

# PS080, PowerTool<sup>™</sup> 800 Development Software User's Guide

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# **Chapter 1. Preface**

#### Features

- Supports user-friendly environments for development of battery systems incorporating Microchip's PS8XX IC family
- Microsoft<sup>®</sup> Windows<sup>®</sup> XP compatible
- Interfaces to PS8XX using Microchip PowerInfo<sup>™</sup> 2 or PowerCal<sup>™</sup> 2 hardware
- · Direct input of system parameters in battery cell specified units
- Advanced interactive editor allows quick IC configuration
- Logs reported parameters during discharge test for PS8XX device-based battery systems
- · Verifies proper assembly and correct communication
- Can be used without hardware to develop configuration files for PS8XX

#### **Ordering Information**

Part No.	Description
PS080	PowerTool™ 800 Development Software

#### Supported Hardware

Part No.	Description			
PS051	PowerInfo™ 2 Interface Board			
PS052	PowerCal™ 2 Calibration Board			
PS8070	PS8XX Fuel Gauge Evaluation Board			

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# Chapter 2. Overview

### 2.1 GENERAL OVERVIEW

PowerTool 800 is a Windows XP compatible software package that supports the rapid development and production of rechargeable battery systems based on Microchip's PS8XX ICs. PowerTool 800 simplifies the design process by providing a high-level, menu driven environment that allows the designer to quickly and easily develop, calibrate and test PS8XX device-based battery systems.

PowerTool 800 software interfaces to the battery system through the PowerInfo 2 interface board and PowerCal 2 calibration board. Dual data screens for raw and calculated data provide a user-friendly environment for design and debug.

During development, configuration defaults allow quick setup of PS8XX controlled systems. A simple parameter editor and an enhanced, interactive wizard help tailor the IC to the specific needs of the application and battery. Entry of battery parameters is performed using battery cell specified units, such as volts (V), millivolts (mV), milliamperes (mA) and milliampere-hours (mAh). The PowerTool 800 interface is divided into several pages which give access to a variety of fuel gauge functions.

With all of its advanced features, PowerTool 800 software increases the value of the complete Microchip battery management solution by lowering the costs associated with development, minimizing time to market and maximizing production throughput. PowerTool 800 software is offered free of charge and is available for download on the Microchip web site. It is also included with Microchip's hardware development tools summarized in Table 5-1. The following is a very brief overview of PowerTool 800 features. Please use the HTML Helpfile for additional information. It can be activated by clicking "Help" in the lower right corner of PowerTool 800.

#### 2.1.1 Configuration Wizard

Upon initial start-up of PowerTool 800, the configuration wizard begins. This five-step wizard guides you through basic PS8XX configuration. Click "Step 1" to begin.

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# **Chapter 3. Manufacturing Mode**

### 3.1 MANUFACTURING MODE

PowerTool 800 can be run in Manufacturing or Advanced Configuration mode. Manufacturing mode is typically used in production environments to limit access to only the programming and calibration functions.

#### 3.1.1 Setup Page

Page which contains detailed operation log, Run mode selection, system information and software Reset.

Log File USB Device Vendor ID: 0x04D8 USB Device Product ID: 0x7010 USB Device Version #: 0x0110 Wednesday, December 22, 2004, 10:48:31 1 MicroChip USB device(s) found. USB set as default communication method.	System Info
	System Configuration Available mmp files Default_Lithium  Create Setup File Run Mode MANUFACTURING  Startup Options Startup Options Modem Suppress
	PowerTool 800 Microchip Incorporated

#### FIGURE 3-1: SETUP PAGE

#### 3.1.2 Battery Data Page

Read all battery data values which are available over the communication interface. Write the values to a file and read and log data continuously from this page.



Setup       Battery Data         Temperature       Absolut         Voltage       Remit         Current       FullChar         AvgCurrent       AvgTTI         RelativeSOC       Battery	Cap De geCap Co Empty Ma	rcleCount	Port 1 - ManufID DeviceID KEELOQ GPIO
Powe 80	erTool Ba	attery Data	
Read Registers Re	ad Continuous	Clear Registers	Vrite Screen To ASCII

#### 3.1.3 Calibration Page

Set up and perform parameter initialization, calibration and testing. Use the View buttons to display the various routines. Click "Start" to write the configuration hexadecimal data file and fuel gauge created with the wizard and the date (the green buttons indicate that these two functions are enabled) to PS8XX memory.



