



## **User Guide**

**MP2662 Evaluation Kit (EVKT-MP2662)**

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## Overview

### Introduction

The EVKT-MP2662 is an evaluation kit for the MP2662, a highly integrated, single-cell Li-ion/Li-polymer battery charger with system power path management functionality. Its 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 4.2V for a single-cell Li-ion battery.

### Kit Contents

EVKT-MP2662 kit contents (items below can be ordered separately, and the GUI installation file and supplemental documents can be downloaded from the MPS website).

#	Part Number	Item	Quantity
1	EV2662-C-01A	MP2662 evaluation board	1
2	EVKT-USBI2C-02- bag	Includes one USB to I <sup>2</sup> C communication interface, one USB cable, and one ribbon cable	1

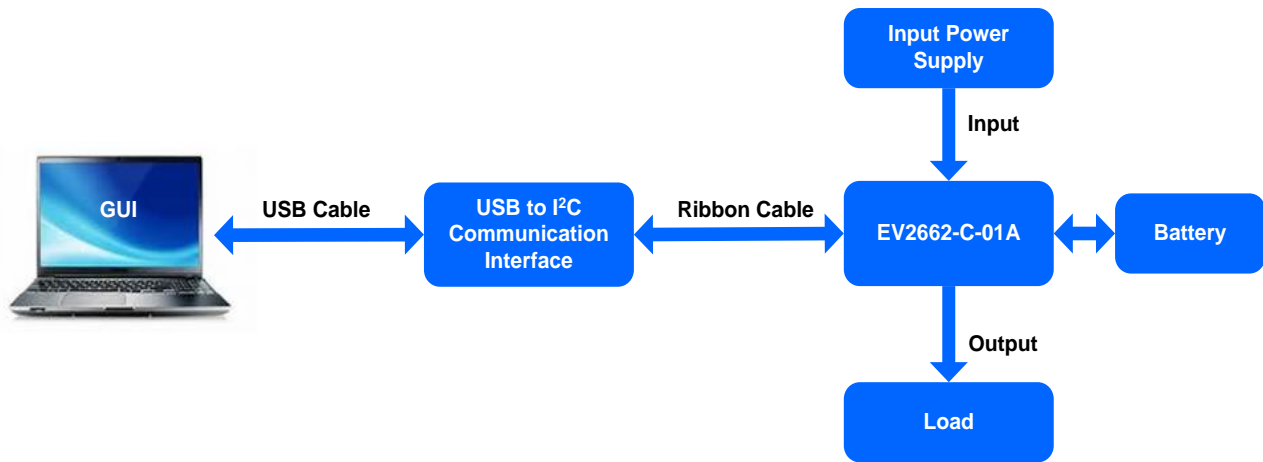


Figure 1: EVKT-MP2662 Evaluation Kit Set-Up

**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 to 4.545V ( $\pm 0.5\%$  Accuracy)
  - Charge Current: 8mA to 456mA ( $\pm 10\%$  Accuracy)
  - Input Current: 50mA to 500mA
  - Maximum 21V Voltage for the Input Source
- I<sup>2</sup>C Interface for Setting Charging Parameters and Status Reporting
- Fully Integrated Power Switches:
  - 290m $\Omega$  LDO MOSFET between IN and SYS
  - 100m $\Omega$  Battery MOSFET between SYS and BATT
  - No External Blocking Diode
- Robust Built-In Charging Protections:
  - Battery Temperature Monitoring
  - Configurable Timer
  - PCB Over-Temperature Protection (OTP)
  - On-Chip Thermal Limiting Regulation
- System Reset Function
- Built-In Battery Disconnection Function

*△ Changes made in I<sup>2</sup>C mode are not retained once the EVB is powered down.*

*△ Information written in OTP mode cannot be changed.*

Adjustable features are outlined below:

I <sup>2</sup> C	OTP
<ul style="list-style-type: none"> <li>• Battery Regulation Voltage</li> <li>• Fast Charge Current</li> <li>• Discharge Current</li> <li>• Pre-Charge Current</li> <li>• Input Minimum Voltage</li> <li>• Input Current Limit</li> <li>• BATT UVLO</li> <li>• Charge Timer</li> <li>• Watchdog Timer</li> <li>• Thermal Regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Battery Regulation Voltage</li> <li>• Fast Charge Current</li> <li>• Pre-Charge Current</li> <li>• Watchdog Timer</li> <li>• VINLOOP function</li> <li>• I<sup>2</sup>C Address</li> </ul>

**Kit Specifications**

Feature	Specification
Supply for Board	4.35V to 5.5V
Operating Input Voltage	4.35V to 5.5V
Supported Operating Systems	Windows XP, 7, or later
System Requirements	Minimum 22.2MB free
GUI Software	MP2662 V1.0

## Section 1. Hardware Specifications

### 1.1 Personal Computer Requirements

The following minimum requirements must be met to use the EVKT-MP2662A:

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

### 1.2 EV2662-C-01A Specifications

The EV2662-C-01A is an evaluation board for the MP2662. For more information, refer to the EV2662-C-01A datasheet.



