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GE Fanuc Automation

PMC669, PMC676, & RM676

Dual Port GigE Controllers

HARDWARE REFERENCE MANUAL

Document Number: Rx-URMH 139

Embedded Systems

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1 Introduction

The PMC669 and PMC676 products provide dual independent gigabit Ethernet ports in a PMC form factor. The RM676 is a PCI edge solution for Dual Port GigE. Each has both a fiber and copper (PMC669TX, PMC676TX) media variant Fiber versions can be ordered with either -SX (standard) or -LX options. The PMC676/ copper media versions will operate at 10, 100 or 1000Mbit/second. Aside from the media type (which in copper allows for multiple transport speeds), each card type has identical features. Except as specifically indicated, information in the following sections applies to all versions.

The Ethernet/Peripheral Component Interconnect (PCI) interface includes a powerful direct memory access (DMA) engine for each port with very deep first-in/first-out (FIFO) buffers (64Kbytes). This assures continuous, full bandwidth operation with minimum PCI overhead.

The PMC676/RM676 has four versions of connector: SC, LC, VF-45 or MT-RJ with both the -SX and -LX options in each connector type. Transceiver (i.e., form factor and distance option) must be specified at order time.

In addition, card edge PCI systems can be accommodated using GE Fanuc Embedded Systems PMC239 adapter for rapid prototype and development.

1.1 Features

- 64bit/66 MHz PCI capable (133 PCI-X for the 676)
- DMA engine
- Dual 1000Mbit Ethernet controllers
- Jumbo Frame capable
- Connector options SC, LC, VF-45 or MT-RJ

1.1.1 Differences between the 676 and 669 families

The PMC676 is a follow on product to the PMC669, utilizing more recent component. The PMC669 is based upon the Intel 82544 controller, and the PMC676 uses the Intel 82546. The significant advantage that the PMC676 gains is that both controllers are in a single component. This allows for direct connection to the host, removing the PCI to PCI bridge required on the PMC669. Under some loading conditions this delivers improved PCI bus utilization and higher total bandwidth.

The 676 can also be used in a 133 PCI-X bus

1.1.2 PMC676/RM676PMC676 (Fiber) Specific options:

- 1000BaseSX or optional 1000BaseLX
- Connector options SC, LC, VF-45 or MT-RJ

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1.1.3 PMC676TX (Copper) Specific options:

- 10/100/1000 BaseTx Ethernet
- Auto-negotiation of operating speed/duplex
- 64Kbytes FIFO
- MDI/MDIX switch over capability
- RJ45 connectors

1.2 Host Off-loading Features

- Packet filtering based on checksum errors
- Simple Network Management Protocol (SNMP) and Remote Monitoring (RMON) statistic counters
- Hardware Transmission Control Protocol (TCP) checksum off-loading
- Support for various address filtering modes
- 16 exact matches (unicast or multicast)
- 4096-bit hash filter for multicast frames
- Promiscuous unicast and promiscuous multicast transfer modes

1.3 Interconnect

All utilize industry standard connection methods. Controllers can be hooked “point-to-point” or into a switch. The copper versions support “MDIX” which auto detects how to configure the transmit and receive lines, removing the need for “cross over” cables.

1.4 Software Support

GE Fanuc Embedded Systems has software drivers for all the popular operating systems (e.g., VxWorks®, HP-UX, LynxOS®, Digital UNIX, Windows NT®, Solaris™, etc.). These drivers have been carefully designed and implemented to fit within the Local Area Network (LAN) protocol stack of the host operating system.

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2 Handling And Installation

2.1 Handling Precautions

Electronic assemblies use devices that are sensitive to static discharge. Observe anti-static procedures when handling these boards. All products should be in an anti-static plastic bag or conductive foam for storage or shipment. Work at an approved anti-static workstation when unpacking boards.