# **Chapter 4. Advanced Configuration Mode**

#### 4.1 ADVANCED CONFIGURATION MODE

PowerTool 800 can be run in Manufacturing or Advanced Configuration mode. Advanced Configuration mode is typically used by engineers during system development and testing. Advanced Configuration mode includes the pages available in Manufacturing mode and those explained in this section.

#### 4.1.1 Parameters Page

Read and write all memory locations. Use buttons in the View box to display parameters in various categories. Click in the value text box of any parameter to display a description.

Setup Battery Data Pa	arameters Luts Battery Lab GPIO Utilities
	View Configuration Calibration Safety Charge/Disch Capacity Port 1
BattStatus	Lean_Cycle_Limit         Kpower         Config1         PW1         PW2         Stable_Curr         Crate_Hi         Kpower_SLP         Flags1         ADCListStartOffsel         GPI0SafePtr    PowerTool Reading Parameter Configuration
	What do you want to do?       Bisplay Data       Bisplay Data       Bisplay Data       Bisplay Data       Bisplay Data       File         From Attached Battery       From Existing Hex File       Default Values       File
	Close Help

#### FIGURE 4-1: PARAMETERS PAGE

### 4.1.2 LUTs Page

The modeled cell data is displayed here in raw (internal units) or decoded format.

#### FIGURE 4-2: LUTS PAGE

	SOC	Temp1	Temp2	Temp3	Temp4	Temp5	Temp6	Temp7	Temp8	^
Temperature Axis	-			_						11
VEOD@CR1	_									10
VEOD@CR2	_									10
VEOD@CR3	_									10
VEOD@CR4										- 8
VEOD@CR5										10
VEOD@CR6										10
VEOD@CR7										10
VEOD@CR8										Ш
Temperature Axis										17
Res Cap@CR1										ъ.
Important: When editing the luts, by either reading the battery or rea a known good hex file. Make you changes then write back to the ba or save to a hex file. <b>Read Batter</b>	ding er r ittery wi	ncoded. To:	ows LUT valu see what the a the LUT va	LUT values i	represent, sw change ther	vitch to Deco m in Raw mov	ded view. If	you	VEOD View De	) Bias

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### 4.1.3 Battery Lab Page

Graphical data can be collected and saved using the integrated plot utility.

### FIGURE 4-3: BATTERY LAB PAGE

											Port	1	Ŧ
18000	0 <b>—18000—</b> 1800	0-1										_	
17000	0 <b>—17000</b> —1700	0-											
16000	0 <b>—16000</b> —1600	0-											
15000	0-15000-1500	0-											
14000	0-14000-1400	0-											
13000	0 <b>—13000</b> —1300	D-											
12000	0 <b>—12000—</b> 1200	0-											
11000	0 <b>—11000</b> —1100	0-											
10000	0 <b>—10000</b> —1000		1		1	1		1		1	1	_	
belov	tep 1: Select whi w, then enable th a, press the 'Save	ne plot. If	you wish to	save the	3	4	then	p 2: Select I press the 'Si	tart' button. F	8 d for how long Press the butto e the plot has	on again if yo		
belov	w, then enable th a, press the 'Save Temperature	ne plot. If As' buttor	you wish to h and enter <b>)isabled</b>	ne drop down save the a filename.		Clear	Ste then	ep 2: Select I press the 'Si to stop takin	how often an tart' button. F	d for how long Press the butto e the plot has	g to take dat on again if yo	a, bu	
belov data,	w, then enable th a, press the 'Save Temperature Temperature	e plot. If As' buttor	you wish to n and enter	ne drop down save the a filename.			Ste then	ep 2: Select I press the 'Si to stop takin	how often an tart' button. F ig data befor	d for how long Press the butt e the plot has ery 5	g to take dat on again if yo finished.	a, bu	
belov data, Plot 1: Plot 2: Plot 3: Ste enter	w, then enable th a, press the 'Save Temperature Temperature	you may of Max value cale is aut	you wish to h and enter Disabled	e drop down save the a filename. Save As Save As Save As Y-axis scale fo ing the 'Set M et, and its units Scale in Max A	r the plots by	Clear Clear Clear	Ste then	p 2: Select I press the 'Si to stop takir Collect D	how often an Lart button. F Ig data before ata Once Ev Second(s Plot 2 Color Au File Sa	d for how long Press the butt e the plot has ery 5	g to take dat on again if yo finished. Seconds ess to Star Mouse Curse Par	a, au t	

