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MC-303

Three Slot PC•MIP Carrier for 3U CompactPCI with Front and Rear Panel I/O

User Manual

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Part Number: 89004565 Rev. 6.0
Hardware Revision: A
20050113

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MC-303
Three Slot PC•MIP Carrier for
3U CompactPCI with
Front and Rear Panel I/O

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Product Description

The MC-303 is a 3U CompactPCI PC·MIP® carrier board. It has three PC·MIP slots, providing up to 150 lines of I/O: one front panel only I/O slot supporting Type II PC•MIP modules, one front or rear panel I/O slot supporting Type I or Type II PC•MIP modules, and one rear panel only I/O slot supporting Type I PC•MIP modules.

Using the industry standard Intel 21152 PCI to PCI Bridge, the MC-303 supports a 32-bit data path at 33 MHz, for 132 MB/s operation. All PC•MIP slots support bus mastering.

The MC-303 carrier board complies with the PICMG 2.0, version 2.1 CompactPCI specification and each PC•MIP slot is compatible with the PC•MIP draft specification (ANSI/VITA-29).

Key Features

- 3U CompactPCI carrier board holds up to three PC•MIP modules
- Intel 21152 PCI to PCI Bridge
- 32-bit, 33 MHz, up to 132 MB/s operation
- PC•MIP draft specification (ANSI/VITA-29) compatible
- PCI Specification, Revision 2.1 compliant
- CompactPCI specification, PICMG 2.0, version 2.1 compliant
- One front panel I/O slot supporting Type I or Type II modules
- One front panel I/O slot supporting Type II modules only
- One rear panel I/O slot supporting Type I modules only
- 100 I/O lines via rear panel J2 CompactPCI connector

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PC•MIP Installation and Removal

Overview

The PC•MIP front panel hardware has been designed so that the front panel itself need never be removed from the carrier board. In order to accommodate modules with different I/O requirements, holes in the front panel contain removeable bezels. These bezels are replaced as modules are installed and removed. A small keeper affixed with a single screw to the carrier board holds each bezel in place.

PC•MIP carriers are shipped with a set of blank bezels and keepers sufficient to handle any combination of single- or double-wide modules. Type II modules (those with front panel I/O) are shipped with bezels machined for their specific I/O connector configuration. Type I and Type U modules (those without front panel I/O) are shipped without bezels.

Installation of Type I and Type U Modules

Type I and Type U modules have no front-panel I/O. Installation requires a small screwdriver.
If the slot has front panel access and does not have a blank bezel in place, one should be fitted before installing the module. Slide the blank bezel into place from the outside of the front panel. Push the keeper through the front panel from the outside, and fit the screw into the keeper from the solder side of the carrier. Tighten the screw.
Gently push the module down into its slot. The screws on the back of the module will prevent it from clicking into place. Single-wide modules have two screws. Double-wide modules have four.
Using the small screwdriver, turn the screws clockwise. Doing so will pull the module down into its slot. Tighten the screws. The four screws on double-wide modules must be tightened carefully and in sequence to avoid excessive flexing of the PCB. Tighten the screws one turn at a time, moving to the next screw in a clockwise fashion around the board until all the screws have been tightened.

Installation of Type II Modules

Type II modules have front-panel I/O. They are supplied with a bezel that must be fitted into the front panel after the module is installed. Installation requires a small screwdriver.
Remove any existing bezel from the front panel. Do so by unscrewing the single screw on the solder side of the carrier board that holds the small keeper in place. Push the keeper out through the front panel and slide the bezel out.
Poke the I/O connector on the module through the bezel hole. Then gently push the module down into its slot. The screws on the module will prevent it from clicking into place. Single-wide modules have two screws. Double-wide modules have four. The four screws on double-wide modules must be tightened carefully and in sequence to avoid excessive flexing of the PCB. Tighten the screws one turn at a time, moving to the next screw in a clockwise fashion around the board until all have been tightened.
Using the small screwdriver, turn the screws clockwise. Doing so will pull the module down into the slot. Tighten the screws.
Slide the module bezel into place from the outside of the front panel. Push the keeper through the front panel from the outside, and fit the screw into the keeper from the solder side of the carrier. Tighten the screw.
If provided, fit hardware to attach the module bezel to the module.

