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## PowerInfo™ 2 Configuration Interface

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### Features

- Hardware platform for configuration, verification and test of Microchip PS70X and PS5XX ICs
- Operates under control of Windows® based PowerMate™ (PS70X) software and PowerTool™ 500 (PS5XX) software through an RS-232 port or USB interface to the PC
- Directly connects to assembled PS70X or PS5XX battery pack
- SMBus communication managed by onboard processor
- Supports loading and verification of battery configuration parameters and 3D cell models in memory
- Pluggable battery connector for convenience and flexibility
- Terminals for attachment to an external load or charger
- Powered through USB port or by 12V DC external supply (included) when connected to RS-232 port
- Production proven EMI/ESD protection
- Overall mechanical dimensions:
  - 2.5 W x 4.0 L (inches)
  - 63.5 W x 101.6 L (millimeters)

### Ordering Information

| Part No. | Description                  |
|----------|------------------------------|
| PS051    | PowerInfo™ 2 Interface Board |

### Development/Test Software

| Part No. | Description                                |
|----------|--|
| PS070    | PowerMate™ Software for use with PS70X     |
| PS050    | PowerTool™ 500 Software for use with PS5XX |

# PS051

## 1.0 PRODUCT OVERVIEW

The PowerInfo 2 board is a simple, easy to use hardware interface that supports configuration, verification and test of Microchip PS70X and PS5XX ICs. It operates under the control of Microchip's development/test software interfaced to a Windows PC.

The PowerInfo 2 board facilitates serial or USB communication between the PC and the SMBus battery interface. If connected to the PC's serial (RS-232) port, the PowerInfo 2 board must be powered through an external 12V DC power supply. If connected through a USB port, no additional power is required.

## 2.0 GENERAL SETUP

The Microchip PowerInfo 2 interface facilitates communication between a battery containing a Microchip PS5XX or PS70X IC and a PC running Microchip's development/test software. The information that follows will guide you through the setup of the various features available.

### 2.1 Connections

- P1 – Serial (RS-232)
- J1 – USB
- J2 – 12V DC power supply (used with serial connection only)
- TB1 – Pluggable terminal block for device under test. Looking into the connector on the board, the pins from left to right are:
  - V+ (VP): Battery pack positive
  - C: SMBus clock
  - D: SMBus data
  - T: T-pin
  - V- (VN): Battery pack negative
- TB2 – External charger or load connection

### 2.2 Jumpers

- ADR – Jumper for board address identification

| Address | Jumper Position |     |
|---------|-----------------|-----|
|         | 2-3             | 1-4 |
| 0       | X               | X   |
| 1       | X               | O   |
| 2       | O               | X   |
| 3       | O               | O   |

**Legend:** O = open, X = connect

### 2.3 USB Setup

The preferred method to connect PowerInfo 2 to the PC is through the USB port. Connect the USB cable from J1 on the PowerInfo 2 board to the USB port on the PC. The board is now powered through the USB connection. Attach your battery to the TB1 connector and launch the Microchip development/test software on the PC.

### 2.4 RS-232 Setup

Connect the serial cable from P1 on the PowerInfo 2 board to the RS-232 port on the PC. Connect a 12V DC power supply to J2 and plug it into the electrical outlet. The board is now powered. Attach your battery to the TB1 connector and launch the Microchip development/test software on the PC.

### 2.5 Charger/Load Setup (Optional)

A battery charger or a load can be attached at TB2 to exercise the device under test.

## 3.0 PS700Driver SETUP

The software driver for PS700 was developed for a PIC<sup>®</sup> microcontroller and can be installed on the PowerInfo 2 board when using a PS705X module board or a PS7070 evaluation board. This software driver is distributed on a PIC16F876 when a license agreement has been executed.

### 3.1 Installing PS700Driver

Disconnect the PS051 from power and PC. Remove the PIC microcontroller at location U1. Keep this IC in a safe place as it must be replaced to operate the PS051 with another PowerSmart<sup>®</sup> product, such as PS501. Install the PS700Driver at location U1. The PowerInfo 2 board can now be used with the PS700 development products.

### 3.2 Removing PS700Driver

To use the PS051 with another PowerSmart product, such as PS501, the PS700Driver must be removed and the PIC microcontroller originally located at U1 replaced. Disconnect the PS051 from power and PC. Remove the PS700Driver at location U1. Install the original PIC microcontroller and reconnect PC and power connections.

