 and PMC-MC-X4 are designed to allow two fans to be mounted within the cutouts on the side of the board. The fans are controlled with a temperature sensor based pulse width modulation control. The fans can be forced off using the dipswitch.

X4 models have a separate power supply to provide power to a thermal switch. If the board level temperature exceeds the setpoint of the switch [SW2] the main power supplies are shut-down until the temperature falls. The switch is set with hysteresis to

prevent toggling when at the limit. The switch can be set to 70, 75, 80, or 85C. The standard value is 75C with 10C hysteresis. The 12V supply is used for the fans is not affected by the thermal shut-down to make sure the fans stay on when the temperature switch shuts down the other supplies.

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 the built in fans to blow air across the PMC's and X2 or X4 carrier. The fans are rated at 5+ CFM each and are larger 12V models [than the previous revision] to increase cooling and reduce noise [audible].

An optional JTAG connector is available. Add –JTAG to your PN for this to be installed. The header is made up of TP4 and J15 for placement purposes. 3.3V, GND, TDI, TDO, TCK, TMS are available. The header is tied to PMC position 0 on the standard JTAG pin definitions.

Product Details

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 positions to generate the local Grant with a round robin style arbiter. The CPLD is reprogrammable with the JTAG connector to allow for customer "improvements".

DIPSwitch Definitions X2:

Switch	Signal
1	Address Select. C = Lower, O = Upper
2	VIO Select C = 3.3, O = 5V
3	PCI-X En O = enabled C = Disabled
4	M66EN Override C = 33 MHz only O = PMC controlled
5	PCIXCAP Override C = 33/66 O = 133/100
6	PCISEL 100 C= 100, O = 133
7	64 Bit Enabled O = Enabled C = Disabled
8	Enable/Disable M12V O = Enable, C = Disable

DIPSwitch Definitions X4:

Switch	Signal
1	Address Select. C = Lower, O = Upper
2	VIO Select C = 3.3, O = 5V
3	C= Force Reset O = standard operation
4	M66EN Override C = 33 MHz only O = PMC controlled
5	Clock Source Select O = STD C = External
6	FAN override. C = FAN's off, O = Automatic Control
7	64 Bit Enabled O = Enabled C = Disabled
8	Enable/Disable M12V O = Enable, C = Disable

C = Closed O = Open settings on DIPSwitch. C and O are shown in silk.

The CPLD accepts RESET-OUT from slot 0, power on reset signals based on the 3.3V and 5V power rails, and an EPAD reset input to create the PCI RST signal. PCI RST is pulled up with 4.7K to VCC_IO. A 1000 pF capacitor can be used to change the shape of the reset signal. Certain PrPMC modules are sensitive to the reset line signal shape. If Reset does not have a fast enough rise time C24 can be removed.

X4: A 133.33 MHz reference clock is provided to the CPLD along with the M66EN signal. The CPLD divides down to 66.66 MHz or 33.33 based on M66EN. M66En is set to '0' by the DIPSwitch or an installed PMC device. ECLK is a test point tied to the clock buffer and is located on the edge of the card for scope reference when PMC's are installed. ECLK is located near Slot 2 on the side rail. The signal at ECLK is not matched length and has a series termination. For reference, this signal will be slightly out of phase with the PMC clocks.

On the X4, the DIPSwitch selects the source for the clock buffer. The CPLD with automatic or DIPSwitch selection can be used or a clock output from Slot 0. The clock is buffered and re-driven to the other slots. The clock lines are equal length. The clock selection also selects the remote or standard mode of operation.

In standard mode the local clock is used and the CPLD performs the arbitration for the PMC's and supplies reset etc.

When remote [external] mode is selected it is expected that an extension cable is in use [PMC Extendio II or similar] along with an external host – the X4 is an expansion chassis in this configuration. The external clock is distributed instead of the local one. The arbitration is modified to use the PMC positions 1,2,3 to arbitrate locally with the request from position 0 used to ask the host for the bus and the grant from the host used to allow the local PMC's access to the bus. In addition the reset and other house keeping functions responsibilities are passed to the remote host.

The remote configuration has been tested with the PCIeBPMCX1 and PCIBPMC connected with Extendio. Multiple PMC's running DMA in parallel were used for the main test. The length of the expansion cable will be determined by the characteristics of the cable. It is recommended to use a bridged interface within the host computer to reduce the apparent length before the cable.

With 12" cables up to two PMC's can be installed and operate as targets – that is without DMA. With the 4/6" cable set up to two PMC's can be installed using DMA.

On the X2 the DIPswitch and PMC signals are used with the CPLD to control a PCI clock PLL. The combination allows the standard PCI and PCI-X frequencies to be generated. **Please note**: *100 MHz is the fastest "supported" frequency.* The CPLD is guaranteed at 125 Mhz. 133 is an "over-drive" option and should only be used at room temperatures. ECLK is available for checking the frequency selected. The signal at ECLK is not matched length and has series termination. This clock will be slightly out of phase with the PMC clocks.

J6[X2,X4] CPLD JTAG

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

TP4 Slot 0 JTAG – JTAG option to install
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 PMC connector. Default is not installed. Part of –JTAG option.

VIO is selected with the DIPSwitch. VIO is 3.3 when the switch is closed and 5V with it open.

