



MCP7383X
Li-Ion System
Power Path Management
Reference Design

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, Accuron, dsPIC, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PRO MATE, rPIC and SmartShunt are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Linear Active Thermistor, MXDEV, MXLAB, SEEVAL, SmartSensor and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, In-Circuit Serial Programming, ICSP, ICEPIC, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, PICkit, PICDEM, PICDEM.net, PICTail, PIC³² logo, PowerCal, PowerInfo, PowerMate, PowerTool, REAL ICE, rfLAB, Select Mode, Total Endurance, UNI/O, WiperLock and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

All other trademarks mentioned herein are property of their respective companies.

© 2008, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949:2002 ==

Microchip received ISO/TS-16949:2002 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC[®] MCUs and dsPIC[®] DSCs, KEELOQ[®] code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Table of Contents

Preface	1
Introduction.....	1
Document Layout	1
Conventions Used in this Guide	2
Recommended Reading.....	3
The Microchip Web Site	3
Customer Support	3
Document Revision History	3
 Chapter 1. Product Overview	
1.1 Introduction	5
1.2 What is the Li-Ion Battery Charger System Power Path Management Reference Design?	6
1.3 What the Li-Ion Battery Charger System Power Path Management Reference Design kit Includes	6
 Chapter 2. Installation and Operation	
2.1 Introduction	7
2.2 Features	7
2.3 Getting Started	8
 Appendix A. Schematic and Layouts	
A.1 Introduction	11
A.2 Board – Schematic	12
A.3 Board – Top Layer	13
A.4 Board – Top Metal Layer	13
A.5 Board – Bottom Layer	14
 Appendix B. Bill Of Materials (BOM)	
Worldwide Sales and Service	16

Li-Ion System PPM Reference Design

NOTES:

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXA”, where “XXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE on-line help. Select the Help menu, and then Topics to open a list of available on-line help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the Li-Ion System PPM Reference Design. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Recommended Reading
- The Microchip Web Site
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to use the Li-Ion System PPM Reference Design as a development tool to emulate and debug firmware on a target board. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the Li-Ion System PPM Reference Design.
- **Chapter 2. “Installation and Operation”** – Includes instructions on how to get started with this user’s guide and a description of the user’s guide.
- **Appendix A. “Schematic and Layouts”** – Shows the schematic and layout diagrams for the Li-Ion System PPM Reference Design.
- **Appendix B. “Bill Of Materials (BOM)”** – Lists the parts used to build the Li-Ion System PPM Reference Design.

Li-Ion System PPM Reference Design

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB[®] IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File>Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

RECOMMENDED READING

This user's guide describes how to use Li-Ion System PPM Reference Design. The following Microchip document is recommended as supplemental reference resources.

MCP73832 Data Sheet, “Miniature Single-Cell, Fully Integrated Li-Ion, Li-Polymer Charge Management Controllers”, DS21984

This data sheet provides detailed information regarding the MCP73832 product family.

MCP73833 Data Sheet, “Stand-Alone Linear Li-Ion / Li-Polymer Charge Management Controller”, DS22005

This data sheet provides detailed information regarding the MCP73833 product family

AN1149, “Design A Load Sharing System Power Path Management with Microchip’s Stand-Alone Li-Ion Battery Charger”, DS01149

This application note provides general information regarding designing with Microchip’s stand-alone Li-Ion / Li-Polymer charge management controller product family.

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user’s guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://support.microchip.com>

DOCUMENT REVISION HISTORY

Revision A (July 2008)

- Initial Release of this Document.

Li-Ion System PPM Reference Design

NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

Portable electronics has played an important role in modern era. Due to the natural characteristics of Li-Ion / Li-Polymer batteries, they are the most popular power sources for mobile devices. However, extra care in design is always important to implement Li-Ion / Li-Polymer batteries. System Power Path Management allows end-users to charge their batteries without interruption. This reference design is developed to assist product designers in reducing product design cycle and time by utilizing Microchip’s favorite stand-alone Li-Ion battery charge management controllers with system power path management.

This chapter provides an overview of the Li-Ion Battery Charger System Power Path Management Reference Design and covers the following topics:

- “What is the Li-Ion Battery Charger System Power Path Management Reference Design?”
- “What the Li-Ion Battery Charger System Power Path Management Reference Design Kit includes.

