

PM-1004-R20

PC/104 4-Port RS-232/ 422/485 Module

User Manual

Version 2.0

January 10, 2006



@Copyright 2006 by ICP Electronics Inc. All Rights Reserved.

Copyright Notice

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Trademarks

PM-1004-R20 is a registered trademark of ICP Electronics Inc., IBM PC is a registered trademark of International Business Machines Corporation. Intel is a registered trademark of Intel Corporation. AMI is a registered trademark of American Megatrends Inc. , Other product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

Support

Any questions regarding the content of this manual or related issues can be e-mailed to us directly at:
SUPPORT@IEI.COM.TW

Table of Contents

| | |
|---|-----------|
| CHAPTER 1. INTRODUCTION..... | 4 |
| 1.1 SPECIFICATIONS..... | 4 |
| 1.2 PACKAGE CONTENTS | 5 |
| CHAPTER 2. INSTALLATION | 6 |
| 2.1 HARDWARE INSTALLATION | 6 |
| 2.2 BOARD LAYOUT | 7 |
| 2.3 INTERRUPT STATUS ADDRESS SETTING | 9 |
| 2.3.1 INTERRUPT STATUS REGISTER SETUP(S1, VECTOR ADDRESS) | 10 |
| 2.4 COM PORT I/O BASE ADDRESS SETTING | 11 |
| 2.5 COM PORT IRQ SELECTION | 13 |
| 2.6 IRQ SHARING MODE SELECTION | 13 |
| CHAPTER 3. CONNECTION | 14 |
| 3.1 RS-232/422/485 CONNECTOR | 14 |
| 3.2 PC/104 EXPANSION BUS | 16 |

Chapter 1. Introduction

PM-1004-R20 driver & User's manual is the same as PM-1004.

The PM-1004-R20 is a PC/104-compliant 4-port RS-232/422/485 module. The PM-1004-R20 has a high performance serial I/O chip TI TL16C554A on board. Its UART is compatible with the 16C550. The PM-1004-R20 provides two ways of interrupt control mechanism - shared or independent IRQ. Besides, its IO address and interrupt status address are also selectable by jumpers.

1.1 Specifications

- **Bus:** PC/104.
- **Interrupt Level:** 3, 4, 5, 7, 9, 10, 11, 12.
- **Chipset:** TI TL16C554A.
- **Baud Rate:** up to 921.6K bps (at 14.745Mhz clock input).
- **Serial Ports:** 4 16C550-compatible UARTs – PM-1004-R20
- **Shared or Independent Interrupt.**
- **Selectable Interrupt Vector Address.**
- **Selectable I/O Address.**
- **Power Consumption:** +5V @ 0.6A max.
- **Operating Temperature:** 0° ~ 60 ° C.

1.2 Package Contents

The following items will be found in the packaged contents:

- 1 x PM-1004-R20
- 1 x Serial port RS-232 cable (40 pin, 4 DB-9)
- 1 x RS-422/485 cable (16 PIN, 4 DB-9).
- 1 x DRIVER CD-ROM
- 1 x User manual

If any of these items are missing or damaged, please contact the dealer who you purchased the product from. Be sure to save the shipping materials and carton in case you want to ship or store the product in the future.

Chapter 2. Installation

This chapter describes how to install the PM-1004-R20.

