

User Guide

MP2664 Evaluation Kit (EVKT-MP2664)



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Overview

Introduction

The EVKT-MP2664 is an evaluation kit for the MP2664. This board is designed for the MP2664, which is a highly-integrated, single-cell Li-Ion/Li-Polymer battery charger with a system power-path management function. The layout accommodates most commonly used capacitors. The default function of this board is preset for charger mode, and the charge full voltage is preset to 4.200V for 1 cell Li-Ion battery.

Kit Contents

EVKT-MP2664 kit contents (items below can be ordered separately).

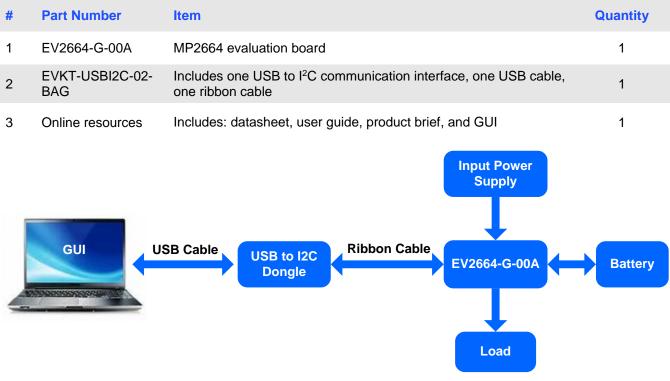


Figure 1: EVKT-MP2664 Evaluation Kit Set-Up



Features and Benefits

- Fully Autonomous Charger for Single-Cell Li-Ion/Li-Polymer Batteries
- Complete Power-Path Management for Simultaneously Powering the System and Charging the Battery
 - Battery Voltage: 3.6V 4.545V (accuracy ±0.5%)
 - Charge Current: 8-535mA (accuracy ±10%)
 - Input Current: 85-455mA
 - 13V Maximum Voltage for the Input Source
- I²C Interface for Setting Charging Parameters and Status Reporting
- Fully Integrated
 - Power Switches
 - $\circ~$ a 300m Ω LDO MOSFET between IN and SYS
 - $\circ~$ a 100m Ω battery MOSFET between SYS and BATT.
 - No External Blocking Diode
- Built-In Robust Charging Protection
 - Battery Temperature Monitoring
 - Programmable Timer
 - PCB Over-Temperature Protection (OTP)
 - Thermal Limiting Regulation On-Chip
- System Reset Function
- Built-In Battery Disconnection Function

 \triangle All changes made in I²C mode will NOT be retained once the EVB is powered down. \triangle Information written in OTP mode CANNOT be changed.

Adjustable features:

I2C	ОТР
 Battery Regulation Voltage Fast Charge Current Discharge Current Pre Charge Current Input Voltage Regulation Input Current Limit BATT UVLO Charge Timer Watchdog Timer Thermal Regulation 	 Battery Regulation Voltage Fast Charge Current Pre Charge Current Watchdog Timer PCB OTP function

Kit Specifications

Feature	Specification
Supply for Board	4.35V - 5.5V
Operating Input Voltage	4.35V - 5.5V
Operating Systems Supported	Windows XP, 7, and later
System Requirements	Minimum 22.2 MB free
GUI Software	MP2664 V1.1



Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following must be minimally met to use the EVKT-MP2664.

- Operating System of Windows XP, 7 or later
- Net Framework 4.0
- PC with a minimum of one available USB port
- At least 22.2 MB of free space

1.2 EV2664-G-00A Specifications

The EV2664-G-00A is an evaluation board for the MP2664. For more information, please refer to the EV2664-G-00A datasheet.

GND	MP2664 Demo Board EV2664~G~00A www.monolithicpower.com	
	85555	SYS
25 1		
GND SDA GND		GND
SCL .	MPS Confident	ial estimates

Feature	Specification
Supply for Evaluation Board	4.35V - 5.5V
Operating Input Voltage	4.35V - 5.5V
EVB Size (L X W)	6.3cm X 6.3cm

Figure 2: EV2664-G-00A Evaluation Board

1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the communication interface, which connects the EVB and the PC and its supporting accessories. It provides I²C capabilities. Together with the MPS Virtual Bench Pro and I²C GUI tools, it provides a quick and easy way to evaluate the performance of MPS digital products. For more details, refer to the EVKT-USBI2C-02 datasheet.