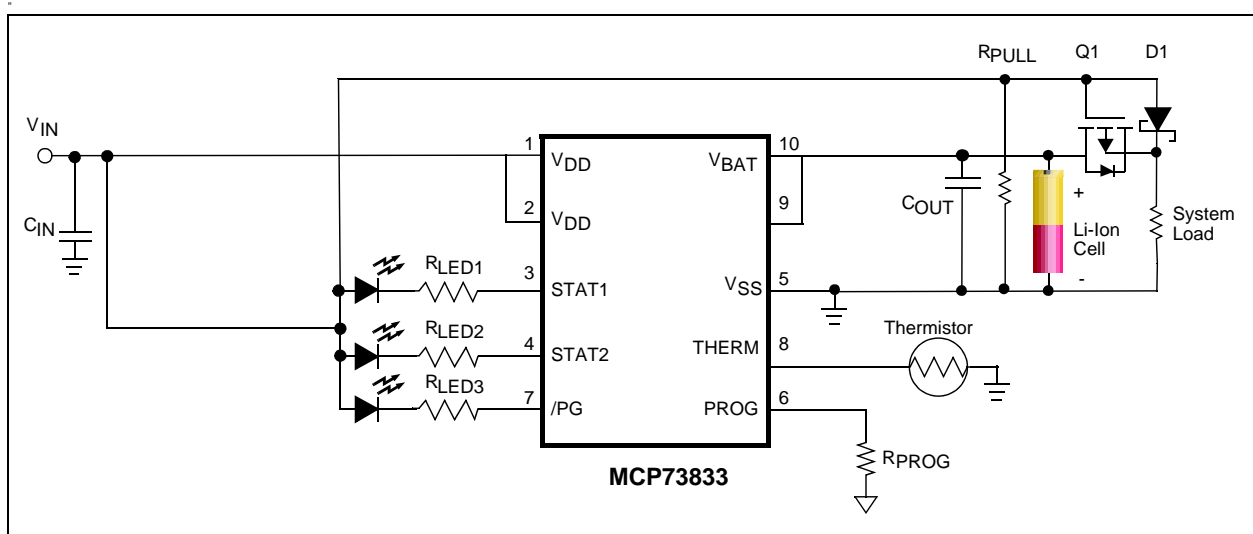


FIGURE 1-1: MCP73833 With System Power Path Management Application.

Li-Ion System PPM Reference Design

1.2 WHAT IS THE LI-ION BATTERY CHARGER SYSTEM POWER PATH MANAGEMENT REFERENCE DESIGN?

The Li-Ion Battery Charger System Power Path Management Reference Design demonstrates the features of Microchip's MCP73832 "*Miniature Single-Cell, Fully Integrated Li-Ion, Li-Polymer Charge Management Controllers*" and MCP73833 "*Miniature Single-Cell, Fully Integrated Li-Ion, Li-Polymer Charge Management Controllers*" with the load sharing system power path management capability.

There are two independent circuits on the reference design. First circuit is designed with MCP73832, which allows maximum programmable fast charge current up to 500 mA. The second circuit is designed with MCP73833, which allows maximum programmable fast charge current up to 1A and has a power good indicator and an additional status output. Two preset values of fast charge current are available for each circuit by a SPDT dip on the board for users to experience different speed.

Note: Please refer to Table 2-1 for Charge Status Outputs and Table 2-2 for charge current setups.

Both circuits come with load sharing system power path management feature. This feature allows a DC Power Source to support system load while charging a Li-Ion battery. When the DC Power Source is absent, the Li-Ion battery will support system load and stop charging.

The Li-Ion Battery Charger System Power Path Management Reference Design is designed to observe the performance and features on the circuits via multiple test points. Circuits can also be implemented into suitable applications without additional work.

1.3 WHAT THE LI-ION BATTERY CHARGER SYSTEM POWER PATH MANAGEMENT REFERENCE DESIGN KIT INCLUDES

This Li-Ion Battery Charger System Power Path Management Reference Design kit includes:

- Li-Ion Battery Charger System Power Path Management Reference Design, 102-00120
- Analog and Interface Products Demonstration Boards CD-ROM (DS21912)
 - Li-Ion System PPM Reference Design, DS51746
 - MCP73833 Data Sheet, "*Miniature Single-Cell, Fully Integrated Li-Ion, Li-Polymer Charge Management Controllers*", DS21984
 - MCP73832 Data Sheet, "*Stand-Alone Linear Li-Ion / Li-Polymer Charge Management Controller*", DS22005

Chapter 2. Installation and Operation

2.1 INTRODUCTION

The Li-Ion Battery Charger System Power Path Management Reference Design demonstrates Microchip's stand-alone Linear Li-Ion Battery Chargers - MCP73832 and MCP73833 while allowing input power source to operate the system load. The system load can also be supported by the Li-Ion battery when input power is disconnected. A number of device options allow the MCP73832 and the MCP73833 to be utilized in a variety of applications. Please refer to the MCP73832 data sheet (DS21984) and MCP73833 data sheet (DS22005) for device options.

Typical applications for the reference design are Smart Phones, PDA, Portable Media Players, MP3 Players, Digital Cameras, Handheld Medical devices, Bluetooth headsets, Ultra-Mobile PC and Portable Communicators.