2.2 Unpacking And Verification

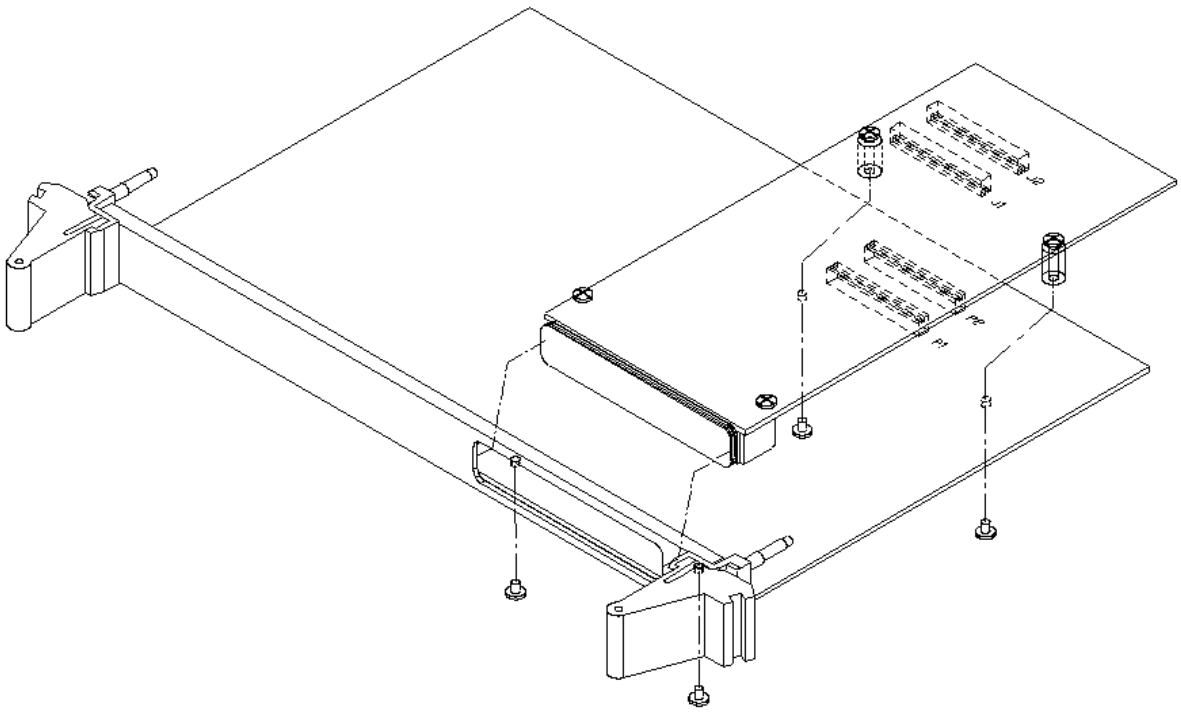
GE Fanuc Embedded Systems products are shipped in individual, reusable shipping boxes. When receiving the shipping container, inspect it for any evidence of physical damage. If the container is damaged, request that the carrier's agent be present during the unpacking of individual boxes and the inspection of each unit.

Remove the PMC module from the shipping box and anti-static packaging. Verify that it is not damaged and that all items are present by referring to the packing list.

2.3 Installation

The PMC module is now ready for installation. Installation is done generically as with the commercial versions of the card. Follow any specific procedures recommended by the manufacturer of the chassis used.

Turn all system power OFF. Remove the host board from the chassis (if currently installed). Locate the PMC connectors on the host board. Carefully plug the PMC module into the mating connectors on the host's printed circuit board. Be sure the PMC module is seated properly into the common mezzanine card (CMC) connectors on the host.