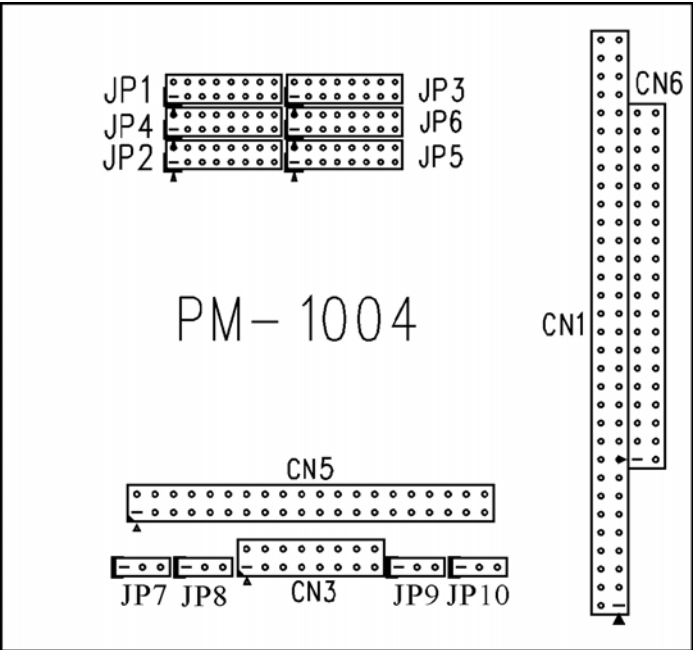
2.1 Hardware Installation

To install the PC/104 modules, please follow the instructions below.

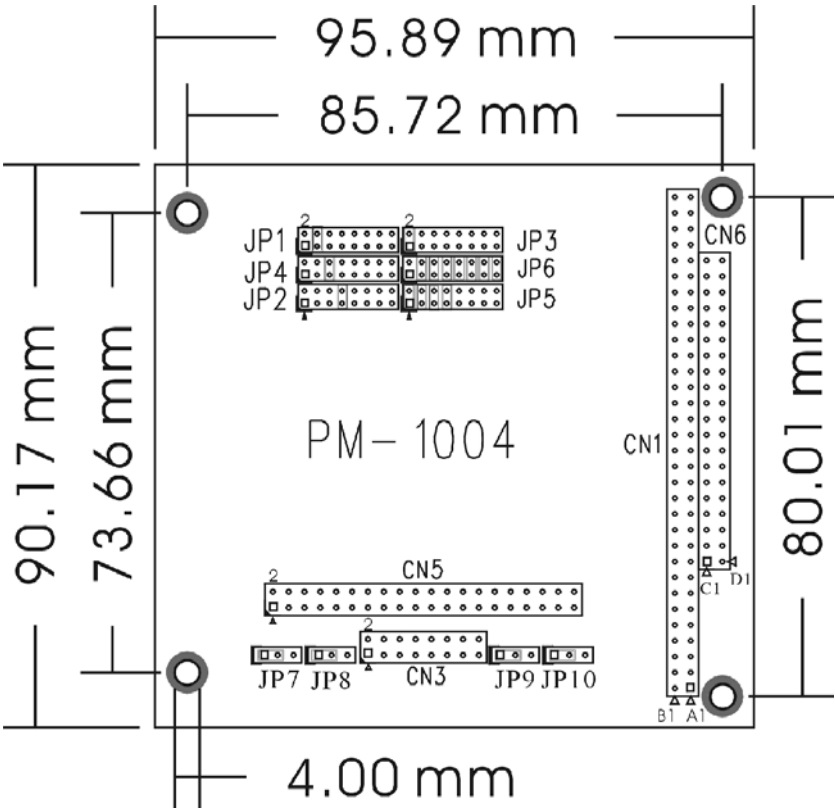
Note: Please ground yourself to remove any static charges before touching your PM-1004-R20. You can do it by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.

1. Turn the power off
2. Plug the PC/104 module into the connectors on the CPU card.
3. Secure the PC/104 module with the four mounting
4. Adjust the required jumper settings
5. Attach the cables
6. Turn the power back on

2.2 Board Layout



Board Dimension (mm)



