

Proposed changes to PC/104-Plus and the PCI-104 PCI bus



By Jim Blazer

The PC/104 Embedded Consortium has commissioned the Technical Committee to revise the specifications for the PC/104-Plus and PCI-104 buses. A proposed change is to add a fourth bus master slot to the bus instead of having slots 3 and 4 share a bus master position. This will allow systems to have four bus master add-in cards and will make all the slots the same. I have asked the Technical Committee Chairman, Dr. Paul Haris of RTD Embedded Technologies, to explain the technical details of this change and the impact it might have on existing boards and systems. Here is his reply.

About the specifications

The current PC/104-Plus and PCI-104 PCI bus is based on the PCI Local Bus Specification – Rev. 2.1. In 1998, the PCI Special Interest Group published the PCI Local Bus Specification – Rev. 2.2. This revision dropped the optional cache support pins, SBO# and SDONE. The proposed new PC/104-Plus Rev. 2.0 and PCI-104 Rev. 1.0 specifications will adopt this change. By doing so, the number of reserved pins on the PC/104 PCI bus will increase to five.

Next generation add-on modules will also incorporate a fourth bus master by requiring the routing of pins B30 and C30 of the PC/104 PCI bus connector to the signal select Mux's, which contain the REQ# and GNT# lines. Instead of tying together position two with a third add-on module and position three with a fourth add-on module to ensure that one of the modules is a target only, they would tie directly to their own respective REQ# and GNT# lines, thereby allowing them both to be bus masters. See Figure 1, which depicts the signal select on an expansion board with the old PC/104 PCI bus, and Figure 2,

which depicts the signal select on an expansion board with the new PC/104 PCI bus. Since B30 and C30 are long-standing reserved pins, this new design will eliminate any possible electrical conflicts with existing modules.

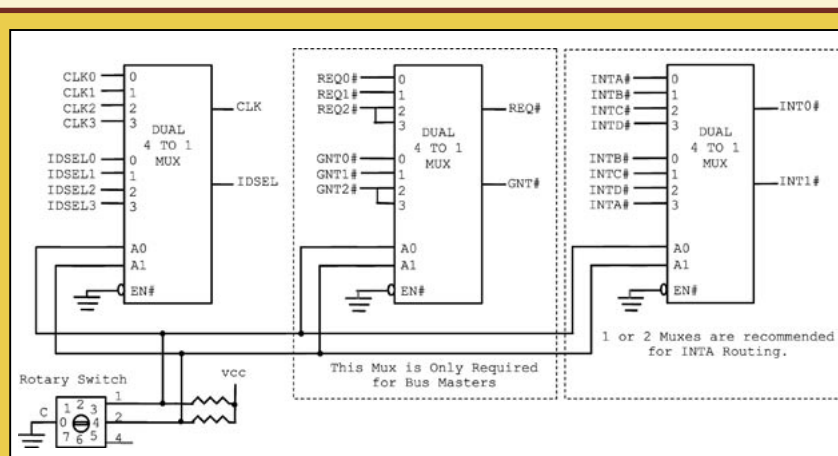


Figure 1

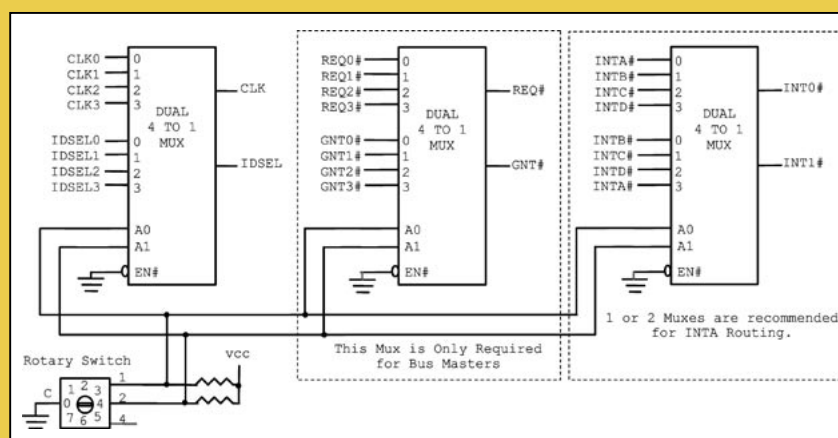


Figure 2

Backward and forward compatibility

Backward compatibility and the limitations of forward compatibility are of utmost importance if an advancing standard is to remain viable to the industrial community. For revision reference purposes, the old PC/104 PCI bus is Rev. 1.2 and the proposed

new revision is Rev. 2.0, which reflects the old and new revision numbers of the PC/104-Plus specifications.

Considering backward compatibility, how do Rev. 2.0 add-on modules integrate to a Rev. 1.2 CPU? The first two add-on “slots” (the two boards closest to the CPU) have not changed. The distinction comes in slots 3 and 4. Because a Rev. 1.2 CPU does not have the REQ3#/GNT3# lines connected to the PCI bus, a Rev. 2.0 add-on module cannot be a bus master in slot 4. It can only be a bus master in slot 3. Since the conventional wisdom about slots is that the first three are bus masters and the fourth is target-only, this definition represents no change. Yet, if it is necessary to remedy this incompatibility, a designer can add jumpers to Rev. 2.0 add-on modules on the REQ#/GNT# pairs two and three, which will allow add-on modules to have the capability to switch between Rev. 1.2 and 2.0. No matter the configuration of the add-on module, the fact still remains that a Rev. 1.2 CPU can only support either two target-only or one target and one bus master add-on modules in slots 3 and 4 at any one time.