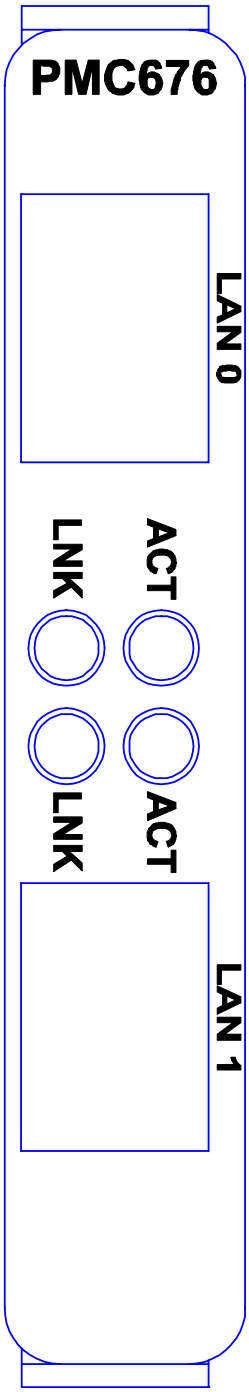
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- Use screws to fasten PMC card to the host CMC.
- Remove the four screws from the bottom of the stand-offs of the PMC.
- Line-up the J1 and J2 connectors on the host CMC to the J1 and J2 connectors on the PMC card.
- Ensure all connectors are properly aligned before pushing the connectors together.
- Use the four screws to connect the PMC stand-offs to the host CMC.

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3 Front Panel Connectors And Indicators

3.1 PMC676



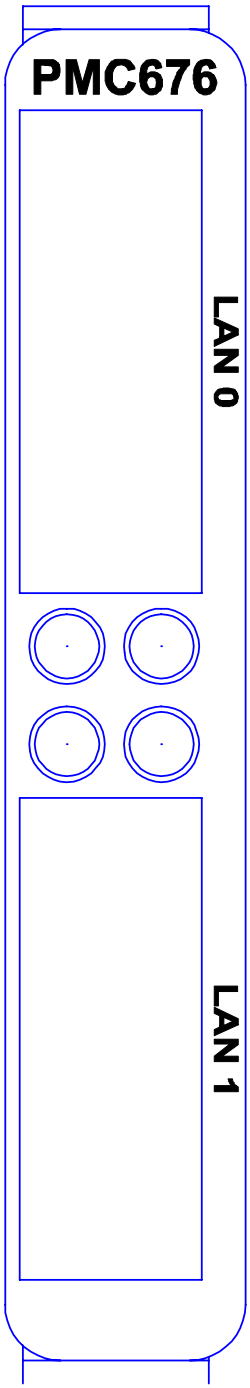
PMC676LC

LC Connector

There are four LEDs two per port.

Link illuminates when a valid single has been detected by the receiver.

ACT illuminates on activity (either receive or transmit)



PMC676SC

SC Connector

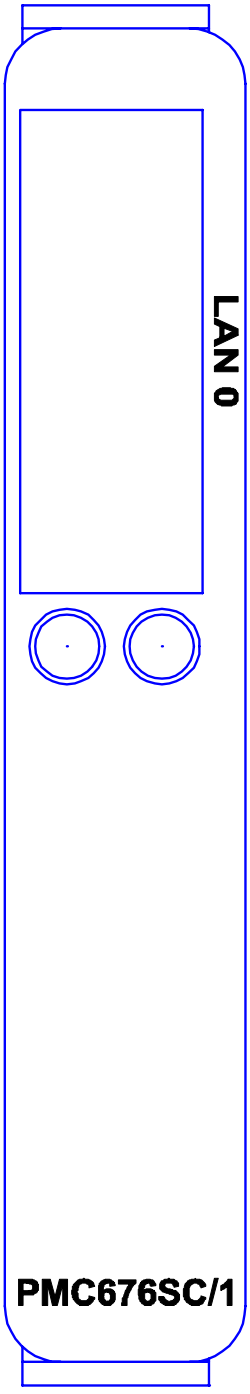
There are four LEDs:

Link illuminates when a valid single has been detected by the receiver.

ACT illuminates on activity (either receive or transmit

(NB: the layout of the LEDs is as the LC panel, due to space constraints the front panel is not marked.