2.2 FEATURES

The Li-Ion Battery Charger System Power Path Management Reference Design has the following features:

- Load sharing system power path management that support charging single cell Li-Ion battery and system load at the same time without affecting charging algorithm of Microchip's stand-alone charge management controllers.
- The system load is supported by Li-Ion battery when input power source is removed
- Blue LED indicates charge status
- Additional Red LED to indicate Power-Good (\overline{PG}) and Green LED to indicate charge complete (Available from MCP73833)
- Dip Switch to select programmable fast charge current between 1000 mA (H) and 50 mA (L) for MCP73833 and 400 mA (H) and 25 mA (L) for MCP73832
- Available THERM pin on the MCP73833 for temperature monitoring with a thermister. It is disabled by default and can be enabled to use with NTC thermister.
- Preconditioning of deeply depleted cells.
- Internal Safety Timer (available from MCP73833)
- Automatic Charge Termination
- Automatic Recharge
- Thermal Regulation
- Small DFN packages with Exposed Pad as additional heat sink.

Li-Ion System PPM Reference Design

2.3 GETTING STARTED

The Li-Ion Battery Charger System Power Path Management Reference Design is fully assembled and tested for charging a single-cell Li-Ion or Li-Polymer battery with or without system load.

2.3.1 Power Input and Output Connection

2.3.1.1 POWERING THE LI-ION BATTERY CHARGER SYSTEM POWER PATH MANAGEMENT REFERENCE DESIGN

1. Connect the positive battery terminal to V_{BAT+} and negative battery terminal to V_{BAT-} .
2. Connect the 5V DC power supply Negative Terminal to V_{SS} .
3. Connect the 5V DC power supply Positive Terminal to V_{DD} .
4. It should initiate the battery charging cycle when the power source is present.
5. Position the DIP Switch to “H” for 400 mA fast charge current rate of MCP73832 and 1000 mA fast charge current rate of MCP73833.
6. Position the DIP Switch to “L” for 25 mA fast charge current rate of MCP73832 and 50 mA fast charge current rate of MCP73833.

Note: Fast Charge Current can be programmed with various resistors that based on the Figure 2-1 and Figure 2-2.

Note: The Li-Ion battery pack can be replaced with test circuit or electronic load that can sink current with DC power supply. Please refer to Figure 2-3.

7. Connected positive of load to System Load on the board and negative of load to either V_{SS} or V_{BAT-} . The load can be a power resistor or E-Load.
8. Remove DC power supply, the load should be supported by the Li-Ion battery now.

Note: MCP73832 circuit is labeled “A” on the reference design while MCP73833 circuit is labeled “B” on the reference design.

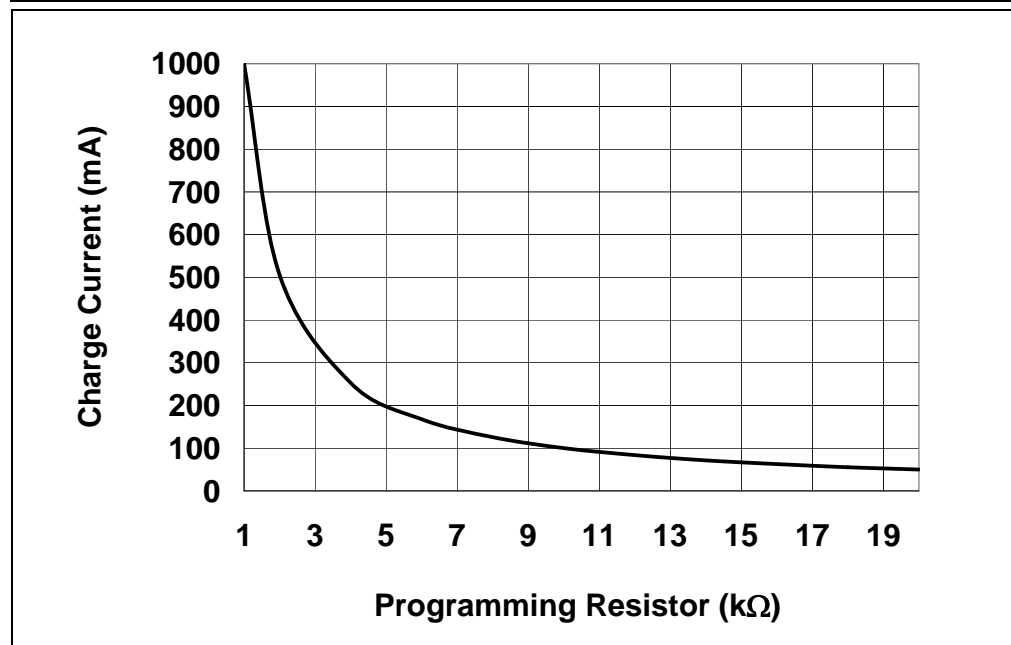


FIGURE 2-1: MCP73833 Charge Current (I_{OUT}) vs. Programming Resistor (R_{PROG}).