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Removal of Type I and Type U Modules

Type I and Type U modules have no front-panel I/O. Removal requires a small screwdriver.
Using the small screwdriver, turn the screws on the back of the module counter-clockwise. Single-wide modules have two screws. Double-wide modules have four. Doing so will push the module up out of its slot. Because the screws are captive, they cannot be loosened too far. The four screws on double-wide modules must be loosened carefully and in sequence to avoid excessive flexing of the PCB. Tighten the screws one turn at a time, moving to the next screw in a clockwise fashion around the board until all the screws have been released.
Using fingers, lift the module out of its slot.

Removal of Type II Modules

Type II modules have front-panel I/O. The module bezel must be removed before removing the module. Removal requires a small screwdriver.
If the module has hardware that attaches it to the front panel bezel, remove that hardware first.
Next, remove the module bezel. To remove the module bezel, unscrew the single screw on the solder side of the carrier board that holds the small keeper in place. Push the keeper out through the front panel and slide the bezel out.
Using the small screwdriver, turn the screws on the back of the module counter-clockwise. Single-wide modules have two screws. Double-wide modules have four. Doing so will push the module up out of its slot. The screws are captive, so they cannot be loosened too far. The four screws on double-wide modules must be loosened carefully and in sequence to avoid excessive flexing of the PCB. Tighten the screws one turn at a time, moving to the next screw in a clockwise fashion around the board until all have been released.
Using fingers, lift the module out of its slot. Pull it out of the front panel hole. Store the module with its bezel.
If the slot is to remain empty or is to accept a Type I or Type U module, fit a blank bezel to the front panel. To do this, slide the blank bezel into place from the outside of the front panel. Push the keeper through the front panel from the outside, and fit the screw into the keeper from the solder side of the carrier. Tighten the screw.

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PC•MIP Slots

Overview

Three PC•MIP slots are provided, as shown in the figure below:

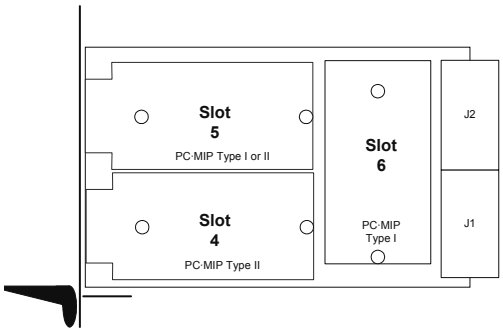


Figure 1 PC•MIP Slot Assignments

Each slot has front and back-panel I/O access as shown in the table below:

	Module		Front panel I/O	Back panel I/O
Slot	Type I	Type II	Location	Location
4		Yes	On module	
5	Yes	Yes	On module	J2
6	Yes			J2

Figure 2 PC•MIP Slot Compatability Summary

Type I modules may be plugged into slots 5 or 6 only. All I/O is via the PCI back panel J2 connector.

Type II modules may be plugged into slots 4 or 5 only. Slot pair 4-5 also supports double-wide Type II modules.

Type U modules may be plugged into any slot since they have no I/O requirements.
Double-wide
Type U modules may be plugged into slot pair 4-5.

PCI Slots

Each PC•MIP slot is a hard-wired PCI slot. Its physical slot number and bus-mastering capabilities are fixed, as shown in the table below:

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Slot Number	Bus Master
4	Yes
5	Yes
6	Yes

Figure 3 PCI Slot Capability Summary

PCI to PCI Bridge

The PCI bridge chip, an Intel 21152, is a transparent 32-bit, 33 MHz device. All PC•MIPs on the carrier are visible to the system CPU.

The wiring of the bridge to the PC•MIP slots controls the mapping of PCI slot numbers to physical slots. PCI slot numbers start at 4.

The bridge implements the interrupt mapping for the PC•MIP slots. This mapping is defined by the PCI specification.