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PMC676SC
1 PORT

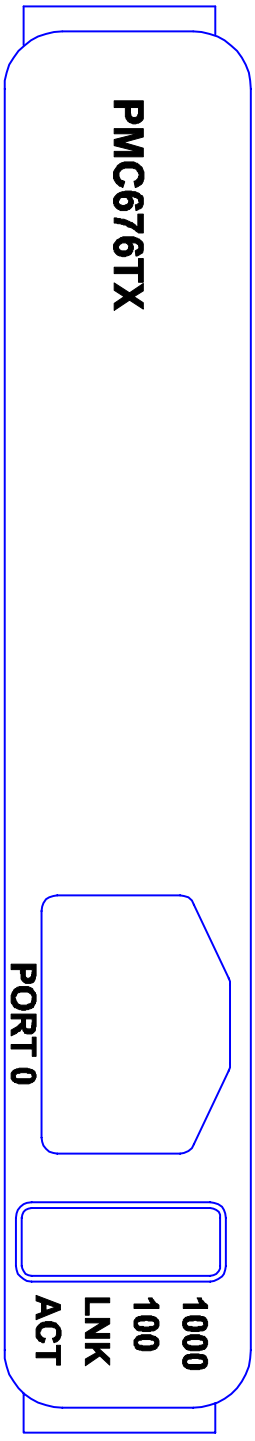
SC Connector

There are two LEDs:

Link illuminates when a valid single has been detected by the receiver.

ACT illuminates on activity (either receive or transmit

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PMC676TX
1 PORT

RJ45

There are four LEDs:

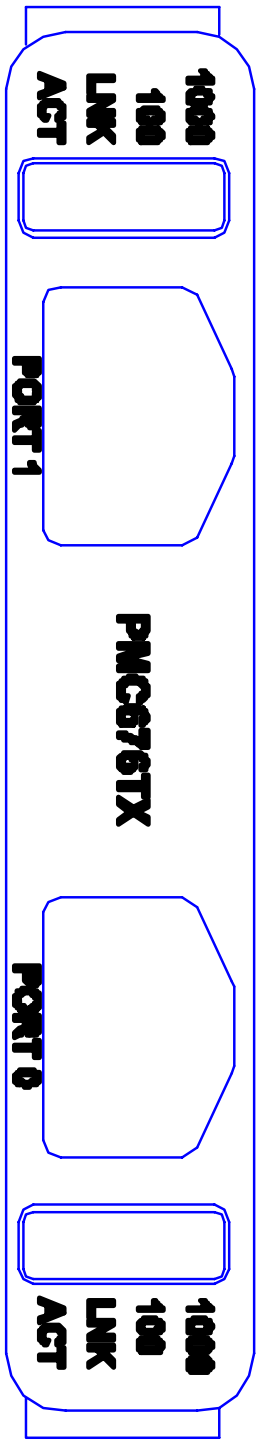
LNK illuminates when a valid link signal is detected by the receiver.

1000 is illuminated if the base speed is gigabit.

100 is illuminated if the base speed is 100Mbit

(Thus LNK on and both 1000 and 100 off indicate 10Mbit operation.

ACT illuminates on any network activity.



PMC676TX
2 PORT

RJ45

There are four LEDs for each port

LNK illuminates when a valid link signal is detected by the receiver.

1000 is illuminated if the base speed is gigabit.