Forward compatibility deals with how Rev. 1.2 add-on modules integrate to Rev. 2.0 CPUs. With a version 2.0 CPU, the first two slots do not change for either add-in board version. A Rev. 1.2 add-in board in slot 3 can be either bus master or target-only. Rev.1.2 add-in boards in slot 4 can be either a target only or a bus master if the board in slot 3 is not a bus master. Otherwise, it must be a target only.

Benefits of the revisions

The bottom line is that new add-in boards will work with old CPUs, and old add-on modules can work with new CPUs in the typical configuration of the first three slots being bus masters and the fourth slot being target-only. New CPUs will work with new add-in cards in any configuration of bus masters and targets. Finally, if a designer installs jumpers on new add-on modules’ REQ#/GNT# pairs two and three that allow conversion to a Rev. 1.2 add-on module, then the Rev. 2.0 add-on module can be a bus master in either slot 3 or 4.

The proposed mechanical layout is the same as the PC/104-Plus, but without the ISA bus connector. This frees up additional space for external connectors as shown in Figures 3 and 4.

(Note: Drawings are used with the permission of the PC/104 Embedded Consortium.)

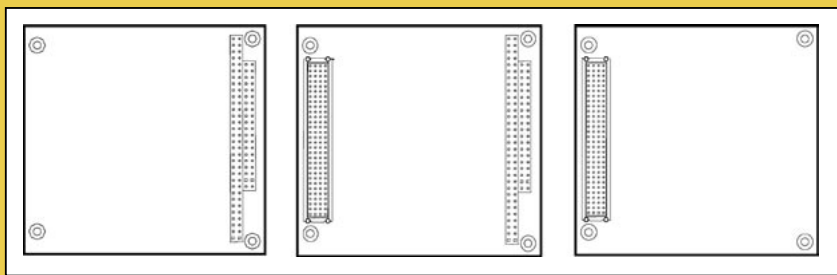


Figure 3

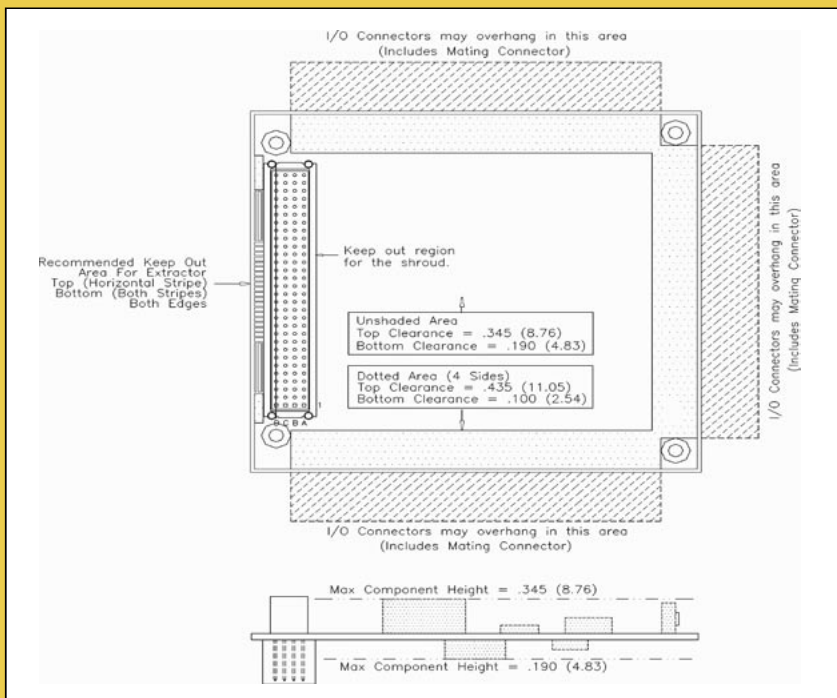


Figure 4. PCI-104 form factor

About the consortium and membership

The PC/104 Consortium is incorporated in California as a non-profit trade association. Membership is open to companies throughout the world who offer or use products that support the PC/104 standard or that target PC/104 applications. The consortium offers four categories of membership. Each provides a unique level of participation and financial commitment. Members of the consortium take advantage of the following benefits:

- They participate in shaping the future of embedded market standards
- They gain early access to new developments in the industry
- As a member, they can most effectively reach users of embedded technology
- They gain recognition as a major player in the embedded market

The consortium offers flexible levels of membership and participation. The following is a list of the current membership roster.

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Comm Con Connectors, Inc.	OEM Micro Solutions, Inc.
Condor Engineering, Inc.	Parvus Corporation
Connect Tech	PremierAdvance by Premier Communications Corp.
Contemporary Controls	Radicom Research, Inc.
Contradata Milano SRL	RAF Electronic Hardware
Diamond Systems Corp.	Samtec, Inc.
Douglas Electronics, Inc.	SBS Science & Technology Co., Ltd.
Eagle Technology	Toronto Microelectronics, Inc.
EMJ Embedded Systems	Tri-M Systems & Engineering
Enseo	Umezawa Musen Denki Co., Ltd.
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