Figure 3: EVKT-USBI2C-02 Communication Interface



Section 2. Software Requirements

2.1 Software Installation Procedure

Programming occurs through the MPS I²C GUI. Follow the instructions below to install the software.

Note: This software can be downloaded from the MPS website.

- 1. Download and extract the zip package of the "I²C evaluation kit software for MP2664" to a directory of your choice.
- 2. Double click the .exe file to open the set-up guide (see Figure 4).
- 3. Follow the prompts in the set-up guide.
- 4. Wait for the status screen to verify that installation is complete (see Figure 5).

🕞 Setup - MP2664	
Select Destination Location Where should MP2664 be installed?	mes
Setup will install MP2664 into the following folder.	
To continue, click Next. If you would like to select a different folder, c	lick Browse.
C:\Program Files (x86)\MP2664	Browse
At least 8.5 MB of free disk space is required.	
< Back Next	> Cancel

Figure 4: MPS I²C GUI Set-Up Guide

Device Driver Installation Wizard		
	Completing the De Installation Wizard	
	The drivers were successfully in	stalled on this computer.
	You can now connect your devi came with instructions, please re	ice to this computer. If your device ad them first.
	Driver Name	Status
	✓ Silicon Laboratories Inc	Ready to use
	< Back	Finish Cancel

Figure 5: Driver Set-Up Success



Section 3. Evaluation Kit Test Set-up

3.1 Hardware Setup

The hardware must be properly configured prior to use. Follow the instructions below to set up the EVB.

- 1. Locate the proper wires to connect the EVB to the EVKT-USBI2C-02 communication interface.
- 2. Connect SCL, SDA, and GND (see Figure 6). If needed, refer to the datasheet for further clarification.



Figure 6: EVB to MPS I²C Communication Interface Wire Connection

3.2 Powering up the EVB

- 1. Connect the positive and negative terminals of the load to the SYS and GND pins, respectively.
- 2. Connect the positive and negative terminals of the battery to the VBATT and GND pins, respectively. If it is a battery simulator, preset the battery voltage between 0V and 4.545V, then turn it off. Connect the battery simulator output to the VBATT and GND pins respectively.
- 3. Preset the power supply output between 3.9V and 7.0V, then turn off the power supply. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
- 4. **Make sure the battery voltage has been preset** (if a battery simulator is used, **turn on the battery emulator).** Turn the power supply on. The IC will enter the power on sequence automatically.

Reminder: if the battery simulator is connected, please make sure to turn on the battery emulator first, before the input supply in the start-up sequence.

3.3 Software Set-Up

After connecting the hardware according to Section 3.1 and Section 3.2, follow the steps below to use the GUI software:

- 1. Start the software. It will check the EVB connection automatically.
 - If connection is successful, both the USB and MP2664 DEMO board statuses are "connected". (See Figure 7).

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MP2664 Evaluation Kit

File REG control OTP Help			
	FET Control		I2C Watchdog Timer
LDO_FET Off (EN_HIZ)	BATT_FET Charge Off (CEB)	EN_Shipping Mode (FET_DIS)	Watchdog Disable Timer 💽
Charge Operation Control Input Minimum Voltage (Vin_min) 4.60		Safety Timer Setting Charge Timer Shrs	Watchdog Reset 06s - Register monitoring
Input Current Limit (lin_LIM) 455m	nA 🔽	Other Control	Auto monitor Register
Fast Charge Current (ICC) 246m	nA Thremal Regulation Thremal R	on Threshold 120oC	Register 06s -
Battery UVLO Threshold(Vbatt_UVLO) 2.8V		Reporting	Register
Pre Charge Current (IPRE) 20m/	A		7 6 5 4 3 2 1 0 ce Control (0X00) 0 1 0 1 1 1 1 ufiguration (0X01) 0 0 R R 0 1 0 0
Battery Regulation Voltage(Vbatt_REG) 4.200	v	PRE/Ter	nt Control (0X02) R R R 0 1 1 1 0 m Current (0X03) R 1 0 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 0 0 1 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 1 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 1 <
Pre Charge Threshold (Vbatt_PRE) 3.0V	System Sta	Tim	recontrol (0x04) 1 0 1 0 0 1 1 er Control (0x05) R 1 0 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 0 1 <
Battery Recharge Threshold(Vrech) Vbatt	_REG-300mV 💌	Syst	em Status(0X07) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Discharge Current Limit(IDSCHG) 2000	ImA 🔽		
EN_TERM T TER	RM_TMR	Write All	Register Reset
USB: Connected.	2664 Demo board: Connected.	I2C 400kH	z www.monolithicpower.com