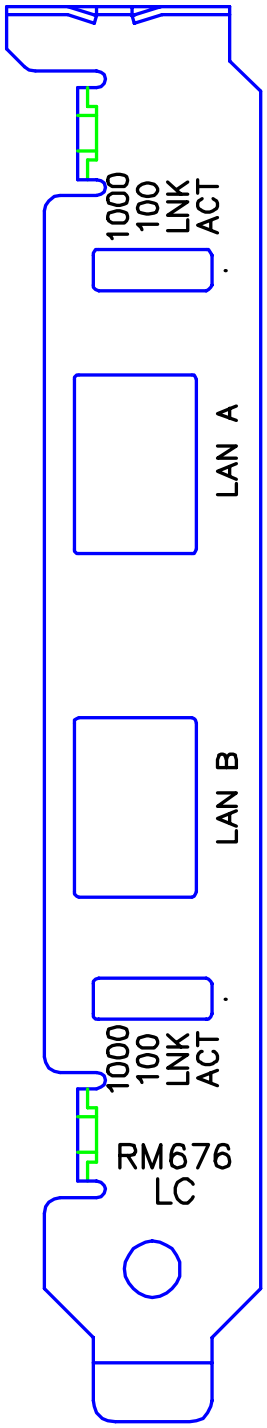
100 is illuminated if the base speed is 100Mbit

(Thus LNK on and both 1000 and 100 off indicate 10Mbit operation.

ACT illuminates on any network activity.

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3.2 RM676



RM676LC

LC Connectors

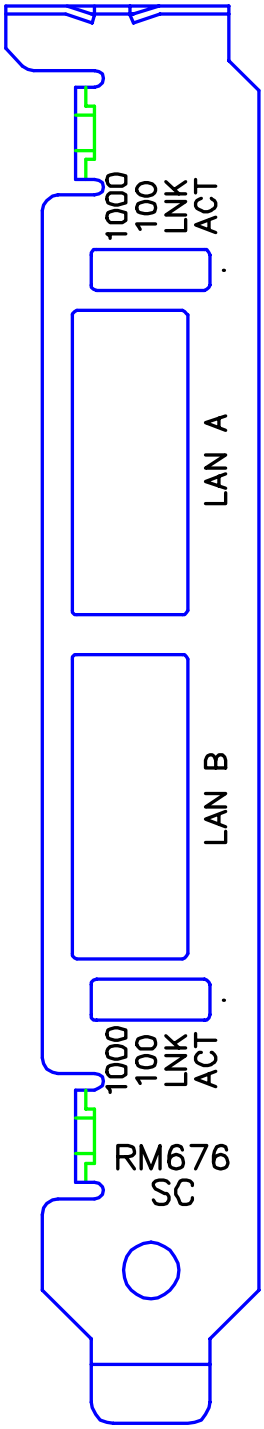
LNK illuminates when a valid link signal is detected by the receiver.

1000 is illuminated if the base speed is gigabit.

100 is illuminated if the base speed is 100Mbit

(Thus LNK on and both 1000 and 100 off indicate 10Mbit operation.

ACT illuminates on any network activity.



RM676SC

SC Connector

LNK illuminates when a valid link signal is detected by the receiver.

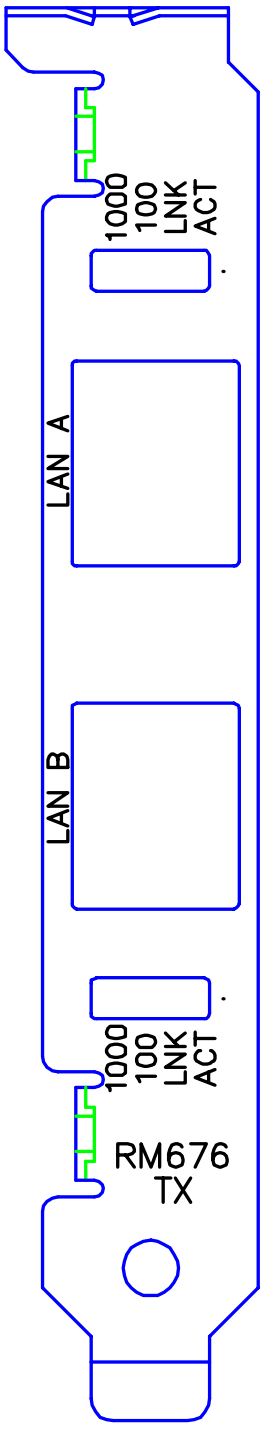
1000 is illuminated if the base speed is gigabit.