Figure 2: EV2662-C-01A Evaluation Board

Feature	Specification
Supply for Evaluation Board	4.35V to 5.5V
Operating Input Voltage	4.35V to 5.5V
EVB Size (LxW)	6.3cmx6.3cm

### 1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the USB-to-I<sup>2</sup>C communication interface device, which connects the EVB, the PC, and supporting accessories. It provides I<sup>2</sup>C capabilities. Together with MPS's Virtual Bench Pro and 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

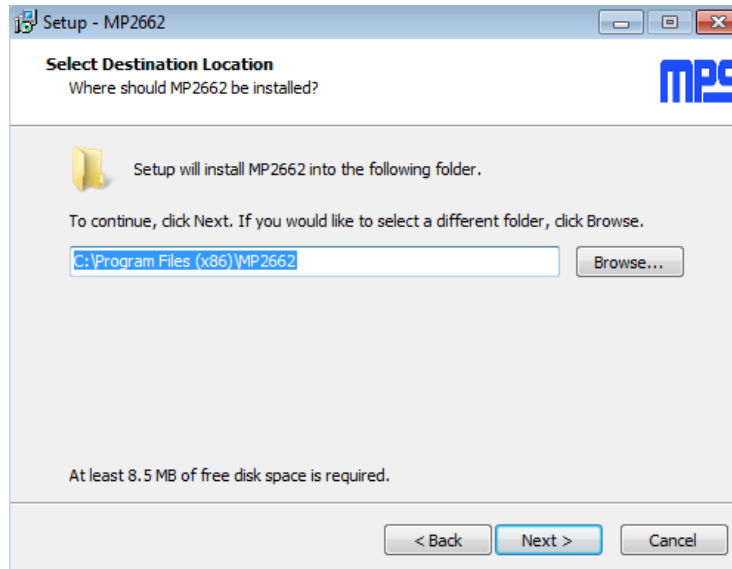
## Section 2. Software Requirements

### 2.1 Software Installation Procedure

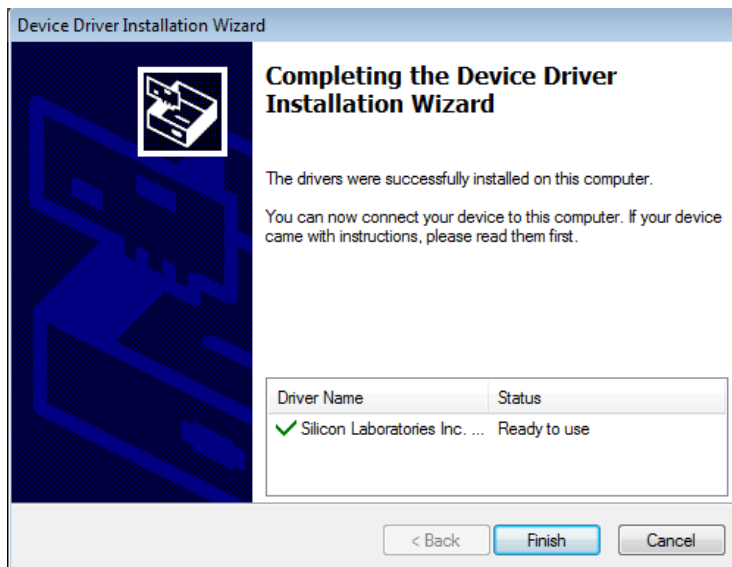
Programming occurs through the MPS I<sup>2</sup>C GUI. Follow the instructions below to install the software:

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

1. Download and extract the zip package titled “MP2662 I<sup>2</sup>C Evaluation GUI”.
2. Double click the .exe file to open the set-up guide (see Figure 4). If a protection window comes up, click “More info,” then click “Run anyway.”
3. Follow the prompts in the set-up guide.
4. Wait for the status screen to verify that installation is complete (see Figure 5).



**Figure 4: MPS I<sup>2</sup>C GUI Set-Up Guide**



**Figure 5: Successful Driver Set-Up**

## Section 3. Evaluation Kit Test Set-Up

### 3.1 Hardware Set-Up

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

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). Refer to the MP2662 datasheet for further clarification.