2.3 Interrupt Status address setting

● JP5: Interrupt Status Address Setting

| Interrupt Status Address | 9-10 | 7-8 | 5-6 | 3-4 | 1-2 |
|--------------------------|------|-----|-----|-----|-----|
| 200H | ON | ON | ON | ON | ON |
| 210H | ON | ON | ON | ON | OFF |
| 220H | ON | ON | ON | OFF | ON |
| 230H | ON | ON | ON | OFF | OFF |
| 240H | ON | ON | OFF | ON | ON |
| 250H | ON | ON | OFF | ON | OFF |
| 260H | ON | ON | OFF | OFF | ON |
| 270H | ON | ON | OFF | OFF | OFF |
| 280H | ON | OFF | ON | ON | ON |
| 290H | ON | OFF | ON | ON | OFF |
| 2A0H | ON | OFF | ON | OFF | ON |
| 2B0H | ON | OFF | ON | OFF | OFF |
| 2C0H | ON | OFF | OFF | ON | ON |
| 2D0H | ON | OFF | OFF | ON | OFF |
| 2E0H | ON | OFF | OFF | OFF | ON |
| 2F0H | ON | OFF | OFF | OFF | OFF |
| * 300H | OFF | ON | ON | ON | ON |
| 310H | OFF | ON | ON | ON | OFF |
| 320H | OFF | ON | ON | OFF | ON |
| 330H | OFF | ON | ON | OFF | OFF |
| 340H | OFF | ON | OFF | ON | ON |
| 350H | OFF | ON | OFF | ON | OFF |
| 360H | OFF | ON | OFF | OFF | ON |
| 370H | OFF | ON | OFF | OFF | OFF |
| 380H | OFF | OFF | ON | ON | ON |
| 390H | OFF | OFF | ON | ON | OFF |
| 3A0H | OFF | OFF | ON | OFF | ON |
| 3B0H | OFF | OFF | ON | OFF | OFF |
| 3C0H | OFF | OFF | OFF | ON | ON |
| 3D0H | OFF | OFF | OFF | ON | OFF |
| 3E0H | OFF | OFF | OFF | OFF | ON |
| 3F0H | OFF | OFF | OFF | OFF | OFF |

*: Default

2.3.1 Interrupt Status Register Setup (S1,Vector Address)

When data arrives at one of the four ports, it will generate an interruption in the interrupt register. The PC software can read this, and identify immediately which port generated the interruption. This saves time, and makes programming easier. When a data bit of the interrupt status register is set to 1, the corresponding channel is selected to generate an interruption. If the bit is 0, then no interruption is generated. S1 controls the interrupt status register for the card, as shown in the following figure.

| S1 300H (default) | |
|-------------------------------------|-----------------|
| Interrupt Status Register S1 | |
| Bit | Function |
| 0 | Port 1 |
| 1 | Port 2 |
| 2 | Port 3 |
| 3 | Port 4 |
| 4 | Not Used |
| 5 | Not Used |
| 6 | Not Used |
| 7 | Not Used |

2.4 COM Port I/O Base Address Setting

● JP6: COM Port I/O Base Address Setting

| Base Address | 11-12 | 9-10 | 7-8 | 5-6 | 3-4 | 1-2 |
|--------------|-------|------|-----|-----|-----|-----|
| 200-207H | ON | ON | ON | ON | ON | ON |
| *208-20FH | ON | ON | ON | ON | ON | OFF |
| 210-217H | ON | ON | ON | ON | OFF | ON |
| 218-21FH | ON | ON | ON | ON | OFF | OFF |
| 220-227H | ON | ON | ON | OFF | ON | ON |
| 228-22FH | ON | ON | ON | OFF | ON | OFF |
| 230-237H | ON | ON | ON | OFF | OFF | ON |
| 238-23FH | ON | ON | ON | OFF | OFF | OFF |
| 240-247H | ON | ON | OFF | ON | ON | ON |
| 248-24FH | ON | ON | OFF | ON | ON | OFF |
| 250-257H | ON | ON | OFF | ON | OFF | ON |
| 258-25FH | ON | ON | OFF | ON | OFF | OFF |
| 260-267H | ON | ON | OFF | OFF | ON | ON |
| 268-26FH | ON | ON | OFF | OFF | ON | OFF |
| 270-277H | ON | ON | OFF | OFF | OFF | ON |
| 278-27FH | ON | ON | OFF | OFF | OFF | OFF |
| 280-287H | ON | OFF | ON | ON | ON | ON |
| 288-28FH | ON | OFF | ON | ON | ON | OFF |
| 290-297H | ON | OFF | ON | ON | OFF | ON |
| 298-29FH | ON | OFF | ON | ON | OFF | OFF |
| 2A0-2A7H | ON | OFF | ON | OFF | ON | ON |
| 2A8-2AFH | ON | OFF | ON | OFF | ON | OFF |
| 2B0-2B7H | ON | OFF | ON | OFF | OFF | ON |
| 2B8-2BFH | ON | OFF | ON | OFF | OFF | OFF |
| 2C0-2C7H | ON | OFF | OFF | ON | ON | ON |
| 2C8-2CFH | ON | OFF | OFF | ON | ON | OFF |
| 2D0-2D7H | ON | OFF | OFF | ON | OFF | ON |
| 2D8-2DFH | ON | OFF | OFF | ON | OFF | OFF |
| 2E0-2E7H | ON | OFF | OFF | OFF | ON | ON |
| 2E8-2EFH | ON | OFF | OFF | OFF | ON | OFF |
| 2F0-2F7H | ON | OFF | OFF | OFF | OFF | ON |
| 2F8-2FFH | ON | OFF | OFF | OFF | OFF | OFF |