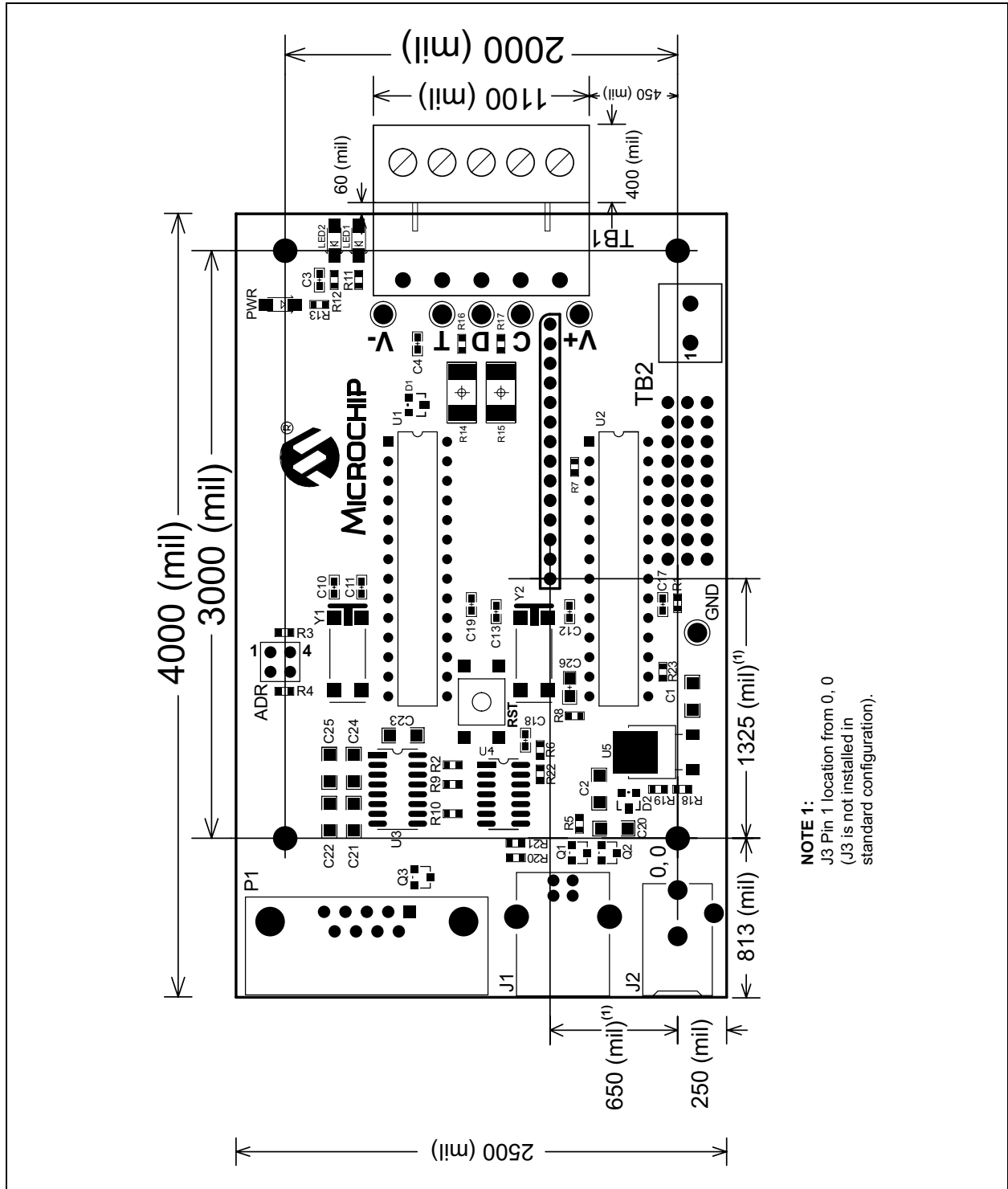
## 4.0 MECHANICAL DESCRIPTION

PCB schematics and bill of materials are included here for completeness. To download the full size schematic and BOM, please visit the Microchip web site at [www.microchip.com](http://www.microchip.com).

## 4.1 Mechanical Dimensions

Overall Dimensions: 2.5"W x 4.0"L.

