

User Guide

MP2663 Evaluation Kit (EVKT-MP2663)



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Overview

Introduction

The EVKT-MP2663 is an evaluation kit for the MP2663. This board is designed for the MP2663, 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 4.095V for 1 cell Li-Ion battery.

Kit Contents

EVKT-MP2663 kit contents (items below can be ordered separately).

#	Part Number	Item	Quantity
1	EV2663-C-00A	MP2663 evaluation board	1
2	EVKT-USBI2C-02- BAG	Includes one USB to I^2C communication interface, one USB cable, one ribbon cable	1
3	Online resources	Includes datasheet, user guide, product brief, and GUI	1
	GUI	USB Cable USB to I2C Communication Interface Ribbon Cable EV2663-C-00A Load	Battery

Figure 1: EVKT-MP2663 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 330m 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

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	MP2663 V1.0





Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following must be minimally met to use the EVKT-MP2663.

- 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 EV2663-C-00A Specifications

The EV2663-C-00A is an evaluation board for the MP2663. For more information, please refer to the EV2663-C-00A datasheet.

	Monolithic Power Systems MP2663 Demo Board EV2663-C-00A www.monolithicpower.com	<u>en</u>
		SYS
	0 · · · · · · · · · · · · · · · · · · ·	UBATT
s		

Feature	Specification
Supply for Evaluation Board	4.35V - 5.5V
Operating Input Voltage	4.35V - 5.5V
EVB Size (L X W)	6.35cm X 6.35cm

MPS

GND

Figure 2: EV2663-C-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 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.







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 MP2663" 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 status screen to verify that installation is complete (see Figure 5).

Select Destination Location Where should MP2663 be installed? Image: Comparison of the should MP2663 into the following folder. To continue, click Next. If you would like to select a different folder, click Browse. C: Program Files (x86) MP2663
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files (x86)\MP2663 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	d			
	Completing the De Installation Wizard			
	The drivers were successfully in	stalled on this computer.		
	You can now connect your device to this computer. If your device came with instructions, please read 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, and 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 MP2663 DEMO board statuses are "connected". (See Figure 7).

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- - X



MP2663 Evaluation Kit

File REG control OTP Help					
	FET Cor	ntrol			Watchdog Timer
LDO_FET Off (EN_HIZ)	BATT_FET Charge		ode (FET_DIS)	Watchdog	Disable Timer 💌
Charge Operation Co	ontrol	Safety Timer Setting	g	Watchdog Reset	Rate 06s –
Input Minimum Voltage (Vin_MIN)	3.88V 💌	Constant Current Charge Timer 5hrs	-	Re	gister monitoring
Input Current Limit (lin_LIM)	455mA 💌	Other Control		Read all Register	Auto monitor Register
Fast Charge Current (ICC)	127mA 💌	Fault Reporting	301P		06s 🖵
Battery UVLO Threshold(Vbatt_UVLO)	2.9V 💌			Registe	7 6 5 4 3 2 1 0
Pre Charge Current (IPRE)	6mA 💌		Input Source C Power_On Configur Charge Current C	ration (0X01)	0 0 0 0 1 1 1 0 0 0 0 1 1 0 1 0 0 0 0 1 1 0 1 0 0 0 0 0 1 1 1
Battery Regulation Voltage(Vbatt_REG)	4.095V 💌		PRE/DCHG Co Charge Voltage Co		0 0 0 1 1 1 0 0 1 0 0 0 0 1 1 0
Pre Charge Threshold (Vbatt_PRE)	3.0V •	System Status Reporting	Miscellaneous C	ontrol (0X05) ontrol (0X06) Status(0X07)	0 1 0 0 1 0 1 0 0 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0
Battery Recharge Threshold(Vrech)	Vbatt_REG-150mV -			Fault (0X08)	0 0 0 0 0 0 0
Discharge Current Limit(IDSCHG)	800mA		Write All		Register Reset
USB: Connected.	MP2663 Demo board: C	onnected.	I2C 400kHz	w	ww.monolithicpower.com

Figure 7: Appearance of USB and MP2663 EVB Board Show Connected

- If connection is not successful, "Not Connected" will appear in red. Check connections between the EVB, communication interface, and PC. Re-plug the USB into the computer.
 - 1) MP2663 DEMO Board "Not Connected" means that the evaluation board is not connected correctly.
 - 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.