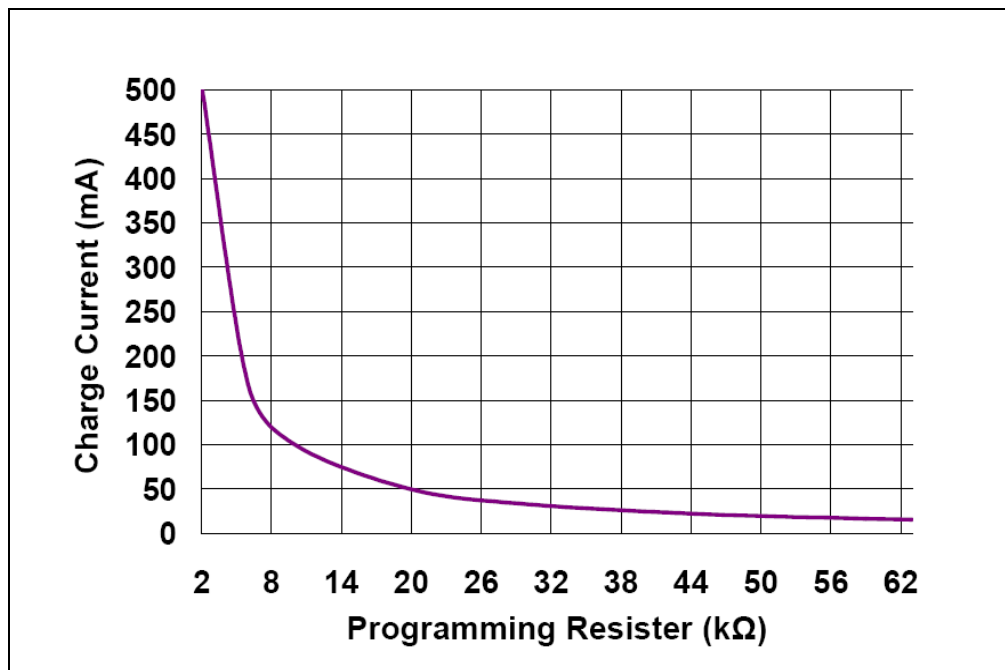


FIGURE 2-2: MCP73832 Charge Current (I_{OUT}) vs. Programming Resistor (R_{PROG}).

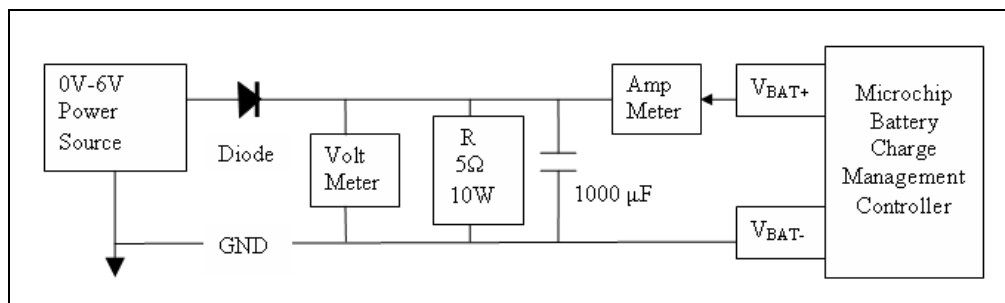


FIGURE 2-3: Simulated Battery Load.