The bridge implements the bus mastership control for the PC•MIP slots. A two-level round-robin arbiter selects one master from among the three slots 4 through 6 and the host PCI bus. The table below shows the salient configuration registers:

Location	Value	Description
Vendor ID	0x1011h	Intel, the manufacturer of the chip
Device ID	0x0024h	21152 PCI to PCI Bridge chip
Revision	0x05h	21152 chip revision

Figure 4 PCI Configuration Registers: 21152 AB Bridge Chip

Please note that revision 21152AB of the PCI bridge chip used on this card is now obsolete. Future versions of the card will use version 21152BB of the PCI bridge chip. The 21152BB is backwards compatible with the 21152AB and has been validated by SBS. It, however, has different vendor, device and revision IDs. If you card is fitted with the 21152BB, please use the following vendor, device, and revision IDs for configuration.

Location	Value	Description
Vendor ID	0x8086h	Intel, the manufacturer of the chip
Device ID	0xB152h	21152 PCI to PCI Bridge chip
Revision	0x00h	21152 chip revision

Figure 4A PCI Configuration Registers: 21152 BB Bridge Chip

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Connectors

Overview

Connectors are fitted as shown in the table below:

Connector	Wired To	Description
J1	PCI Bridge	32-bit CompactPCI bus
J2	PB3, PC3	Back-panel I/O for PC•MIP slots 5 and 6
PA1, PA2	PCI Bridge	PCI bus for slot 4
PB1, PB2	PCI Bridge	PCI bus for slot 5
PC1, PC2	PCI Bridge	PCI bus for slot 6
PB3	J2	Back-panel I/O for PC•MIP slot 5
PC3	J2	Back-panel I/O for PC•MIP slot 6

Figure 5 Connector Summary

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J1

J1 connects the carrier board to the CompactPCI backplane. Figure 6 below lists its pin assignments.

	Row					
Position	A	B	C	D	E	F
25	+5V	REQ64#	ENUM#	+3V	+5V	GND
24	AD01	+5V	VIO	AD00	ACK64#	GND
23	+3V	AD04	AD03	+5V	AD02	GND
22	AD07	GND	+3V	AD06	AD05	GND
21	+3V	AD09	AD08	M66EN	CBE0#	GND
20	AD12	GND	VIO	AD11	AD10	GND
19	+3V	AD15	AD14	GND	AD13	GND
18	SERR#	GND	+3V	PAR	CBE1#	GND
17	+3V	SDONE	SBO#	GND	PERR#	GND
16	DEVSEL#	GND	VIO	STOP#	LOCK#	GND
15	+3V	FRAME#	IRDY#	GND	TRDY#	GND
14	Key	Key	Key	Key	Key	GND
13	Key	Key	Key	Key	Key	GND
12	Key	Key	Key	Key	Key	GND
11	AD18	AD17	AD16	GND	CBE2#	GND
10	AD21	GND	+3V	AD20	AD19	GND
9	CBE3#	IDSEL	AD23	GND	AD22	GND
8	AD26	GND	VIO	AD25	AD24	GND
7	AD30	AD29	AD28	GND	AD27	GND
6	REQ#	GND	+3V	CLK	AD31	GND
5	N/A	N/A	RST#	GND	GNT#	GND
4	N/A	GND	VIO	INTP	INTS	GND
3	INTA#	INTB#	INTC#	+5V	INTD#	GND
2	TCK	+5V	TMS	TDO	TDI	GND
1	+5V	-12V	TRST#	+12V	+5V	GND

Figure 6 Connector J1 CompactPCI Bus Pin Assignment

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J2

J5 connects the flexible I/O from slots 5 and 6 to the back panel. It is wired as shown in Figure 7 below:

