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PMC60 MODULE

USER'S MANUAL

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Cyclone P/N 800-0360

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CHAPTER 1
GENERAL INFORMATION
1.1 OVERVIEW 1-1
1.2 FEATURES 1-1
1.3 SPECIFICATIONS 1-1
1.4 ASSEMBLY DRAWING 1-1
1.5 PANEL DRAWING 1-2
1.6 REFERENCE MANUALS 1-3

CHAPTER 2
INSTALLATION
2.1 INSTALLATION ON A HOST 2-1

CHAPTER 3
HARDWARE DESCRIPTION
3.1 INTRODUCTION 3-1
3.2 PMC SIGNAL SET EXTENSION 3-1
3.3 ETHERNET PORTS 3-2
3.4 82559ER ETHERNET CONTROLLER 3-2
3.5 ETHERNET PORT LEDS 3-2

CHAPTER 4
PROGRAMMING INFORMATION
4.1 INTRODUCTION 4-1
4.2 ETHERNET PORTS 4-1
4.3 ETHERNET ADDRESS ASSIGNMENT 4-1

CHAPTER 5
CONNECTORS
5.1 PMC MODULE CONNECTOR 5-1
5.2 ETHERNET PORT CONNECTORS 5-3

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CONTENTS

LIST OF FIGURES

Figure 1-1. Assembly Drawing 1-2
Figure 1-2. PMC Panel Drawing 1-2
Figure 3-1. PMC60 Block Diagram 3-1

LIST OF TABLES

Table 1-1. PMC60 Power Requirements 1-1
Table 3-1. PMC Signal Assignment 3-2
Table 5-1. P11 PMC Module Connector Pinout 5-1
Table 5-2. P12 PMC Module Connector Pinout 5-2
Table 5-3. 10/100BaseTx Connector 5-4

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CHAPTER 1
GENERAL INFORMATION

1.1 OVERVIEW

The PMC60 module expands the I/O capabilities of its host board by providing two 10/100BaseTx Ethernet ports. The PMC60 connects to the PMC Module Interface on its host board. The module may be hosted on the Cyclone CPCI-943 or CPCI-710 CompactPCI cards.

See the CPCI-943 or CPCI-710 manuals for more information on the PMC Module Interface.

1.2 FEATURES

- Two 10/100BaseTx type Ethernet ports, based on Intel's 82559ER Fast Ethernet PCI Bus Controller.
- **The PMC60 is only compatible with PMC slots on Cyclone Microsystems host boards. The PMC60 requires additional signals not provided by the PMC specification. The PMC60 will not function in PMC slots on other makes of host boards.**

1.3 SPECIFICATIONS

Table 1-1. PMC60 Power Requirements

Voltage	Current Typical	Current Maximum
+3.3V	0.27 A	0-41 A
+5V	0 A	0 A
+12V	0 A	0 A
-12V	0 A	0 A

Host Clock signal: 33MHz Maximum

Physical Characteristics: Height x Width: 2.913" x 5.886"
Occupies one PMC Module Location

1.4 ASSEMBLY DRAWING

The layout or assembly drawing is shown in Figure 1-1.