100 is illuminated if the base speed is 100Mbit

(Thus LNK on and both 1000 and 100 off indicate 10Mbit operation.

ACT illuminates on any network activity.

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RM676TX

RJ45 Connectors

There are four LEDs:

LNK illuminates when a valid link signal is detected by the receiver.

1000 is illuminated if the base speed is gigabit.

100 is illuminated if the base speed is 100Mbit

(Thus LNK on and both 1000 and 100 off indicate 10Mbit operation.

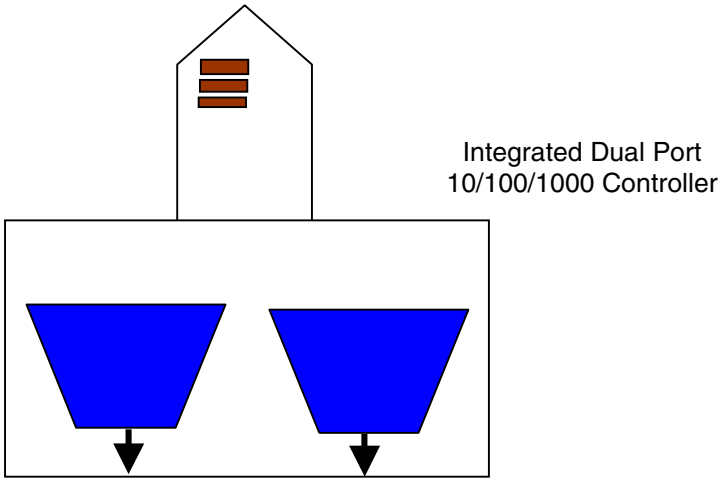
ACT illuminates on any network activity.

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4 Architecture

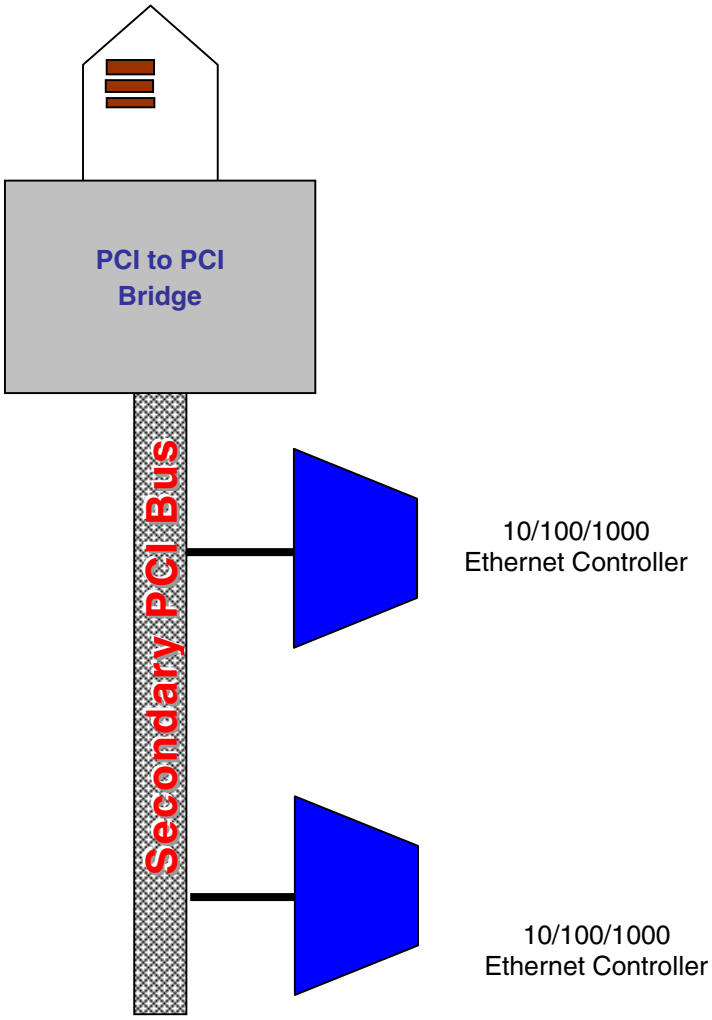
4.1 PMC676/RM676 Subsystems

The 676 uses a single component dual port gigE controller. Port 0 is PCI function 0, Port 1 is PCI function 1.