		Row					
Slot	**Position**	A	B	C	D	E	F
	22	n/c	n/c	n/c	n/c	n/c	GND
5	21	5-1	5-2	5-3	5-4	5-6	GND
	20	5-7	5-8	5-9	5-11	5-12	GND
	19	5-14	5-15	5-16	5-17	5-19	GND
	18	5-20	5-22	5-23	5-24	5-25	GND
	17	5-27	5-28	5-30	5-31	5-32	GND
	16	5-33	5-35	5-36	5-38	5-39	GND
	15	5-40	5-41	5-43	5-44	5-46	GND
	14	5-47	5-48	5-49	5-51	5-52	GND
	13	5-54	5-55	5-56	5-57	5-59	GND
	12	5-60	5-61	5-62	5-63	5-64	GND
	11	+3.3V	+3.3V	+3.3V	+5V	+5V	GND
6	10	6-1	6-2	6-3	6-4	6-6	GND
	9	6-7	6-8	6-9	6-11	6-12	GND
	8	6-14	6-15	6-16	6-17	6-19	GND
	7	6-20	6-22	6-23	6-24	6-25	GND
	6	6-27	6-28	6-30	6-31	6-32	GND
	5	6-33	6-35	6-36	6-38	6-39	GND
	4	6-40	6-41	6-43	6-44	6-46	GND
	3	6-47	6-48	6-49	6-51	6-52	GND
	2	6-54	6-55	6-56	6-57	6-59	GND
	1	6-60	6-61	6-62	6-63	6-64	GND

Figure 7 Connector J2 PC•MIP Pin Assignment

For each PC•MIP slot, Figure 7 omits fourteen P3 pins: 5, 10, 13, 18, 21, 26, 29, 34, 37, 42, 45, 50, 53, 58. These pins are connected to ground.

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P1, P2

Three sets of P1/P2 connectors are fitted, one per slot. Each connector is wired identically except for bus mastership, interrupt, and PCI configuration pin assignments. See the PCI Configuration information on page 4 for details. Figures 8 and 9 below list the pin assignments for the two connectors.

P1/J1 Pin	Signal	P1/J1 Pin	Signal
1	Reserved-r	2	Reserved-r
3	Reserved-r	4	Reserved-r
5	–12V	6	TRST#
7	TCK	8	+12V
9	Ground	10	TMS
11	TDO	12	TDI
13	+5V	14	+5V
15	+5V	16	INTA#
17	INTB#	18	INTC#
19	INTD#	20	+5V
21	PRSNT1#	22	Reserved-q
23	Reserved-q	24	+3.3V
25	PRSNT#2	26	Reserved-q
27	Ground	28	Ground
29	Reserved-q	30	Reserved-q
31	Ground	32	RST#
33	CLK	34	+3.3V
35	Ground	36	GNT#
37	REQ#	38	Ground
39	+3.3V	40	Reserved-q
41	AD[31]	42	AD[30]
43	AD[29]	44	+3.3V
45	Ground	46	AD[28]
47	AD[27]	48	AD[26]
49	AD[25]	50	Ground
51	+3.3V	52	AD[24]
53	C/BE[3]#	54	IDSEL
55	AD[23]	56	+3.3V
57	Ground	58	AD[22]
59	AD[21]	60	AD[20]
61	AD[19]	62	Ground
63	+3.3V	64	AD[18]

Figure 8 Connector P1 Pin Assignments

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P2/J2 Pin	Signal	P2/J2 Pin	Signal
64	AD[17]	63	AD[16]
62	C/BE[2]#	61	+3.3V
60	Ground	59	FRAME#
58	IRDY#	57	Ground
56	+3.3V	55	TRDY#
54	DEVSEL#	53	Ground
52	Ground	51	STOP#
50	LOCK#	49	+3.3V
48	PERR#	47	SDONE
46	+3.3V	45	SBO#
44	SERR#	43	Ground
42	+3.3V	41	PAR
40	C/BE[1]#	39	AD[15]
38	AD[14]	37	+3.3V
36	Ground	35	AD[13]
34	AD[12]	33	AD[11]
32	AD[10]	31	Ground
30	M66EN	29	AD[09]
28	Ground	27	Ground
26	AD[08]	25	C/BE[0]#
24	AD[07]	23	+3.3V
22	+3.3V	21	AD[06]
20	AD[05]	19	AD[04]
18	AD[03]	17	Ground
16	Ground	15	AD[02]
14	AD[01]	13	AD[00]
12	+3.3V	11	+3.3V
10	ACK64#	9	REQ64#
8	+5V	7	+5V
6	+5V	5	+5V
4	Reserved-r	3	Reserved-r
2	Reserved-r	1	Reserved-r

Figure 9 Connector P2 Pin Assignment

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Fuses

Four fuses are fitted, as shown in Figure 10 below:

Power Rail	Rating	Location
+3.3 V	3A	F4
+5 V	3A	F3
-12 V	3A	F1
+12 V	3A	F2

Figure 10 Fuses Fitted

Note that replacing fuses voids the warranty for this product. Contact the factory to arrange fuse replacement.