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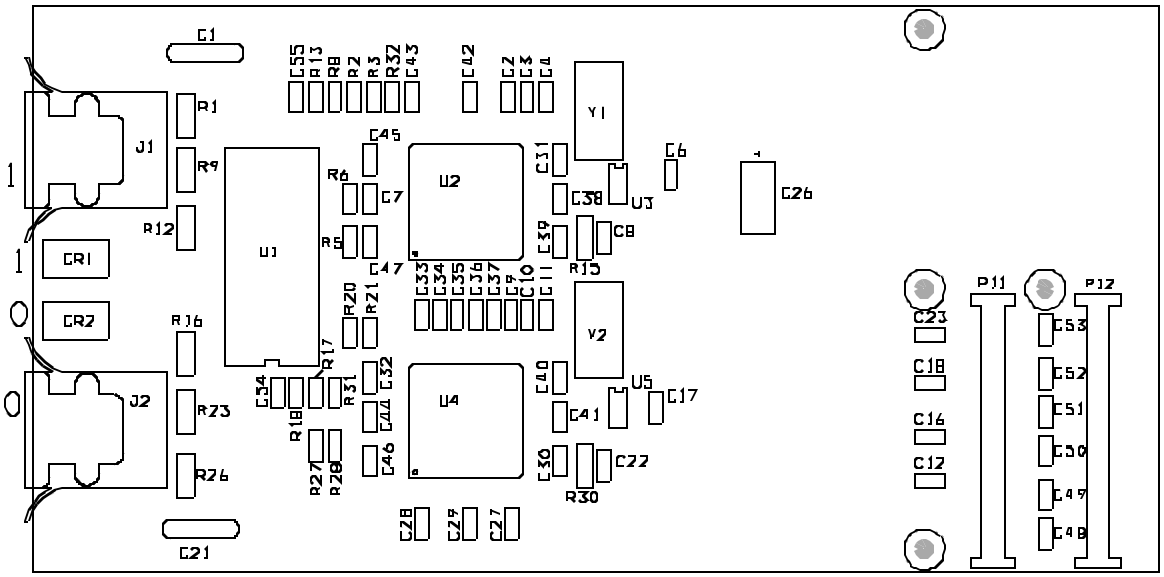


Figure 1-1. Assembly Drawing

1.5 PANEL DRAWING

The layout of the front panel of the PMC module is shown in Figure 1-2.

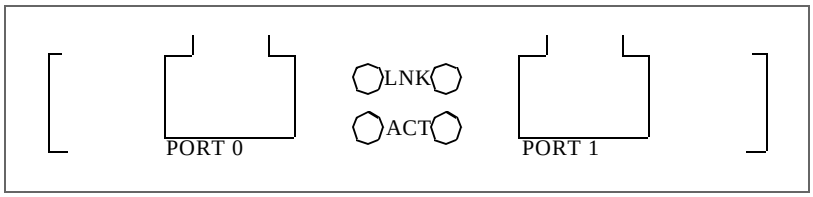


Figure 1-2. PMC Panel Drawing

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1.6 REFERENCE MANUALS

82559ER Data
Intel Corporation
Literature Sales
PO Box 7641
Mt Prospect, IL 60056-7641
(800) 879-4683

PCI Local Bus Specification, Rev 2.1
PCI Special Interest Group
PO Box 14070
Portland, OR 97214
(800) 433-5177 (US)
(503) 797-4207 (International)
(503) 234-6762 (Fax)

IEEE STD P1386, Draft 2.0
IEEE Std P1386.1, Draft 1.5
Institute of Electrical and Electronics Engineers
PO Box 1331
445 Hoes Lane
Piscataway, NJ 08855-1331

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CHAPTER 2
INSTALLATION

2.1 INSTALLATION ON A HOST

Static discharge can severely damage integrated circuits. The host board and PMC Modules should only be handled with proper static protection. PMC Modules should always be installed with power to the host board OFF. Mounting or dismounting a module with the host power on could permanently damage the circuitry on the module.

Refer to the PMC60's host board user's manual for PMC module mounting locations.

PMC Modules mount "face down", that is, with the component side of the module facing the component side of the host. While holding the module upside down, carefully tip the front panel connector of the module though the opening in the host panel and align the module and host connectors. With the module and host aligned, press the two assemblies together, fully mating the connectors. Install the mounting hardware, two screws for the stand-offs and two screws for the module front panel are used to secure the PMC to the host.

To dismount module, first remove the host board on which the module is mounted. Then, lift the side of the connector end upwards until it disconnects from the host’s connector and slightly bend the module at the opposite end so as to loosen it from the front panel of the host board.

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CHAPTER 3
HARDWARE DESCRIPTION

3.1 INTRODUCTION

This chapter describes the hardware and general operation of the PMC60 Module. The VLSI circuits are not described in detail. The user should consult the manuals and data sheets listed in section 1.6 Reference manuals, for a detailed description of these devices. Connectors are not covered in detail in this chapter, see Chapter 5 CONNECTORS, for more information. Consult Chapter 4 for software and programming information. The PMC60 Module has two PCI devices; Intel's 82559ER Fast Ethernet PCI bus Controller.

