PCM-36E06

PC/104 Advanced Communications Module

User Manual
Rev 0.2

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INTRODUCTION

The PCM-36E06 is a PC/104 Advanced Communication Module with the following features:

- 8-Bit PC/104 card with 16-Bit pass-through.
- Dual standard 16550 on-board UARTs with address & IRQ jumper selection.
- Solid and proven Trimble(r) 12-channel GPS engine, provides accurate performance, and is a Cost-effective GPS solution
- GPRS/GSM/PCS Cell Modem with internal TCP/IP stack with AT command control.
- GSM Tri Band 900/1800/1900 MHz International Cell Modem.
- Provision for Multi-Tech Socket Modem products, including 2400 to 56K baud dial-up modems, Bluetooth Modules with planned support for future communication technologies.
- Additional RS232 Serial Port.
- Single 5 Volt supply Operation.
- Compatible with virtually all Operating Systems including Linux, WinCE, WinXP and DOS.

The combination of GPS and a GPRS/GSM/PCS modem on a single PC/104 module is extremely useful. Any GPS application that needs to communicate will by nature require a wireless connection. The PCM-36E06, GPS/GPRS combination is an unprecedented value when both GPS and a Cell Modem are required.

The PCM-36E06 uses a 16550 compatible dual UART as the interface to communicate to the GPS, Cell Modem and Dial-Up Modem. Jumpers allow each UART to be individually mapped to different I/O locations and there are also jumpers to select the desired interrupt for each UART. Different component populations allow UART channel 1 to be configured for RS-232 Serial port or GPS communication, and channel 2 can be configured as a Dial-Up or GPRS/GSM/PCS Fax/Modem. There are many combinations possible, but not all may be available off-the-shelf. See www.emacinc.com for listings of the currently supported off-the-shelf combinations or contact info@emacinc.com to discuss a custom combination.

Following are summaries of the different modules.

GPS MODULE

The GPS engine used is the Trimble® Lassen iQ, a 12-channel parallel tracking engine which is ideally suited for embedded applications. The GPS uses a sophisticated satellite technology to locate and track any location in the world, in real-time. The Lassen iQ GPS receiver outputs a complete position, velocity, and time (PVT) solution in either NMEA version 3.0 ASCII or Trimble TSIP binary protocol. A Pulse-Per-Second (PPS) signal is available for very accurate timing and synchronization applications. This signal can be used to generate a processor interrupt if required. See the Trimble® Lassen iQ PDF for more details.

DIAL-UP MODEM MODULE

The Dial-Up Fax/Modem utilizes a standard Multi-Tech embedded socket modem module. These modem modules come in a variety of speeds from 2400 baud to 56K baud and can be easily exchanged. There are also other modules available from Multi-Tech that can plug into this modem socket, including a Bluetooth module. They have plans to support other emerging communication technologies as well. See the Multi-Tech SocketModem PDFs for more details.

CELL MODEM MODULE

The Telit GPRS/GSM/PCS Fax/Modem is the ideal solution for remote wireless data communications. It supports 900, 1800, 1900 Mhz bands allowing it to work internationally at packed data rates of up to 85.6Kbps. This GPRS modem also provides an internal TCP/IP stack allowing lower-end operating systems such as DOS to communicate over the Internet. Modem control is handled through the simple and familiar AT command set eliminating the need for custom drivers. See the Telit GM862-PCS PDF for more details

SPECIFICATIONS

UARTS

- **IC:** National Semiconductor 16550 compatible PC16552 Dual UART or equivalent.
- **UART Channel 1:** RS232 Serial Port or GPS MODULE
- **UART Channel 2:** Dial-Up Modem Module or GPRS/GSM Cell Modem.
- **Baud Rate:** 50 ~ 115,200 bps.
- **Interrupts:** IRQ 3,4,5,6,7,9,10,11,12, or 15, individually selectable or shared.
- **I/O Addressing:** I/O address range for each channel is individually jumper selectable from 200 to 3F8 Hex.

GPS MODULE

- **Control Chipset:** Trimble(r) Colossus RF ASIC & IO-TS DSP, 32-Bit RISC CPU.
- **Receiving Channel:** 8-channel, continuous tracking receiver with 32 correlators
- **Receiving Frequency:** L1 (1575.42 MHz), C/A code.
- **Protocols:** TSIP, TAIP & NMEA.
- **Navigation Update Rate:** 1 Hz (1 second).
- **Time to First Fix:** Cold start 84 seconds, Warm start 42 seconds, Hot Start 13 seconds.
- **Antenna:** Trimble P/N 39265-02 with 15' of cable. GPS has antenna short-circuit detection and protection.

CELL MODEM MODULE

- **Control Module:** Telit GM862-PCS
- **Output Frequency:** GSM - 900 Mhz, DCS - 1800 Mhz, PCS-1900 MHz.
- **Output Power:** GSM - 2 Watt Peak, DCS - 1 Watt Peak, PCS-1 Watt Peak.
- **Compliance:** GPRS class B -class 10. GSM Phase 2/2+.
- **Modem Control:** AT Command set with ITU, GSM, GPRS, Telit extensions.
- **Sensitivity:** Better than -102 dBm in normal operating conditions.
- **Data Speed:** CSD up to 14.4Kbps. Packed Data up to 85.6Kbps.
- **Clock:** Real-Time Clock/Calendar with Alarm functionality.
- **Antenna:** 50 Ohm, 1.6" high Helical Stub with a cable length of 9".