Li-Ion System PPM Reference Design

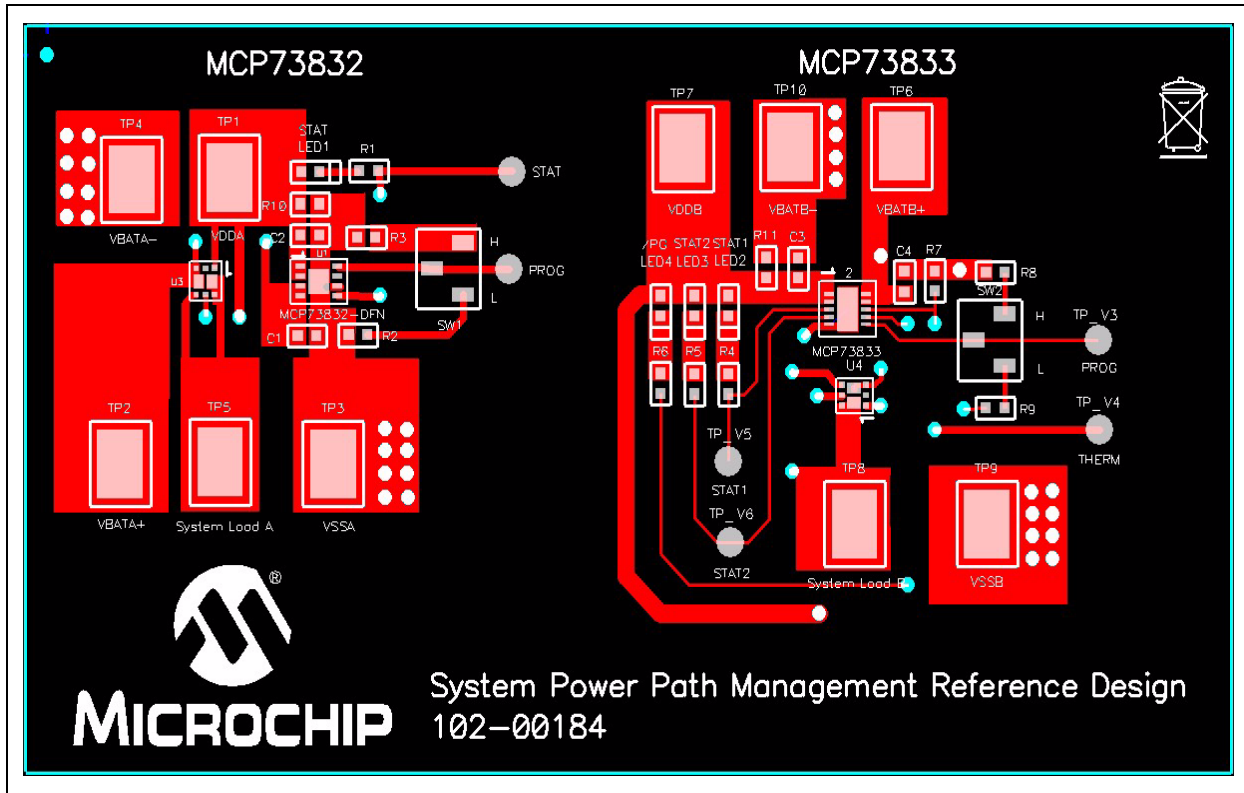


FIGURE 2-4: Board Top Assembly.

TABLE 2-1: MCP73833 CHARGE STATUS OUTPUTS

CHARGE CYCLE STATE	STAT1 (BLUE)	STAT2 (GREEN)	$\overline{\text{PG}}$ (RED)
Shutdown	OFF	OFF	OFF
Standby	OFF	OFF	ON
Charge in Progress	ON	OFF	ON
Charge Complete (EOC)	OFF	ON	ON
Temperature Fault	OFF	OFF	ON
Timer Fault	OFF	OFF	ON
System Test Mode	ON	ON	ON

TABLE 2-2: MCP73832 CHARGE STATUS OUTPUTS

CHARGE CYCLE STATE	STAT (BLUE)
Shutdown	OFF
No Battery Present	OFF
Preconditioning	ON
Constant-Current Fast Charge	ON
Constant Voltage	ON
Charge Complete - Standby	OFF