A block diagram is shown in Figure 3-1. The figure shows the major components, the PMC connectors and the two Ethernet ports.

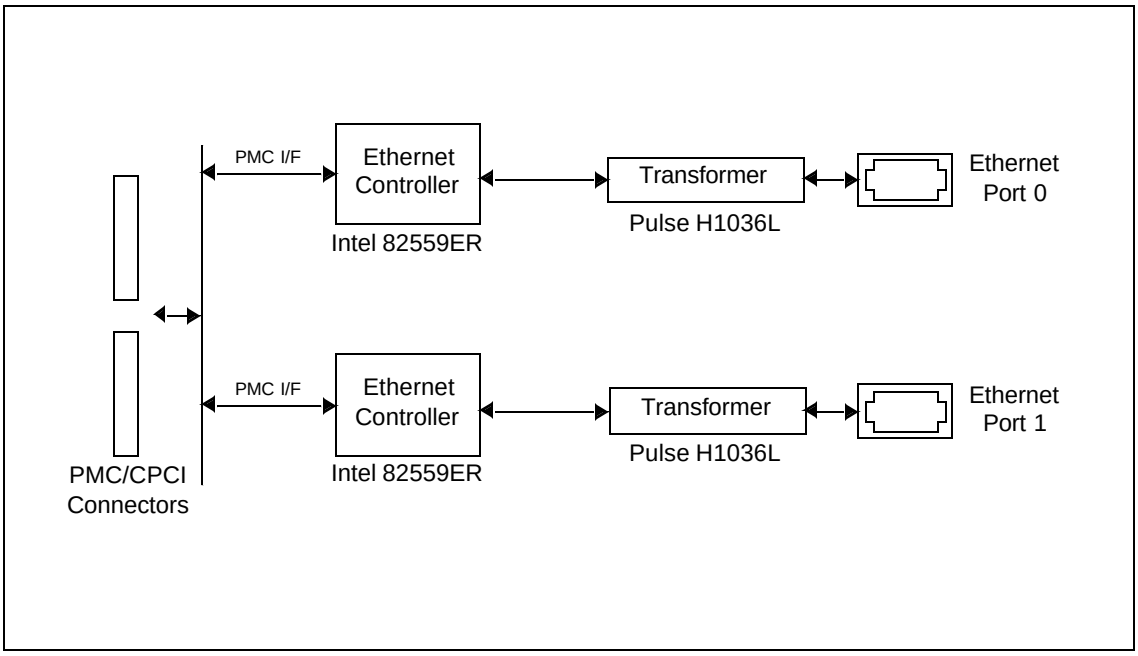


Figure 3-1. PMC60 Block Diagram

3.2 PMC SIGNAL SET EXTENSION

The PMC60 requires an extension to the PCI signal set as provided by the PMC specification. The PMC60 needs support for a second PCI agent. Cyclone host boards with PMC slots provide extra signals in support of up to three PCI agents, consult the host board user's manual for more information.

Table 3-1 shows the attachment of PMC60 agents to the standard and extended PMC signals. The first ethernet port (Port 0) is connected to the PMC specification compliant signals for clocking, bus arbitration and configuration cycle selection (e.g. IDSEL). Port 0 uses INTA# for interrupts. The second ethernet port (Port 1) is connected to the extended signals for clocking, bus arbitration and configuration cycle selection. Port 1 is attached to INTB# for interrupts.

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Table 3-1. PMC Signal Assignment

Agent	IDSEL	Clocking	Arbitration		Interrupt
Port 0	IDSEL#	CLK	REQ#	GNT#	INTA#
Port 1	IDSEL1#	CLK1	REQ1#	GNT1#	INTB#

Connector pin assignments for both the standard and extended PMC signals can be found in Table 5-1 and 5-2 in Chapter 5 CONNECTORS.

3.3 ETHERNET PORTS

The Ethernet ports are 10/100BaseTx type based on Intel's 82559ER Fast Ethernet PCI Bus Controller. The 82559ER uses a PCI bus interface to communicate with the host.

3.4 82559ER ETHERNET CONTROLLER

The 82559ER contains a 32-bit PCI bus master interface that interacts with the host memory to access data for transmission or deposit received data.