DIAL-UP MODEM MODULE

- **Data Modem:** ITU-T V.92/V.90/56K, V.34/33.6K, V.32bis/14.4K, V.22bis/2400 baud.
- **Fax Modem:** ITU-T V.17, V.29, V.27, V.21.
- **Approvals:** Global
- **Certifications:** UL1950, CSA 950, EN 60950, AS 3260, CCC, FCC Part 15.
- **Modem Control:** AT Command set.
- **Error Correction:** V.42 LAPM, MNP 2-4.
- **Data Compression:** V.42bis, MNP Class 5.
- **Modem Speed:** 56 Kbps maximum.
- **Fax Speed:** 14.4 Kbps maximum..

MECHANICAL AND ENVIRONMENTAL

- **Power Requirements:** 5 V ± 5 %, ripples within 50 mV p-p
- **Power Consumption:** + 5 V @ 300 mA (typical)
- **Operating Temperature:** 0° ~ 60°C (32° ~ 140°F)
- **Operating Humidity:** 0% to 95% relative humidity, non-condensing
- **Board Dimensions:** 96 mm x 90 mm (3.77" x 3.54") (L x W)
- **Weight:** approximately102 g (0.224 lbs.)

CONFIGURATION

SETTING THE UART I/O ADDRESSES

There are two jumper blocks to set the I/O addresses for the UARTS and the control register:

JB4 UART 1 (RS232 Serial port or GPS)
JB5 UART 2 (Dial-Up or GPRS/GSM/PCS Fax/Modem)

Each jumper block shows a hexadecimal weighted value to the left of it. To determine the address, add the weighted value of each shunt present and add 200 hex to the total. The following table shows the jumper settings for common UART addresses.

	ADDRESSES			
	3F8	3E8	2F8	2E8
008	■■	■■	■■	■■
010	■■		■■	
020	■■	■■	■■	■■
040	■■	■■	■■	■■
080	■■	■■	■■	■■
100	■■	■■		

For example, if you look at the 2E8 column, the values added would be (008+020+040+080)+200=2E8.

IRQ SELECTION

There are three jumper blocks for selecting IRQs:

JB1 UART 1 (RS232 Serial port or GPS)
JB2 UART 2 (Dial-Up or GPRS/GSM/PCS Fax/Modem)
JB3 GPS 1Hz timing signal (PPS). See GPS Module for more details.

Only one shunt per jumper block should be used.

CELL MODEM CONFIGURATION

A SIM must be obtained from your cell service provider and inserted in the cell modem module as shown on the sticker on the module

If the cell modem is used for incoming and outgoing server type data exchange communication, an Internet type APN should be requested which provides a Public incoming and outgoing IP address.

The cell modem should be queried to make sure it is configured with the correct frequency band for its region. The code for each band is shown below.

BAND CODE	FREQUENCY	REGION
0	DCS 1800 MHz	EUROPE
1	PCS 1900 MHz	U.S.

The command AT#BND? will return the current band code configuration. If this is not the desired band, the command AT#BND=0 or AT#BND=1 can be used to set it. This is a non-volatile configuration.

CONNECTORS

HDR1: CONFIGURATION

This should not be used. It is only used for configuration during manufacturing.

HDR2: UART 1, RS-232 PORT

The optional RS-232 serial port connector has the following pin assignments.

HDR2 (UART 1)			
(NOT USED)	1	2	(NOT USED)
RECEIVE	3	4	**RTS**
TRANSMIT	5	6	**CTS**
(NOT USED)	7	8	(NOT USED)
GROUND	9	10	(NOT USED)

The pin assignments for the DB9 adaptor that plugs into this header are related, but different.

DB9 PIN #	DESCRIPTION
1	(NOT USED)
2	**RECEIVE**
3	**TRANSMIT**
4	(NOT USED)
5	**GROUND**
6	(NOT USED)
7	**RTS**
8	**CTS**
9	(NOT USED)

HDR3: DIAL-UP MODEM SPEAKER

If the dial-up modem is installed, HDR3 allows connecting an external speaker for monitoring the dial-up modem's call progress.

1- **SPEAKER OUTPUT**
2- **GROUND**

JK1: PHONE LINE JACK

If the dial-up modem is installed, this provides a standard jack for connecting the modem to the phone line.

CONTROL REGISTER

The control register implemented is a single register but it is accessible from two separate I/O addresses. The register addresses are the UART 1 and UART 2 base addresses +7. For example, if UART 1 was at 3F8 and UART 2 was at 2E8, the control register would be accessible at both 3FF (3F8+7) and 2EF (2E8+7).

The register is defined as follows:

BIT	RD	WR[1]	FUNCTION
0	✓		Read state of the UART 1 (RS-232 or GPS Module) Interrupt line
1	✓		Read state of the UART 2 (Dial-Up or Cell Modem) Interrupt line
2	✓		Read state of the GPS Pulse-Per-Second (PPS) output line
3	✓		Read state of the ISA reset-in line
4	✓		Read state of the Cell Modem PWRCTL line (reads 1if the Cell Modem is on)
5	✓	✓	Read or Write the state of the active-low reset out (resets the Dial-Up Modem)
6	✓	✓	Read or Write the state of the output port[2] that drives the Cell Modem ON/OFF toggle input.
7	✓		Not used. Reads 0.

NOTES:

(1) Writing to a bit without write capability has no effect.

(2) The output of this port is inverted before being presented to the ON/OFF pin of the Cell Modem, so it is active high. A one-second (min) high pulse is required to change the ON/OFF state of the Cell Modem (reflected by the PWRCTL monitor bit). If PWCTL is 1, a 1 second pulse will turn OFF the modem. If PWCTL is 0, a 1 second pulse will turn ON the modem.