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4.2 PMC669 Subsystems



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5 Functional Specifications

5.1 PMC676

Functional Specifications: PMC676 Single or Dual Fiber Gigabit Ethernet with deep FIFO

Power	**6 Total Watts**
@ 3.3 V	**0.9 Amp**
@ 5 V	**0.6 Amp**
Form Factor	
PMC	**Single Slot**
MTBF	
MIL 217-F Nav Shel 25 Deg. C	**245000 Hours**
Temperature	
Operating	**0 to +60 ° C**
Storage	**-40 to +85 ° C**
Humidity	
Operating	**5% to 95% Non-Condensing**
Storage	**5% to 95% Non-Condensing**

Conformal Coating	**Yes, additional charge**

PCI Bus Characteristics	
Signaling	**3 & 5V**
Specification	**2.2**
Speed	**33/66MHz**
Width	**32/64**

Ethernet Characteristics	
Ports	
10/100/1000 Base-TX	**2**
Port Routing	
Front	**(2) RJ45 10/100/1000BaseTX**

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5.2 PMC676TX

Functional Specifications: PMC676TX Single or Dual Copper Gigabit Ethernet with deep FIFO

Power	**6 Total Watts**
@ 3.3 V	**0.9 Amp**
@ 5 V	**0.6 Amp**
Form Factor	
PMC	**Single Slot**
MTBF	
MIL 217-F Nav Shel 25 Deg. C	**245000 Hours**
Temperature	
Operating	**0 to +60 ° C**
Storage	**-40 to +85 ° C**
Humidity	
Operating	**5% to 95% Non-Condensing**
Storage	**5% to 95% Non-Condensing**

Conformal Coating	**Yes, additional charge**

PCI Bus Characteristics	
Signaling	**3 & 5V**
Specification	**2.2**
Speed	**33/66MHz**
Width	**32/64**

Ethernet Characteristics	
Ports	
10/100/1000 Base-TX	**2**
Port Routing	
Front	**(2) RJ45 10/100/1000BaseTX**

5.3 RM676

Functional Specifications: RM676 Single or Dual Fiber Gigabit Ethernet with deep FIFO

Power	**6 Total Watts**
@ 3.3 V	**0.9 Amp**

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@ 5 V	0.6 Amp
Form Factor	
PMC	Single Slot
MTBF	
MIL 217-F Nav Shel 25 Deg. C	245000 Hours
Temperature	
Operating	0 to +60 ° C
Storage	-40 to +85 ° C
Humidity	
Operating	5% to 95% Non-Condensing
Storage	5% to 95% Non-Condensing

Conformal Coating	Yes, additional charge

PCI Bus Characteristics	
Signaling	3 & 5V
Specification	2.2
Speed	33/66MHz
Width	32/64

Ethernet Characteristics	
Ports	
10/100/1000 Base-TX	2
Port Routing	
Front	(2) RJ45 10/100/1000BaseTX

Functional Specifications: RM676TX Dual or Single 10/100/1000Base-T Ethernet

Form Factor	
PCI	
Temperature	
Operating	0 to +60 ° C
Storage	-40 to +85 ° C
Humidity	
Operating	5% to 95% Non-Condensing
Storage	5% to 95% Non-Condensing

Conformal Coating	Yes, additional charge

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Conformal Coating	**Yes, additional charge**
PCI Bus Characteristics	
Ethernet Characteristics	
Ports	
10/100/1000 Base-TX	**4**
Port Routing	
Front	**(4) RJ45 10/100/1000BaseTX**

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