**FIGURE 4-1: PS051 DIMENSION DETAILS**

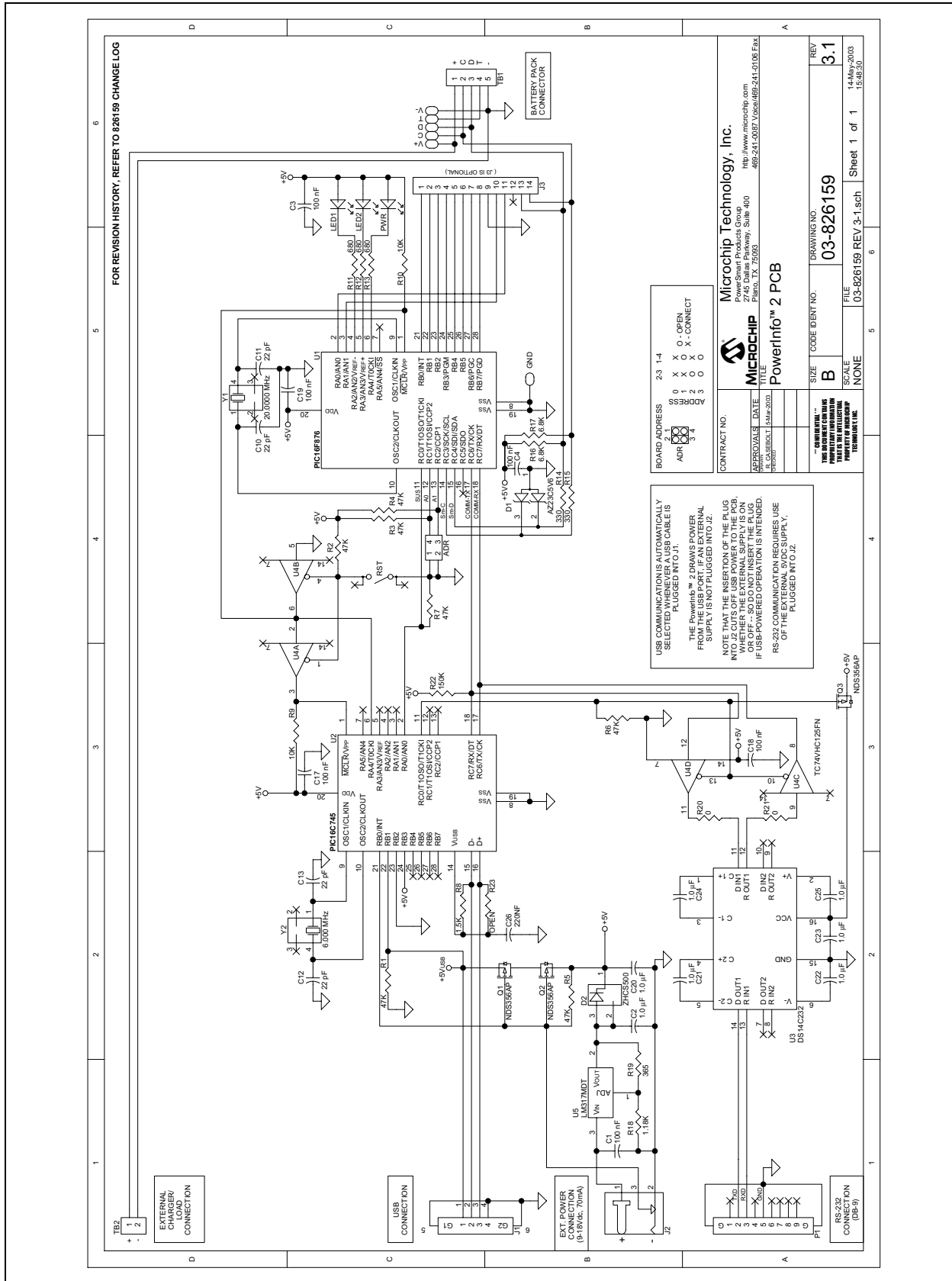


**NOTE 1:**  
 J3 Pin 1 location from 0, 0  
 (J3 is not installed in  
 standard configuration).

# PS051

## 4.2 Schematic

FIGURE 4-2: PS051 BOARD SCHEMATIC



## 4.3 Bill of Materials

**TABLE 4-1: PS051 BILL OF MATERIALS**

| Symbols           | Description   | Manufacturer                 | Manufacturer PN                    | Qty. |
|-------------------|---|------------------------------|------------------------------------|------|
|                   | Raw PCB, PowerInfo™ 2   | Microchip                    | 04-826159 Rev. 3.1                 | 1    |
| U1                | Firmware Specification, PowerInfo™ 2 Main MCU   | None                         | Document                           | Doc. |
| U2                | Firmware Specification, PowerInfo™/PowerCal™ USB MCU  | None                         | Document                           | Doc. |
| C10-C13           | Capacitor, Ceramic, 22 pF, 50V, +/-5%, C0G dielectric, 0603   | Panasonic                    | ECJ-1VC1H220J                      | 4    |
| C3-C4,<br>C17-C19 | Capacitor, Ceramic, 100 nF, 25V, +80%/-20%, Y5V dielectric, 0603  | Panasonic                    | ECJ-1VF1E104Z                      | 5    |
| C26               | Capacitor, Ceramic, 220 nF, 25V, +/-10%, X7R dielectric, 0805   | Panasonic                    | ECJ-2YB1E224K                      | 1    |
| C2, C20-C25       | Capacitor, Ceramic, 1.0 µF, 25V, +/-10%, X7R dielectric, 1206   | Panasonic                    | ECJ-3YB1E105K                      | 7    |
| C1                | Capacitor, Ceramic, 100 nF, 50V, +/-10%, X7R dielectric, 1206   | BC Components                | 1206B104K500BT                     | 1    |
| LED1-LED2,<br>PWR | LED, clear green, 1206 package  | Lumex                        | SML-LX1206GC-TR                    | 3    |
| D2                | Schottky Diode, 40V, 500 mA, SOT-23   | Zetex                        | ZHCS500TA                          | 1    |
| D1                | Dual Zener Diode, 5.6V +/- 5%, 300 mW, common-anode, SOT-23   | Diodes Inc.<br>General Semi. | AZ23C5V6-7<br>AZ23-C5V6            | 1    |
| ADR               | Connector, shorting jumper, female, 2-position, 100 mil spacing, mates with 25 mil square pins, 15-microinch gold over nickel                             | AMP                          | 382811-6                           | 2    |
| TB1               | Header, pluggable terminal block, 5.08 mm pitch x 5 positions, 12A/250V, right angle, closed end  | Phoenix                      | 1757271                            | 1    |
| U1, U2            | IC socket, 28-pin DIP, 300 mil width  | Mill-max                     | 110-99-328-41-001                  | 2    |
| J2                | Connector, coaxial power, female, 2.0 mm center pin x 6.5 mm sleeve, right angle PCB mount  | Cui Stack                    | PJ-102A                            | 1    |
| TB2               | Terminal block, PCB, 5.08 mm pitch x 2 positions, 16A/250V  | Phoenix                      | 1729128                            | 1    |
| V-, GND           | Test point, 0.125" OD, for 0.062" hole, black   | Keystone                     | 5011                               | 2    |
| V+                | Test point, 0.125" OD, for 0.062" hole, red   | Keystone                     | 5010                               | 1    |
| C, D, T           | Test point, 0.125" OD, for 0.062" hole, white   | Keystone                     | 5012                               | 3    |
| J1                | Connector, USB type B, right angle PCB mount, shielded  | Mill-max<br>Molex            | 897-30-004-90-000000<br>67068-0000 | 1    |