SW1 is the power switch. With the adapter plugged in 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. An ordering option is to remove the switch and provide always on operation. For remote installations this may be a good choice.

Please note: X2 only has the 0 and 1 positions.

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
	A16/A20	A17/A21	A18/A22	A19/A23

The Address Select (DIPSwitch) can be used to choose the range 16-19 or 20-23 for the addresses used for IDSEL.

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.

P5 is an optional 10 pin right angle connector installed ["**-OPB**"] to allow the internal Power Supplies to be used for external devices [Off Board Power] – for example: additional equipment mounted in a common enclosure. This option is available on the X4 only. An OnShore connector [OSTOQ0815512] is mounted to the board. OSTTJ0811520 is the mate [cable side] connector. The mate is supplied if you order this option.

Pins 1,3,5,7 are ground
Pin 2 = -12V 3A
Pin 4 = 3.3V 6A
Pin 6 = 5V 6A
Pin 8 = 12V 3A

Additional Notes: the load added at P5 is part of the load supplied by the internal power supplies. The total power delivered must stay within the operating range for each supply and in the aggregate.

The standard PowerDin4 connector is pinned out with 1,4 = VINA and 2,3 VINB => standard PowerDin4 connector definitions. The mounting pins and shield are tied to each other and open on the board. Applies to X2 and X4.

The X2 & X4 designs have an option for a vertical power connector [**-VPI**]. The PowerDin4 connector is not installed and a Molex 15311026 is installed instead. Pin1 is VINA and Pin2 is VINB. This connector has 12A 600V rated contacts. The mate for the connector is Molex 19091029.

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 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. PMC-MC-X2 and PMC-MC-X4 are manufactured with .125 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.

Each 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 power dissipation due to internal circuitry is very low. It is possible to create higher power dissipation requirements with the installed PMC's. A fraction of the power delivered to the PMC is converted to heat. Figure on ~ 1/9th of the power delivered to the PMC's or external devices will become local wattage to remove from the system.

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. The X2 and X4 chassis come with FAN's and make use of the Speed Control built into the X2 and X4 backplanes.

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. 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
Dynamic Engineering
150 DuBois St. Suite C
Santa Cruz, CA 95060
831-457-8891
831-457-4793 fax
support@dyneng.com

Specifications

Interface:	32/64 -bit PCI bus routed to PMC sites
Clock rates supported:	X4: 33/66 MHz X2: 33/66/100/125 MHz
Software Interface:	No SW required for X2/X4 operation. PrPMC and installed PMC's determine SW interface for system.
PMC Positions:	X4: 1-4 X2: 1-2
Initialization:	Hardware reset based on 3.3 and 5V valid plus ~200 mS delay. Software reset via "Reset OUT" signal on Slot 0
Access Modes:	All PCI modes supported by PrPMC installed in Slot 0. Remote mode available on X4 model.
Interrupt:	Interrupts routed to each slot with standard rotating assignment.
IDSEL:	AD20-23 or AD16-19 – DIPSWITCH selection
Dimensions:	X2 – slightly larger than two Single PMC Modules stacked. X4 – slightly larger than two PMC's side-by-side and stacked. Step files are available.
Construction:	High temp FR4 Multi-Layer Printed Circuit, Surface Mount and through hole Components
Power:	10⇔40V in. 5V(15A), 3.3V(15A), +12(4A), -12(4A) supplied to PMC positions. LED's on rails with UV and OV checking.
User	PCI clock speed select, PCI VIO select, Clock source select, Manual Reset, Fan Power Control over-ride, 64 bit enable.

RIO Pinout

Each PMC has an associated VHDCI connector interconnected with the associated Jn4 rear IO Connector.

Jn4(N=0,1,2,3)		VHDCI(P1,P2,P3,P4)	
1	3	1	35
2	4	2	36
5	7	3	37
6	8	4	38
9	11	5	39
10	12	6	40
13	15	7	41
14	16	8	42
17	19	9	43
18	20	10	44
21	23	11	45
22	24	12	46
25	27	13	47
26	28	14	48
29	31	15	49
30	32	16	50
33	35	17	51
34	36	18	52
37	39	19	53
38	40	20	54
41	43	21	55
42	44	22	56
45	47	23	57
46	48	24	58
49	51	25	59
50	52	26	60
53	55	27	61
54	56	28	62
57	59	29	63
58	60	30	64
61	63	31	65
62	64	32	66
		33	67
		34	68

33,34,67,68 are open on VHDCI connector.
Read
J04-1 ⇔ P1-1
J14-62 ⇔ P2-32

Order Information

PMC-MC-X2-RIO	http://www.dyneng.com/pmc_mc_x2.html Standard version with two PMC positions.
PMC-MC-X4-RIO	http://www.dyneng.com/pmc_mc_x4.html Standard version with four PMC positions.
-ROHS	Add ROHS processing. Standard is with leaded solder.
-CC	Add conformal Coating
-VPI	Use Vertical Power connector instead of PowerDin4
-OBP	Add Power Expansion right angle connector. Fused +/- 12, 5 and 3V for in chassis power for additional HW. X4 model only.
-FPR	Move fan headers to rear of X2/X4. Standard is mounted to Slot 0 side, -FPR moves to Slot 1 side.
-NPS	Remove Power Switch for always on operation.

Please note that options can be mixed