The 82559ER has large transmit and receive FIFOs that are unidirectional and independent of each other. The FIFOs provide temporary storage area for frames as they are received or transmitted. The FIFOs allow the 82559ER to withstand long PCI latencies without losing incoming data or corrupting outgoing data.

The interface on the 82559ER for FLASH support is not used on the PMC60. The EEPROM interface has a serial EEPROM attached and is used to store the port's Ethernet address.

3.5 ETHERNET PORT LEDS

Each Ethernet port on the PMC60 has two LEDs driven by t82559ER that provide a visual indication of network status:

The LED labeled "LNK" indicates link integrity. The "LNK" LED will be on continuously when link integrity status is good.

The LED labeled "ACT" indicates network activity. The "ACT" LED will blink if there is transmit or receive activity.

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CHAPTER 4
PROGRAMMING INFORMATION

4.1 INTRODUCTION

This chapter provides software and programming information for the PMC60 Module. This chapter does not contain list of registers in the devices. The user should consult the manuals and data sheets listed in section 1.6, Reference Manuals, for a detailed description of registers and configuration information. Refer to Chapter 3 for hardware and general operation of the PMC60 Module.

The PMC60 Module connects to the PMC Module Interface of its host CPCI board. The PMC Module Interface is a 32-bit PCI bus conforming to the PCI Local Bus Specification Revision 2.1, with exceptions noted in the host board users manual and Chapter 3.

Ethernet Port 0 is connected to the PMC compliant IDSEL# line and uses INTA# for interrupts (the INTA# pin of Port 0's 82559ER is connected to the PMC INTA#). Ethernet Port 1 uses an extension of the PMC signals found only on Cyclone host boards. Ethernet Port 1 is connected to IDSEL1# and INTB# (the INTA# pin of Port 1's 82559ER is connected to the PMC INTB#). Refer to section 3.2, PMC Signal Set Extension, for more information about the added PMC signals. Refer to the host board manual for a mapping of IDSELs versus PMC slots to obtain a Device ID for each ethernet port, and for the binding and sharing of PMC interrupts versus processor interrupt pins.

4.2 ETHERNET PORTS

The 82559ER establishes a shared memory communication system with the host CPU. This shared memory is divided into three parts: the Control/Status Registers (CSR), the Command Block List (CBL) and the Receive Frame Area (RFA). The CSR resides on-chip and can be accessed by either I/O or memory cycles, while the rest of the 82559ER memory structures reside in system (host) memory. The first 8 bytes of the CSR is called the System Control Block (SCB). The SCB serves as a central communication point for exchanging control and status information between the host CPU and the 82559ER.

The host software controls the state of the 82559ER Command Unit (CU) and Receive Unit (RU) (for example Active, Suspended, Idle) by writing commands to the SCB. The 82559ER posts the status of the CU and RU in the SCB Status word and indicates status changes with an interrupt. The SCB also holds pointers to a linked list of action commands called the CBL and a linked list of received resources called the RFA.

Parameters which must be established prior to making the 82559ER operational included internal configuration values (established using the Configure Command) and assigning an individual Ethernet address (using the Individual Address Setup Command). Note that the aforementioned shared memory communication architecture must be established prior to the execution of 82559ER action commands. Refer to the 82559ER manual for further information regarding device configuration.

4.3 ETHERNET ADDRESS ASSIGNMENT

In order to provide a unique ethernet address for all PMC modules with Ethernet ports, an algorithm has been established that combines the PMC module number, the port number and the board's serial number.

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The Ethernet address is a six byte number. The first three bytes are assigned to Cyclone Microsystems and are fixed at:

00 80 4Dh

The last three bytes are broken into three binary fields:

XXXX XXXX YYZZ ZZZZ ZZZZ ZZZZb

The first binary field, XXXX XXXX is the Module ID, in Hex. The PMC60's ID is 3ch (60 converted).