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



3.4 Device Programming Instructions

The MP2663-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)

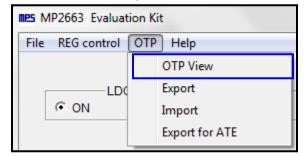


Figure 8: Select OTP

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

MP2663 Evaluation Kit		
File REG control OTP Help		
C CHO C	BATT FET CHG OFF DSG OFF	U2C Watchdog Timer
Charge Operation Control	Safety Timer Setting	Watchdog Reset 06s -
Input Minimum Voltage (Vin_MIN) 3.88V		Kesel 000 C
	Constant Current Charge Timer 5hrs	Register monitoring
Input Current Limit (lin_LIM) 455mA	Other Control Thremal Regulation Threshold 1200C	Read all Rate
Fast Charge Current (ICC) 127mA		Register 06s -
Battery UVLO Threshold(Vbatt_UVLO) 2.9V	Fault Reporting	Register
Pre Charge Current (IPRE) 6mA	Input Source Power_On Config	7 6 5 4 3 2 1 0 Control (0X00) 0 0 0 0 0 1 1 1 Juration (0X01) 0 0 0 1 1 1 1
Battery Regulation Voltage(Vbatt_REG) 4.095V	Charge Current PRE/DCHG	Control (0X02) 0 0 0 0 1 1 1 Current (0X03) 0 0 0 1 1 1 0 0
Pre Charge Threshold (Vbatt_PRE) 3.0V	Charge Voltage Timer System Status Reporting Miscellaneous	Control (0X05) 0 1 0 0 1 0 1 0
Battery Recharge Threshold(Vrech) Vbatt_REG-150mV	System	Status(0X07) 0 <t< td=""></t<>
Discharge Current Limit(IDSCHG) 800mA		
EN_TERM TERM_TMR	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).



MP2663 Evaluation Kit				
	File REG control	OTP	Help	
			OTP View	
	LDO		Export .	
	ON		Import	
			Export for ATE	
		_		
Export OT	P configuration		×	
Part	NO. MP2663GC -	Pac	kage WLCSP-9 (1.55mmx1.55mn	
	Cancel		Export	

Figure 10: Select "Export"

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

mes MP2663 Evaluation Kit	X 🗉 🗆
File REG control OTP Help	
C CHG ON C OFF CHG OFF □ DSG OFF	I2C Watchdog Timer Watchdog Disable Timer • Watchdog AUTO Reset
Charge Operation Control	Watchdog Reset 06s -
Input Minimum Voltage (Vin_MIN) 3.88V	Register monitoring
Input Current Limit (lin_LIM) 455 Save As	Read all Register
Fast Charge Current (ICC) 127 Hard Disk Drives (2) ▲ Sattery UVLO Threshold(Vbatt_UVLO) 2.9V Cocal Disk (D:) △	06s 🗸
Devices with Removable Storage (1) Devices with Removable Storage (1) Devices with Removable Storage (1)	Register 7 6 5 4 3 2 1 0 ontrol (0X00) 0 0 0 0 0 1 1 1 ration (0X01) 0 0 0 1 1 0 1
Battery Regulation Voltage(Vbatt_REG) 4.09 File name: MP2663GC-xxxx Save 4G Ct	ontrol (0X02) 0 0 0 0 1 1 1 urrent (0X03) 0 0 0 1 1 1 0 0
Save as type: ext Files ("bd) ▼ Cancel F	ontrol (0X04) 1 0 0 0 1 1 0 ontrol (0X05) 0 1 0 0 1 0 1 0 ontrol (0X06) 0 0 0 1 0 1 1 0
Potton/ Pochargo Throchold(/roch) /// - # DEC 450	Status(0X07) 0 <t< td=""></t<>
Discharge Current Limit(IDSCHG) 800mA	
	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 the "USBXpress Device" in the Device Manager.

USBXpress Device

If the PC is running Windows10, check the driver version of 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).

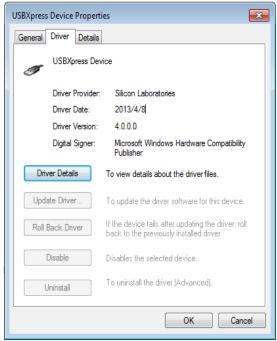


Figure 12: Correct Driver Version is 4.0.0.0

• 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 MP2663 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-MP2663	Complete evaluation kit
Contents of EVKT-MP2663	
EV2663-C-00A	MP2663-xxxx evaluation board
EVKT-USBI2C-02	Includes 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.

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EVKT-MP2663