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PC•MIP Glossary

Bezel	A hardware component which mounts over the module's I/O connector into the carrier board's front panel. It is included with Type II PC•MIP modules.
Captive Hardware	Refers to mechanical elements permanently attached ("captive") to the PC•MIP module so that they cannot be lost. The term is used to distinguish mechanically operational items that are typically not captive, such as removable screws.
Circuit Card	The basic fiberglass, epoxy and copper structural and circuit connections of mezzanine modules and carrier boards. The term is synonymous with printed circuit board, PCB, and PWA. A common, but not required, material used to fabricate circuit cards is known as "FR4."
CompactPCI®	A specification for the use of the PCI bus on a backplane with 3U and 6U Eurocard boards. Controlled by the PCI Industrial Computers Manufacturing Group.
Connector-side	The surface of the PC•MIP module that is faces the carrier board when installed. This face is opposite the label-side.
East	One of the four compass points used within this Draft Standard to assure a consistent orientation in the figures and text for modules and carrier boards.
Front Panel	This term applies to carrier boards and the host system. It is used primarily with VME and CompactPCI and related systems. For PC•MIP carrier boards in these systems, the carrier provides a metal front panel plate that includes both mounting hardware to hold the host carrier board into the card frame and (possibly) I/O connectors from local (non PC•MIP) circuitry on the carrier board as well as any cutouts to support J4 connectors from Type II PC•MIP modules mounted on the carrier. This term is not applied to desktop form-factor PCs, nor ISA, nor PCI desktop slot boards.
I/O Porch	The rectangular portion of a Type II PC•MIP module that supports that module's I/O connector(s). The nominal porch size on single-size modules is 9 x 33 mm. The nominal porch size on double-size modules is 9 x 74.5 mm. Note that the actual I/O area includes some of the "non-porch" portion of the circuit board and so is deeper than 9 mm.
IndustryPack®	A predecessor module to PC•MIP. The controlling standard is ANSI/VITA 4-1995. Created by SBS Technologies, Inc.
Injector/Ejector	Hardware designed to both install and remove a module easily and reliably.

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J1, J2	J1 and J2 are two 64 pin receptacle connectors on the PC•MIP module that carry the 32-bit PCI bus via which the carrier and the module communicate. The pin usage and location on the mezzanine are defined by this Draft Standard. J1 and J2 mate to P1 and P2 on the carrier board respectively.
J3	J3 is the 64-pin I/O receptacle connector between the module and the carrier board. 14 ground pins are defined on this connector by this Draft Standard, but each module defines the remaining 50 pin's functions. J3 mates to P3 on the carrier board.
J4	J4 is a term reserved for the "front panel" I/O connector on Type II PC•MIP modules, but not on Type I modules. The selection of the physical connector is left to manufacturer of the Type II module, and is not defined in this Draft Standard. J4 typically mates to an equivalent P4 connector on a cable.
J5, J6, J7, J8	J5, J6, J7 and J8 correspond to J1, J2, J3, and J4 respectively for double size modules.
Keep-out zone	Defined regions on the module's and carrier's circuit board for specific features, such as connector or mounting hardware. Component height is restricted in these areas.
Keep-outs	See "Keep-out zones."
Keeper	Or bezel keeper. This is the hardware component on the carrier board that holds the bezels in place. There is one keeper per installed bezel. Keepers are removed and reinstalled by the user or system integrator as part of the process of installing a Type II module.
Label-side	The surface of the PC•MIP module that is visible when the module is installed on a carrier board. This face is opposite the connector-side.
M-modules	A predecessor module to PC•MIP. The controlling standard is ANSI/VITA 12-1996. Created by MEN GmbH.
North	One of the four compass points used within this Draft Standard to assure a consistent orientation in the figures and text for modules and carrier boards. The north end of PC•MIP modules contains the PCI connectors.
P1, P2	P1 and P2 are two 64 pin plug connectors on the carrier that mate to J1 and J2 on the PC•MIP module respectively. Note that P1 and P2 are "virtual" designations in that carrier boards that contain more than one PC•MIP slot will have multiple connectors that could be considered to be P1 or P2. Pin assignment, location constraints and routing constraints are defined in this Draft Standard.
P3	P3 is the 64-pin I/O plug connector between the module and the carrier board. 14 ground pins are defined on this connector by this