Appendix A. Schematic and Layouts

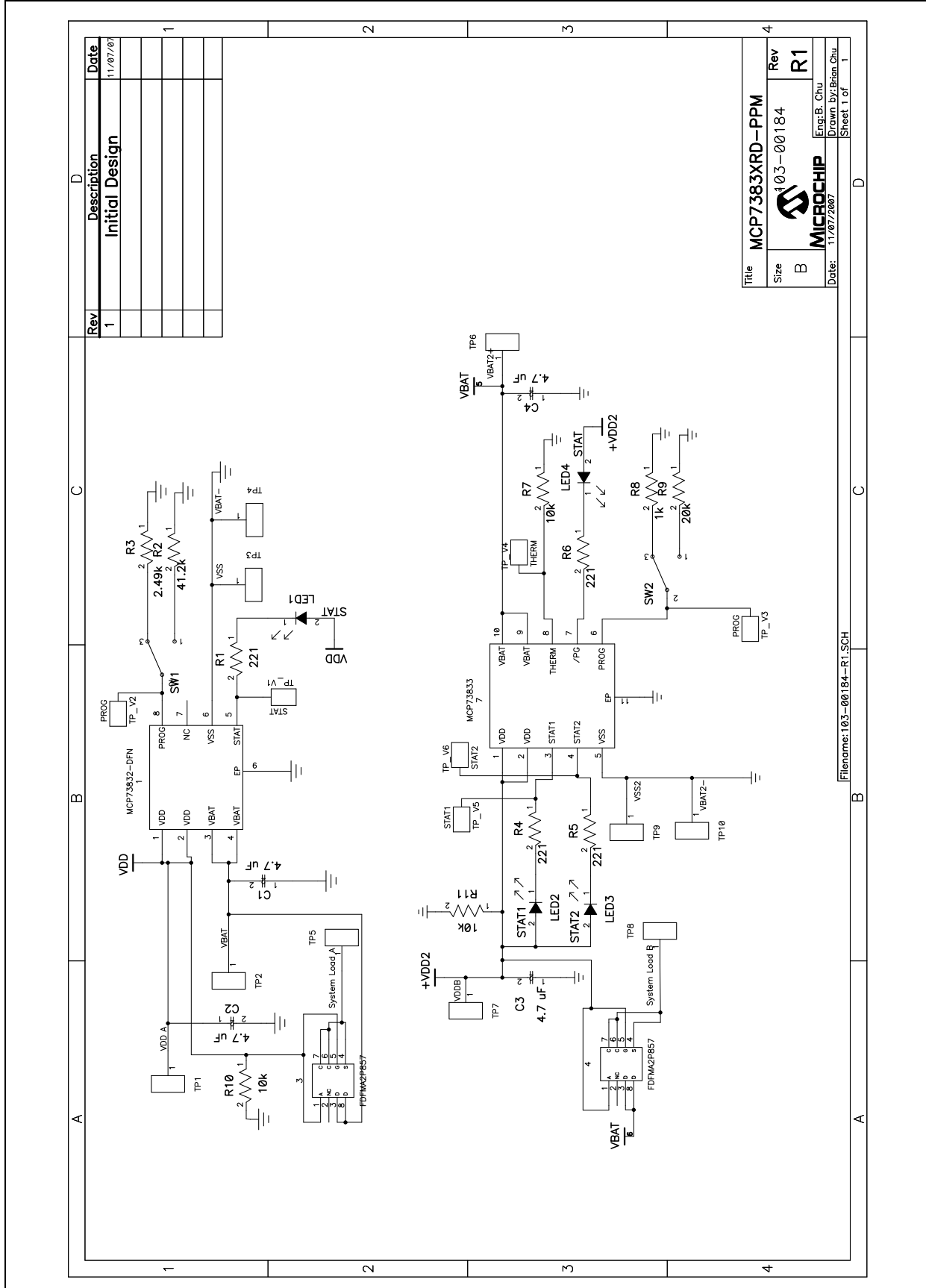
A.1 INTRODUCTION

This appendix contains the following schematics and layouts for the Li-Ion Battery Charger System Power Path Management Reference Design:

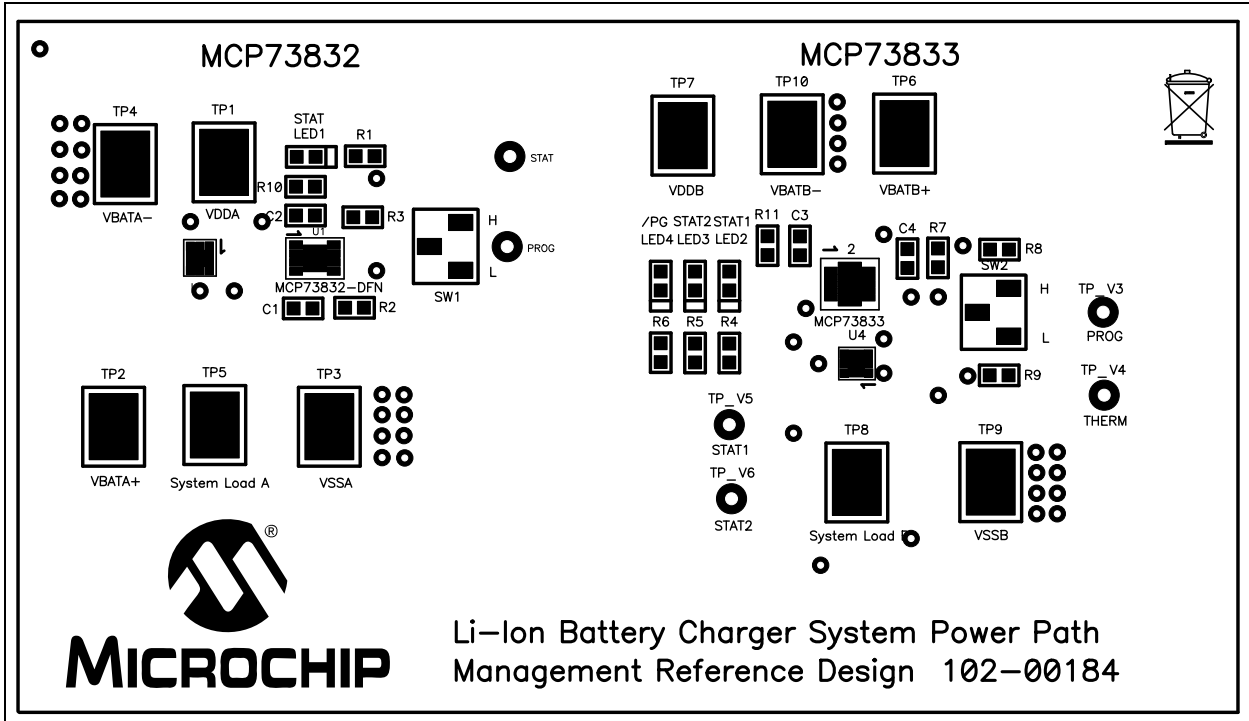
- Board – Schematic
- Board – Top Layer
- Board – Top Metal Layer
- Board – Bottom Layer