|                   | Bumper, hemispherical, 0.44"D x 0.20"H, transparent plastic   | 3M                           | SJ-5303 (CLEAR)                    | 4    |
| ADR               | Connector, break-apart PCB header, straight, 2-row x 36-pin, 100 x 100 mil spacing, 235 mil/100 mil/145 mil length, 25 mil square pins, 10-microinch gold | 3M                           | 929665-09-36-I                     | 1    |
| TB1               | Pluggable terminal block, 5.08 mm pitch x 5 positions, 12A/250V   | Phoenix                      | 1757048                            | 1    |
| P1                | Connector, DB9 right angle PCB mount, female sockets  | Norcomp                      | 182-009-212-531                    | 1    |
| Q1-Q3             | MOSFET, P-channel, -30V, -1.1A, 0.2 ohms, SOT-23  | Fairchild Semi.              | NDS356AP                           | 3    |
| R18               | Resistor, film, 0603, 1%, 1.18 kOhms  | Panasonic                    | ERJ-3EKF1181V                      | 1    |
| R19               | Resistor, film, 0603, 1%, 365 ohms  | Panasonic                    | ERJ-3EKF3650V                      | 1    |
| R20-R21           | Resistor, 0603, zero ohm  | Panasonic                    | ERJ-3GEY0R00V                      | 2    |
| R8                | Resistor, film, 0603, 5%, 1.5 kOhms   | Panasonic                    | ERJ-3GEYJ152V                      | 1    |
| R9-R10            | Resistor, film, 0603, 5%, 10 kOhms  | Panasonic                    | ERJ-3GEYJ103V                      | 2    |
| R22               | Resistor, film, 0603, 5%, 150 kOhms   | Panasonic                    | ERJ-3GEYJ154V                      | 1    |
| R1-R7             | Resistor, film, 0603, 5%, 47 kOhms  | Panasonic                    | ERJ-3GEYJ473V                      | 7    |
| R16-R17           | Resistor, film, 0603, 5%, 6.8 kOhms   | Panasonic                    | ERJ-3GEYJ682V                      | 2    |
| R11-R13           | Resistor, film, 0603, 5%, 680 ohms  | Panasonic                    | ERJ-3GEYJ681V                      | 3    |
| R14-R15           | Resistor, film, 2512, 5%, 330 ohms  | Panasonic                    | ERJ-1TYJ331U                       | 2    |
| RST               | Switch, SPST momentary tact, surface mount, 6 mm square, 4.3 mm high, 260 G-force   | E-Switch                     | TL3301NF260QG                      | 1    |
| U1                | IC, Microcontroller, 20 MHz, with Flash EEPROM, 28-pin/300 mil DIP, 0°C to 70°C   | Microchip                    | PIC16F876-20/SP                    | 1    |
| U2                | IC, Microcontroller, 24 MHz, with USB Interface, 28-pin/300 mil DIP, -40°C to +85°C   | Microchip                    | PIC16C745-I/SP                     | 1    |
| U4                | IC, quad buffer with tri-state outputs, VHCMOS, SO-14, -40°C to +85°C   | Toshiba                      | TC74VHC125FN                       | 1    |
| U3                | IC, RS-232 transceiver, SO-16, 0°C to 70°C  | National Semi.               | DS14C232CM                         | 1    |
| U5                | IC, Linear Voltage Regulator, adjustable 1.2 - 37V output, 500 mA, TO-252 package, 0°C to 125°C   | National Semi.               | LM317MDT                           | 1    |
| Y1                | Crystal, 20.0000 MHz, 18 pF load capacitance, surface mount.  | Citizen                      | CM309S20.000MABJTR                 | 1    |
| Y2                | Crystal, 6.0000 MHz, 18 pF load capacitance, surface mount.   | Citizen                      | CM309S6.000MABJTR                  | 1    |