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	Draft Standard, but the remaining pins' functions are defined by each module. P3 mates to J3 on the PC•MIP module.
PC•MIP®	Pronounced "pee-see-mip." The name given to the mezzanine board modules defined by this Draft Standard. The term is trademarked and may be licensed at no fee from the VITA Standards Organization.
PCI	Short for *PCI Local Bus*. (PCI was originally an acronym for *Peripheral Component Interconnect*.) This bus became prevalent in desktop PCs. Since then a wide range of chip vendors and bus organizations has used it. Controlled by the PCI Special Interest Group.
PC/104	A mezzanine using the ISA bus that was never standardized. Controlled by the PC/104 Consortium.
Porch	See "I/O Porch."
PMC	A predecessor module to PC•MIP. Part of a larger CMC family. Currently an IEEE draft.
Rear Panel	This term applies to carrier boards and the host system. It is used primarily with VME and CompactPCI and related systems. Rear panel refers both the backplane connectors on the carrier board and the connectors on the backplane of the host system. Typically, rear panel I/O on these systems is implemented via the backplane connectors on the carrier board, then via the backplane connectors, then via a cable or transition module that plugs into the backplane. This term is also used, although such use may be confusing, to apply to the single metal exposed mounting bracket on PCI or ISA boards that install into desktop Personal Computers.
SBus	A predecessor module to PC•MIP. The controlling standard is IEEE Std 1496-1993. Created Sun Microsystems.
Slot	Location for a PC•MIP module to mount on a carrier board.
South	One of the four compass points used within this Draft Standard to assure a consistent orientation in the figures and text for modules and carrier boards. The I/O porch on Type II modules is at the south end of the module. The south end of a Type II module is adjacent to the carrier board's front panel.
Stack-up	The sequence of mounting hardware mechanical elements as used when assembled.
Type I	A module or slot that uses I/O via J3-P3 and/or J7-P7. This type of module and carrier slot is typically used on systems for back-panel I/O.
Type II	A module or slot that implements I/O on one or more connectors mounted directly on the module, connected directly to a user or system cable through the carrier board's front panel.

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Type U module	A module that has no I/O so that it may be mounted in either a Type I or Type II slot.
Type U slot	A slot on a carrier board that supports both Type I module and Type II modules.
VME	Also VMEbus. A Standard bus that uses a backplane and 3U and 6U Eurocard boards. VME was originally the Standard IEEE Std 1014-1987 but was taken over by the VITA Standards Organization (VSO) and enhanced with “VME64” and “VME64 Extensions”.
West	One of the four compass points used within this Draft Standard to assure a consistent orientation in the figures and text for modules and carrier boards.

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Specifications

Form Factor	3U CompactPCI
PC•MIP Modules Slots	Three
Carrier Interface	CompactPCI, PICMG 2.0, version 2.1 compliant
PC•MIP Interface	PC•MIP draft specification (ANSI/VITA-29), Revision 0.9
PCI	PCI Specification, Revision 2.1
PCI Bus Operation	32-bit, 33 MHz, up to 132 MB/s
PCI Bridge	Intel 21152 PCI to PCI Bridge
PCI Bus Master	Supported for three PC•MIP modules
I/O Access	Front panel access for two slots using Type II modules Rear panel access for two slots using Type I modules
Power Requirements	+3.3 VDC, 90 mA max Additional power consumed by modules
Dimensions	100 mm x 160 mm
Weight	0.16 kg (0.36 lb)
Environmental	Operating temperature: 0° to +70° C Humidity: 5% to 95% non-condensing Storage: -40° to +85° C

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Repair

Service Policy

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