Figure 7: Appearance of USB and MP2664 EVB Board Show Connected

- If connection is not successful, "Not Connected" will appear in red. Check the connections between the EVB, communication interface, and PC. Re-plug the USB into the computer.
 - 1) MP2664 DEMO Board "Not Connected" means that the evaluation board is not connected correctly.
 - 2) USB "Not Connected" means that the USB I²C communication interface is not connected correctly.
- 2. Click the "Read All Register" button to read the I²C register values, and the default values are displayed (See Figure 7).
- 3. Find the item you want to change and select the desired value from the drop down menu.
- 4. Click the "Write All" button to update values. The changed information of the item will be downloaded to the IC.

 \triangle All changes made via the I²C will be restored to default values once the EVB is powered down.



3.4 Device Programming Instructions

The MP2664-xxxx is an OTP part. Follow the instructions outlined below to create and export customized configurations:

- 1. Using a computer, open the MPS GUI software. Make sure you have powered on the EVB.
- 2. Ensure connection between the EVB and computer.
- 3. Select the "OTP View" in the tool bar. (See Figure 8)

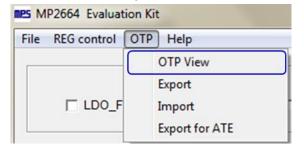


Figure 8: Select OTP

4. Enter a new table (see Figure 9). You can change any parameters highlighted.

MP2664 Evaluation Kit					
File REG control OTP Help					
	FET Con	trol		I2C Watchdog	Timer
LDO_FET Off (EN_HIZ)	BATT_FET Charg	e Off (CEB) 🗖 EN_Shipping Mod	le (FET_DIS)	Vatchdog Disable T) Reset
Charge Operation C		Safety Timer Setting		/atchdog Reset	Rate
Input Minimum Voltage (Vin_min)	4.60V 💌	Constant Current Charge Timer 5hrs		Register mon	itoring
Input Current Limit (lin_LIM)	455mA 💌	Charles 2X extended safety timer		ead all	onitor Register
Fast Charge Current (ICC)	246mA 👻	Enable NTC		egister	06s 👻
Battery UVLO Threshold(Vbatt_UVLO)	2.8V 💌	Fault Reporting		Register	43210
Pre Charge Current (IPRE)	20mA 🔹		Input Source Contro		0 1 1 1 1
Battery Regulation Voltage(Vbatt_REG) Pre Charge Threshold (Vbatt_PRE)	4.200V •		Power_On Configuration Charge Current Contro PRE/BF Current Charge Voltage Contro Timer Contro	I (0X02) R R R nt (0X03) R 1 0 ol (0X04) 1 0 1	
Battery Recharge Threshold(Vrech)	,	System Status Reporting	Miscellaneous Contro System Statu	ol (0X06) R 1 0	0 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0
Discharge Current Limit(IDSCHG)	2000mA		Write All		Register Reset

Figure 9: Parameters that can be Adjusted in OTP Mode



5. Select values from the drop-down menus. Please make sure all the parameters are populated before selecting the EXPORT in the tool bar. Export the configuration by clicking EXPORT. (See Figure 10).