| | | | | | | |
|----------|-----|-----|-----|-----|-----|-----|
| 300-307H | OFF | ON | ON | ON | ON | ON |
| 308-30FH | OFF | ON | ON | ON | ON | OFF |
| 310-317H | OFF | ON | ON | ON | OFF | ON |
| 318-31FH | OFF | ON | ON | ON | OFF | OFF |
| 320-327H | OFF | ON | ON | OFF | ON | ON |
| 328-32FH | OFF | ON | ON | OFF | ON | OFF |
| 330-337H | OFF | ON | ON | OFF | OFF | ON |
| 338-33FH | OFF | ON | ON | OFF | OFF | OFF |
| 340-347H | OFF | ON | OFF | ON | ON | ON |
| 348-34FH | OFF | ON | OFF | ON | ON | OFF |
| 350-357H | OFF | ON | OFF | ON | OFF | ON |
| 358-35FH | OFF | ON | OFF | ON | OFF | OFF |
| 360-367H | OFF | ON | OFF | OFF | ON | ON |
| 368-36FH | OFF | ON | OFF | OFF | ON | OFF |
| 370-377H | OFF | ON | OFF | OFF | OFF | ON |
| 378-37FH | OFF | ON | OFF | OFF | OFF | OFF |
| 380-387H | OFF | OFF | ON | ON | ON | ON |
| 388-38FH | OFF | OFF | ON | ON | ON | OFF |
| 390-397H | OFF | OFF | ON | ON | OFF | ON |
| 398-39FH | OFF | OFF | ON | ON | OFF | OFF |
| 3A0-3A7H | OFF | OFF | ON | OFF | ON | ON |
| 3A8-3AFH | OFF | OFF | ON | OFF | ON | OFF |
| 3B0-3B7H | OFF | OFF | ON | OFF | OFF | ON |
| 3B8-3BFH | OFF | OFF | ON | OFF | OFF | OFF |
| 3C0-3C7H | OFF | OFF | OFF | ON | ON | ON |
| 3C8-3CFH | OFF | OFF | OFF | ON | ON | OFF |
| 3D0-3D7H | OFF | OFF | OFF | ON | OFF | ON |
| 3D8-3DFH | OFF | OFF | OFF | ON | OFF | OFF |
| 3E0-3E7H | OFF | OFF | OFF | OFF | ON | ON |
| 3E8-3EFH | OFF | OFF | OFF | OFF | ON | OFF |
| 3F0-3F7H | OFF | OFF | OFF | OFF | OFF | ON |
| 3F8-3FFH | OFF | OFF | OFF | OFF | OFF | OFF |

*: Default

- **COM Port I/O Address**

| COM Port | I/O address |
|----------|--------------------|
| COM1 | Base Address + 00H |
| COM2 | Base Address + 08H |
| COM3 | Base Address + 10H |
| COM4 | Base Address + 18H |