# PS051

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## 5.0 DEVELOPMENT TOOL SUMMARY

Microchip provides all the necessary hardware and software to enable easy tailoring of battery control algorithm parameters and cell performance models to meet specific application requirements and attain the highest accuracy available anywhere. Table 5-1 summarizes the development tool offering from Microchip to support the PS5XX and PS70X products. Please refer to the Microchip web site for ordering information and design documentation (including schematics) at [www.microchip.com](http://www.microchip.com).

## 5.1 Reference Documents

This data sheet provides an overview of the PS051 Configuration Interface. For further information on other products and development tool operations, please refer to the following documents available for download at [www.microchip.com](http://www.microchip.com).

**TABLE 5-1: MICROCHIP DEVELOPMENT TOOL SUMMARY**

| Development Tool   | Use  |
|--|--|
| PowerInfo™ 2 hardware with Development/Test software (PS051) | Read and write battery registers and memory, pack test                   |
| PowerCal™ 2 hardware with Development/Test software (PS052)  | Read and write battery registers and memory, pack calibration, pack test |

**TABLE 5-2: MICROCHIP REFERENCE DOCUMENTS**

| Document Number | Documents Available                                    |
|-----------------|--|
| DS21774         | PS070 PowerMate™ Development Software Data Sheet       |
| DS21885         | PS050 PowerTool™ 500 Development Software User's Guide |

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