Export OTP configuration	×
Part NO. MP2664GG 💌	Package QFN-10 (2mm×2mm)
Customer Name 🗙 🗙	
Cancel	Export



 Find a location for the exported file and click "Save." Your configurations will be saved in a text file (See Figure 11).

mes MP2664 Evaluation Kit		
File REG control OTP Help		
FET Control	Watchdoo	C Watchdog Timer
LDO_FET Off (EN_HIZ) BATT_FET Charge Off (CEB)		tchdog AUTO Reset
Charge Operation Control	ety Timer Setting Reset	06s -
Input Minimum Voltage (Vin_min) 4.60V Constant Current Charge		
Input Current Limit (lin_LIM) 455		egister monitoring
Fast Charge Current (ICC) 246 Hard Disk Drives (2)	Register	06s 👻
Battery UVLO Threshold(Vbatt_UVLO) 2.8V Collocation Local Disk (D:) Devices with Removable Storage (1)	Regist	ter 7 6 5 4 3 2 1 0
Pre Charge Current (IPRE) 20m	ce Control (0X00) nfiguration (0X01) ant Control (0X02)	0 0 R R 0 1 0 0
Battery Regulation Voltage(Vbatt_REG) 4.20 File name: MP2664GG-3000X Save as type: Text Files (*.bd)	Save BF Current (0X03) Cancel ge Control (0X04)) R 1 0 0 1 0 1 0
Pre Charge Threshold (Vbatt_PRE) 3.0	MISCEIIANE ON CONTROL (0X05)	R 1 0 0 1 0 1 1
Battery Recharge Threshold(Vrech) Vbatt_REG-300mV 💌	System Status(0X07) Fault (0X08)	
Discharge Current Limit(IDSCHG) 2000mA		
	Write All	Register Reset

Figure 11: Various Export Locations Available

7. Send this file to an FAE and apply for the customized "xxxx" code.



3.5 Troubleshooting Tips

• EVKT-USBI2C-02 Driver Problem

If the USBI2C-02 driver is not properly installed, manual installation is required. Follow the steps below:

- Install the correct ".exe" file according to the windows operation system.
 32-bit: \EVKT-USBI2C-02 USB Driver\USBXpressInstaller_x86.exe.
 64-bit: \EVKT-USBI2C-02 USB Driver\USBXpressInstaller_x64.exe.
- 2. Connect the communication interface to the PC with a USB cable.
- 3. Find "USBXpress Device" in the Device Manager.

USBXpress Device

If the PC is running Windows10, check the driver version of the USBXpress Device. Windows 10 will automatically install the older USB driver, which is not compatible. The correct driver version is 4.0.0.0 (see Figure 12).

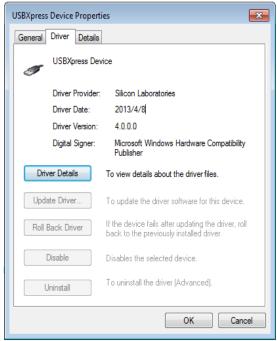


Figure 12: Correct Driver Version is 4.0.0.0

• No Supply

The IC's input pin has an under-voltage lockout (UVLO) detection circuit. If the input voltage (VIN) is lower than the UVLO rising threshold, the charging function is disabled.

• No Charging Event

If the IC detects that the input voltage is lower than the UVLO falling threshold (it enters a no supply state) or over-temperature protection is triggered (it enters a shutdown state), the IC switches to supplement mode powered by the battery.

• Thermal Recovery

If the MP2664 is in a shutdown state due to the die temperature exceeding the thermal protection threshold, the IC enters a power-on sequence when the die's temperature decreases.



Section 4. Ordering Information

The components of the evaluation kit can be purchased separately.

Part Number	Description
EVKT-MP2664	Complete evaluation kit
Contents of EVKT-MP2664	
EV2664-G-00A	MP2664-xxxx evaluation board
EVKT-USBI2C-02	Include one USB to I ² C communication interface, one USB cable, one ribbon cable,
Online resources	Includes datasheet, user guide, product brief, and GUI

Order directly from MonolithicPower.com or our distributors.

Mouser Electronics

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EVKT-MP2664