2.5 COM Port IRQ Selection

- **JP2**: COM4 IRQ setting,
- **JP4**: COM3 IRQ setting,
- **JP1**: COM2 IRQ setting,
- **JP3**: COM1 IRQ setting,

| IRQ | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 |
|-----|-----|-----|-----|-----|------|-------|-------|-------|
| 3 | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 4 | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| 5 | OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF |
| 7 | OFF | OFF | OFF | ON | OFF | OFF | OFF | OFF |
| 9 | OFF | OFF | OFF | OFF | ON | OFF | OFF | OFF |
| 10 | OFF | OFF | OFF | OFF | OFF | ON | OFF | OFF |
| 11 | OFF | OFF | OFF | OFF | OFF | OFF | ON | OFF |
| 12 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON |

Default Setting: COM1 - IRQ3, COM2 - IRQ4, COM3 - IRQ5, COM4 - IRQ7.

2.6 IRQ sharing mode selection

- **JP6**: IRQ sharing mode selection

| Mode | 13-14 | 15-16 |
|---|-------|-------|
| *Independent IRQ Mode | ON | ON |
| COM1~COM4 share 1 IRQ(assigned by JP3) | OFF | ON |

*: Default

Chapter 3. Connection

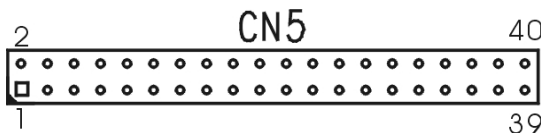
This chapter describes how to connect peripherals, switches and indicators to the PM-1004-R20 board.

3.1 RS-232/422/485 Connector

The serial ports are high speed NS16C550 compatible UART with Read/Receive 16 byte FIFO.

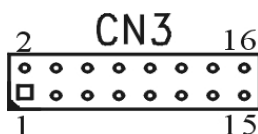
- **CN5(RS-232): COM1 ~ COM4 Serial Port Connectors.**

| PIN NO | DESCRIPTION | PIN NO | DESCRIPTION |
|--------|-------------|--------|-------------|
| 1 | DCD(COM1) | 2 | DSR(COM1) |
| 3 | RXD(COM1) | 4 | RTS(COM1) |
| 5 | TXD(COM1) | 6 | CTX(COM1) |
| 7 | DTR(COM1) | 8 | RI (COM1) |
| 9 | GND(COM1) | 10 | GND(COM1) |
| 11 | DCD(COM2) | 12 | DSR(COM2) |
| 13 | RXD(COM2) | 14 | RTS(COM2) |
| 15 | TXD(COM2) | 16 | CTX(COM2) |
| 17 | DTR(COM2) | 18 | RI (COM2) |
| 19 | GND(COM2) | 20 | GND(COM2) |
| 21 | DCD(COM3) | 22 | DSR(COM3) |
| 23 | RXD(COM3) | 24 | RTS(COM3) |
| 25 | TXD(COM3) | 26 | CTX(COM3) |
| 27 | DTR(COM3) | 28 | RI (COM3) |
| 29 | GND(COM3) | 30 | GND(COM3) |
| 31 | DCD(COM4) | 32 | DSR(COM4) |
| 33 | RXD(COM4) | 34 | RTS(COM4) |
| 35 | TXD(COM4) | 36 | CTX(COM4) |
| 37 | DTR(COM4) | 38 | RI (COM4) |
| 39 | GND(COM4) | 40 | GND(COM4) |



- **CN3 (RS-422/485): COM1 ~ COM4 Serial Port Connectors.**

| PIN NO | DESCRIPTION | PIN NO | DESCRIPTION |
|--------|-------------|--------|-------------|
| 1 | TX+ (COM1) | 2 | TX- (COM1) |
| 3 | RX+ (COM1) | 4 | RX- (COM1) |
| 5 | TX+ (COM2) | 6 | TX- (COM2) |
| 7 | RX+ (COM2) | 8 | RX- (COM2) |
| 9 | TX+ (COM3) | 10 | TX- (COM3) |
| 11 | RX+ (COM3) | 12 | RX- (COM3) |
| 13 | TX+ (COM4) | 14 | TX- (COM4) |
| 15 | RX+ (COM4) | 16 | RX- (COM4) |