Li-Ion System PPM Reference Design

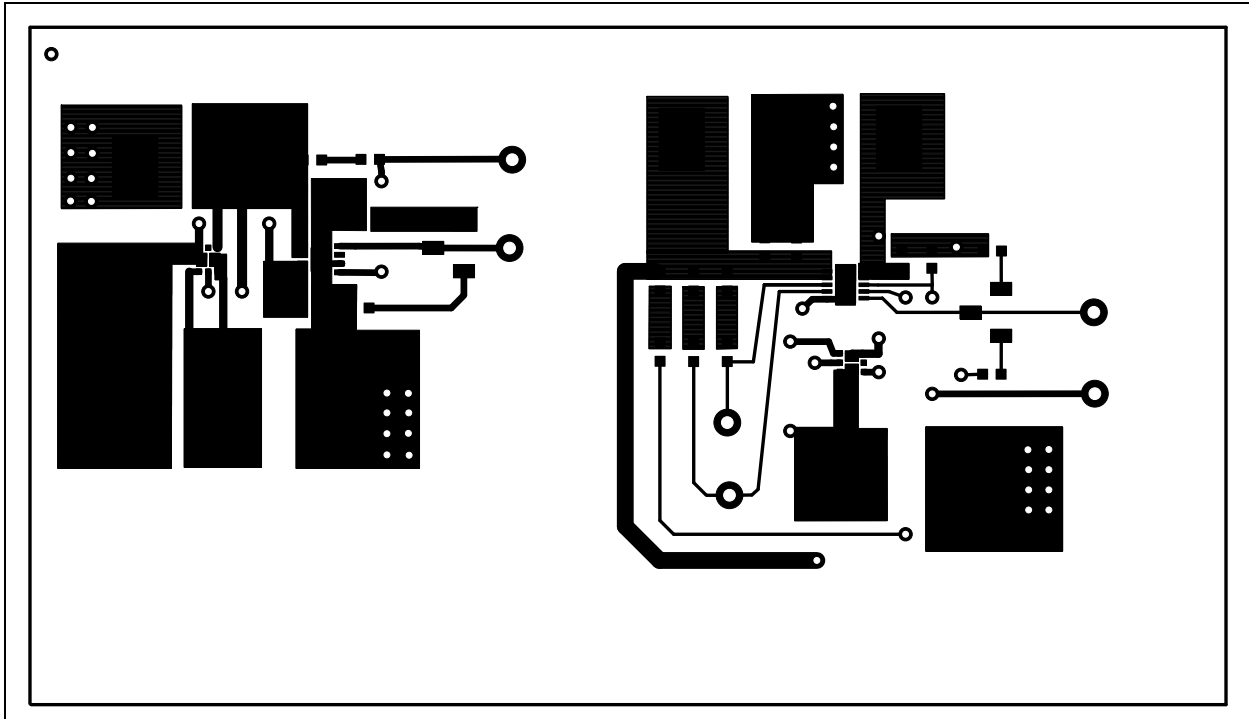
A.2 BOARD – SCHEMATIC



A.3 BOARD – TOP LAYER

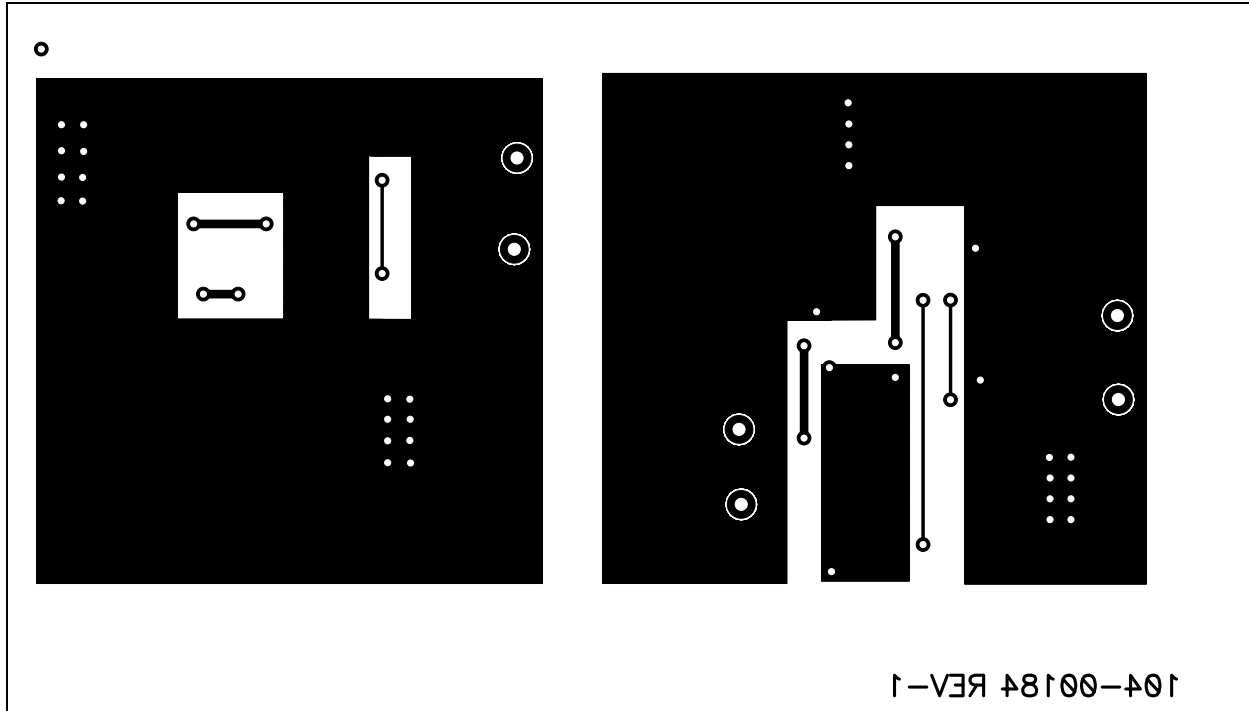


A.4 BOARD – TOP METAL LAYER



Li-Ion System PPM Reference Design

A.5 BOARD – BOTTOM LAYER



Appendix B. Bill Of Materials (BOM)

TABLE B-1: BILL OF MATERIALS (BOM)

Qty	Reference	Description	Manufacture	Part Number
4	Bump	BUMPON HEMISPHERE .44X.20 WHITE	3M	SJ5003-9-ND
4	C1, C2, C3, C4	CAP CERAMIC 4.7 uF 10 X5R 0603	Taiyo Yuden	LMK107BJ475KA-T
2	LED1, LED2	Blue Water Clear 0603 SMD LED	Para Light USA	L-C191LBCT-U1
1	LED3	True Green Water Clear 0603 SMD LED	Para Light USA	L-C191LGCT-U1
1	LED4	Super Red Water Clear 0603 SMD LED	Para Light USA	L-C191KRCT-U1
1	PCB	Printed Circuit Board	—	104-00184-R1
4	R1, R4, R5, R6	RES 221 OHM 1/10W 1% 0603 SMD	Panasonic® - ECG	ERJ-3EKF2210V
1	R2	RES 41.2K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF4122V
1	R3	RES 2.49K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF2491V
3	R7, R10, R11	RES 10K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1002V
1	R8	RES 1K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1001V
1	R9	RES 20K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF2002V
2	SW1, SW2	SWITCH SLIDE SPDT SMD J-LEAD	Copal Electronics Inc	CJS-1200TA
10	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10	PC Test Point Compact SMT	Keystone Electronics®	5016
1	U1	Miniature Single Cell, Fully Integrated Li-Ion, Li-Polymer Charge Management	Microchip Technology Inc	MCP73832-2ATI/MC
1	U2	Stand-Alone Linear Li-Ion / Li-Polymer Charge Management Controller	Microchip Technology Inc	MCP73833-AMI/MF
2	U3, U4	MOSFET/SCHOTTKY P-CH MICROFET2X2	Fairchild Semiconductor®	FDMA2P857

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.



WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://support.microchip.com>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

Kokomo
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

Santa Clara
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8528-2100
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Hong Kong SAR
Tel: 852-2401-1200
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8203-2660
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-4182-8400
Fax: 91-80-4182-8422

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Yokohama
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-572-9526
Fax: 886-3-572-6459

Taiwan - Kaohsiung
Tel: 886-7-536-4818
Fax: 886-7-536-4803

Taiwan - Taipei
Tel: 886-2-2500-6610
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А