### 4.1.4 GPIO Page

The general purpose I/Os are configured with the utility on this page. It is very flexible and allows the user to easily set up complex conditions to set and clear the GPIO pins.

#### FIGURE 4-4: GPIO PAGE

Setup   Battery Data   Parameters   Luts   Battery Lab GP	10 Utilitie	8		
View	)efault	Safety		Port 1 💌
Condition Group Set 🛛 💜	lode	GPIO Set	GPIO Clear	Mode
Param Comp Thresh Units C	CG 0			GPIO O
	G 1			GPIO 1
	CG 2			GPIO 2
Condition Group Clear	CG 3			GPIO 3
Param Comp Thresh Units	CG 4			GPIO 4
	CG 5			
	CG 6			GPIO 5
	CG 7			GPIO 6
Step 1: If you have not already, read an attached battery or a file using the buttons below. Modify or build condition groups b selecting a CG button, right clicking inside the Condition Group	ע			EOC
or Clear boxes, and editing individual conditions.		OR CG 0 to GPI0 1	Remove CG 0 From	EOD
Step 2: Assign Condition Groups to GPIOs by selecting a CG button and a GPIO button, then pressing the 'OR CG to GPIO' button. You can assign several condition groups to an individu GPIO.	ıal	Step 3: You can verify condition of the Mode buttons. Once you have assigned them to the appropriate Gi battery or a hex file using the buttor	group and GPIO assignmen created the condition grou PIOs, you can write this dai	its by using ps and
Read Battery Read Hex File	Writ	e To Battery Write To	Hex File Writ	e To ASCII
			Clo	ose Help

### 4.1.5 Utilities Page

Various utilities related to the power controller boards, PowerInfo 2 and PowerCal 2, are located here.



Setup   Battery Data   Parameters   Luts   Battery Lab   GPI0 Utilities	
PowerController	Port 1
These operations allow you to display information about the powercontroller, download new firmware, and perform basic diagnostics. Activity is displayed in the text box to the right and automatically written to	These diagnostics perform pass/fail tests on various functions of the PS8xx. Activity is displayed in the text box to the left and is automatically written to the log file.
the log file.	P8 Status
PwrController Info	P8 Version Info
Cal Factor Check	P8 FDB Pointer
LED Test	P8 Reset
COM Test     Attach battery first	P8 Unlock
TPIN Test     Detach battery first	Enter Bootloader Mode
Download F/W	Exit Bootloader Mode
VPP Off	SCLSET Cmd
Clear All	
PowerCal Calibration	
To calibrate PowerCal, select parameter to calibrate,	press 'Begin' and
follow instructions. Old and new calibration factors ar right and automatically written to the log file.	
ing it and automatically written to the log life.	
Parameter to Calibrate Instructions	Old New
VPack   Press 'Begin' to begin  calibration.  Begi	
	CF:
Actual	
	<u>Close</u> Help

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# **Chapter 5. Development Tools**

#### 5.1 DEVELOPMENT TOOL SUMMARY

Microchip provides all the necessary hardware and software to enable easy tailoring of charging, 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 PS8XX family. Please refer to the Microchip web site for ordering information and design documentation (including schematics) at www.microchip.com.

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

Development Tool	Use
PowerInfo <sup>™</sup> 2 hardware with PowerTool <sup>™</sup> 800 software (PS051)	Read and write memory and test
PowerCal <sup>™</sup> 2 hardware with PowerTool <sup>™</sup> 800 software (PS052)	Read and write memory, calibration and test



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