- **COM1 ~ COM4 RS232/RS422/RS485 mode Selection**

| | | | |
|-----|-----------|------|-----------|
| JP7 | COM1 | JP8 | COM2 |
| 1-2 | RS232 | 1-2 | RS232 |
| 2-3 | RS422/485 | 2-3 | RS422/485 |
| JP9 | COM3 | JP10 | COM4 |
| 1-2 | RS232 | 1-2 | RS232 |
| 2-3 | RS422/485 | 2-3 | RS422/485 |

3.2 PC/104 Expansion Bus

The PC/104 expansion bus on the enables you to attach it to the PC/104 slot of a target system. The PC/104 bus has already become an industrial embedded PC bus standard, so you can easily install thousands of PC/104 modules from hundreds of vendors in the world. There are two types of connectors on this board -- PC/104-64 and PC/104-40.

● PC/104-40 Connector

| PIN NO | DESCRIPTION | PIN NO | DESCRIPTION |
|--------|-------------|--------|-------------|
| D1 | GND | C1 | GND |
| D2 | MCS16# | C2 | SBHE# |
| D3 | IOCS16# | C3 | LA23 |
| D4 | IRQ10 | C4 | LA22 |
| D5 | IRQ11 | C5 | LA21 |
| D6 | IRQ12 | C6 | LA20 |
| D7 | IRQ15 | C7 | LA19 |
| D8 | IRQ14 | C8 | LA18 |
| D9 | DACK0# | C9 | LA17 |
| D10 | DRQ0 | C10 | MEMR# |
| D11 | DACK5# | C11 | MEMW# |
| D12 | DRQ5 | C12 | SD8 |
| D13 | DACK6# | C13 | SD9 |
| D14 | DRQ6 | C14 | SD10 |
| D15 | DACK7# | C15 | SD11 |
| D16 | DRQ7 | C16 | SD12 |
| D17 | VCC | C17 | SD13 |
| D18 | MASTER# | C18 | SD14 |
| D19 | GND | C19 | SD15 |
| D20 | GND | C20 | GND |

● PC/104-64 Connector

| PIN NO | DESCRIPTION | PIN NO | DESCRIPTION |
|--------|-------------|--------|-------------|
| A1 | IOCHCK# | B1 | GND |
| A2 | SD7 | B2 | IRSTDRV |
| A3 | SD6 | B3 | VCC |
| A4 | SD5 | B4 | IRQ9 |
| A5 | SD4 | B5 | -5V |
| A6 | SD3 | B6 | N/C |
| A7 | SD2 | B7 | -12V |
| A8 | SD1 | B8 | ZWS |
| A9 | SD0 | B9 | +12V |
| A10 | IOCHRDY | B10 | GND |
| A11 | AEN | B11 | SMEMW# |
| A12 | LA19 | B12 | SMEMR# |
| A13 | LA18 | B13 | IOW# |
| A14 | LA17 | B14 | IOR# |
| A15 | LA16 | B15 | DACK3# |
| A16 | LA15 | B16 | DRQ3 |
| A17 | LA14 | B17 | DACK1# |
| A18 | LA13 | B18 | DRQ1 |
| A19 | LA12 | B19 | REFRESH# |
| A20 | LA11 | B20 | SYSCLK |
| A21 | LA10 | B21 | IRQ7 |
| A22 | LA9 | B22 | N/C |
| A23 | LA8 | B23 | IRQ5 |
| A24 | LA7 | B24 | IRQ4 |
| A25 | LA6 | B25 | IRQ3 |
| A26 | LA5 | B26 | N/C |
| A27 | LA4 | B27 | TC |
| A28 | LA3 | B28 | BALE |
| A29 | LA2 | B29 | VCC |
| A30 | LA1 | B30 | OSC |
| A31 | LA0 | B31 | GND |
| A32 | GND | B32 | GND |