The second binary field, YY is the port number. For the PMC60 there are two ethernet ports:

E-Net Port A, YY = 00b
E-Net Port B, YY = 01b

The third binary field, ZZ ZZZZ ZZZZ ZZZZ is the modules serial number converted to hex. For example, if the module serial number is 1234 then:

1234d = 04D2h
ZZ ZZZZ ZZZZ ZZZZ = 00 0100 1101 0010b

The complete ethernet address for an PMC60 with serial number 1234 would be:

E-Net Port A = 00 80 4D 3C 04 D2h
E-Net Port B = 00 80 4D 3C 44 D2h

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CHAPTER 5
CONNECTORS

5.1 PMC MODULE CONNECTOR

The PMC60 Module uses IEEE I386 standard PCI cards with connectors, each of 64 pins. Standoffs are used to maintain the spacing between the PMC60 and the host, and to provide mechanical stability.

The 4 BUSMODE pins are not utilized on the PMC60. Cyclone's CPCI-943 host board does not drive BUSMODE [4:2]# signals nor does the PMC60 drive the BUSMODE1# signal.

Table 5-1. P11 PMC Module Connector Pinout

Pin	Signal	Pin	Signal
1	TCK	2	-12V
3	GND1	4	INTA#
5	INTB#	6	INTC#
7	BUSMODE1#	8	+5V1
9	INTD#	10	PCI-RSVD1
11	GND2	12	PCI-RSVD2
13	CLK	14	GND9
15	GND3	16	GNT#
17	REQ#	18	+5V2
19	VI/O1	20	AD31
21	AD28	22	AD27
23	AD25	24	GND10
25	GND4	26	C/BE3#
27	AD22	28	AD21
29	AD19	30	+5V3
31	VI/O2	32	AD17
33	FRAME#	34	GND11
35	GND5	36	IRDY#
37	DEVSEL#	38	+5V4
39	GND6	40	LOCK#

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Pin	Signal	Pin	Signal
41	SDONE#	42	SBO#
43	PAR	44	GND12
45	VI/O3	46	AD15
47	AD12	48	AD11
49	AD09	50	+5V5
51	GND7	52	C/BE0#
53	AD06	54	AD05
55	AD04	56	GND13
57	VI/O4	58	AD03
59	AD02	60	AD01
61	AD00	62	+5V6
63	GND8	64	REQ64#

Table 5-2. P12 PMC Module Connector Pinout

Pin	Signal	Pin	Signal
1	+12V	2	TRST#
3	TMS	4	TDO
5	TDI	6	GND8
7	GND1	8	PCI-RSVD1
9	PCI-RSVD3	10	PCI-RSVD2
11	BUSMODE2#	12	+3.3V5
13	RST#	14	BUSMODE3#
15	+3.3V1	16	BUSMODE4#
17	PCI-RSVD	18	GND9
19	AD30	20	AD29
21	GND2	22	AD26
23	AD24	24	+3.3V6
25	IDSEL	26	AD23

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Pin	Signal	Pin	Signal
27	+3.3V2	28	AD20
29	AD18	30	GND10
31	AD16	32	C/BE2#
33	GND3	34	PMC + IDSEL1
35	TRDY#	36	+3.3V7
37	GND4	38	STOP#
39	PERR#	40	GND11
41	+3.3V3	42	SERR#
43	C/BE1#	44	GND12
45	AD14	46	AD13
47	GND5	48	AD10
49	AD08	50	+3.3V8
51	AD07	52	PMC + REQ1#
53	+3.3V4	54	PMC + CLK1
55	PMC + GNT1#	56	GND13
57	PMC + GNT2#	58	PMC + CLK2
59	GND6	60	PMC + REQ2#
61	ACK64#	62	+3.3V9
63	GND7	64	PMC + IDSEL2

The signals on marked “PMC + name” are provided only by Cyclone host boards and may be used by Cyclone PMC Modules to support more than one PCI agent on a PMC Module.

5.2 ETHERNET PORT CONNECTORS

Each Ethernet port on the PMC60 connects to a 8 position shielded modular jack that conforms to the 10/100BaseTx Ethernet specification. The connector pinout is shown in Table 5-3.

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Table 5-3. 10/100BaseTx Connector

Pin	Signal	Description
1	TX+	Output
2	TX-	Output
3	RX+	Input
4	--	Not Used
5	--	Not Used
6	RX-	Input
7	--	Not Used
8	--	Not Used

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