Figure 6: EVB to MPS I<sup>2</sup>C Communication Interface Wire Connection

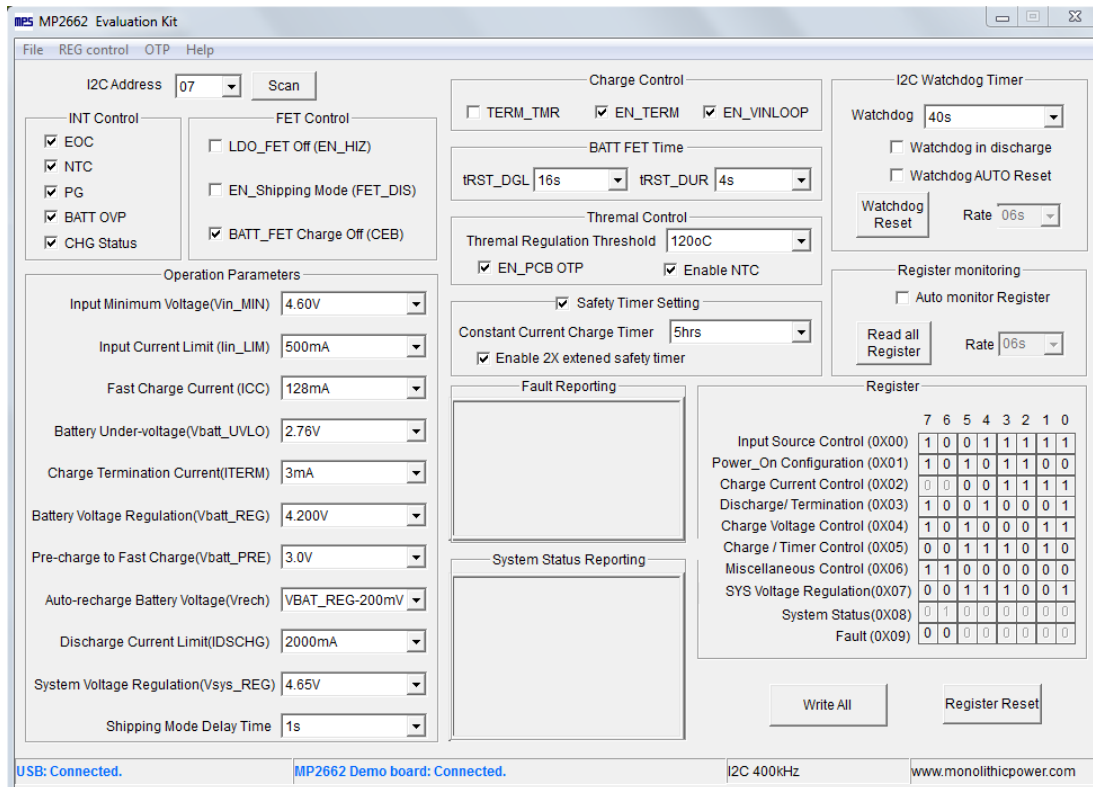
### 3.2 Powering Up the EVB

1. Connect the load to:
  - a. Positive (+): SYS
  - b. Negative (-): GND
2. Connect the battery terminals to:
  - a. Positive (+): VBATT
  - b. Negative (-): GND
3. If using a battery simulator, preset the battery voltage between 0V and 4.545V, then turn it off.
4. Connect the battery simulator output to the VBATT and GND pins, respectively, then turn it on.
5. Preset the power supply output between 4.35V and 5.5V, then turn off the power supply.
6. Connect the power supply output to:
  - a. Positive (+): VIN
  - b. Negative (-): GND
7. Ensure that the battery voltage is present. If the battery simulator is connected, turn on the battery simulator first (before the input supply in the start-up sequence).
8. Turn the power supply on. The IC should automatically enter the power-on sequence.

### 3.3 Software Set-Up

After connecting the hardware according to the steps above, follow the steps below to use the GUI software:

1. Start the software, then click the “Scan” button to select the I<sup>2</sup>C address. It should check the EVB connection automatically.
  - If the connection is successful, both the USB and MP2662 demo board statuses will be listed as “Connected” (see Figure 7).



**Figure 7: Connected USB and MP2662 Demo Board**

- If the connection is unsuccessful, they will be listed as “Not Connected” in red. In this case, check the connections between the EVB, communication interface, and PC. Re-plug the USB into computer.
    - 1) If the MP2662 demo board is listed as “Not Connected,” this means that the evaluation board is not connected correctly.
    - 2) If the USB is listed as “Not Connected,” this means that the USB I<sup>2</sup>C communication interface is not connected correctly.
2. Click the “Read All Register” button to read the I<sup>2</sup>C register values. The default values should be displayed (see Figure 7).
  3. Find the item to be changed, then select a value from the drop-down menu.
  4. Click the “Write All” button to update the values. The item’s changed information should be downloaded to the IC.

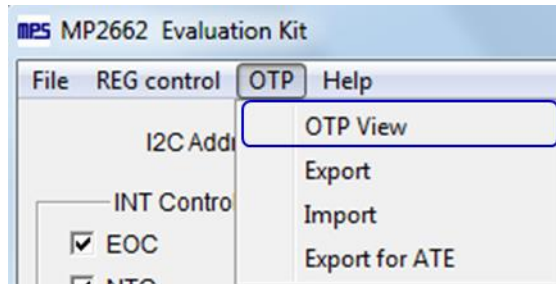
*⚠ All changes made via the I<sup>2</sup>C will be restored to default values once the EVB shuts down.*



### 3.4 Device Programming Instructions

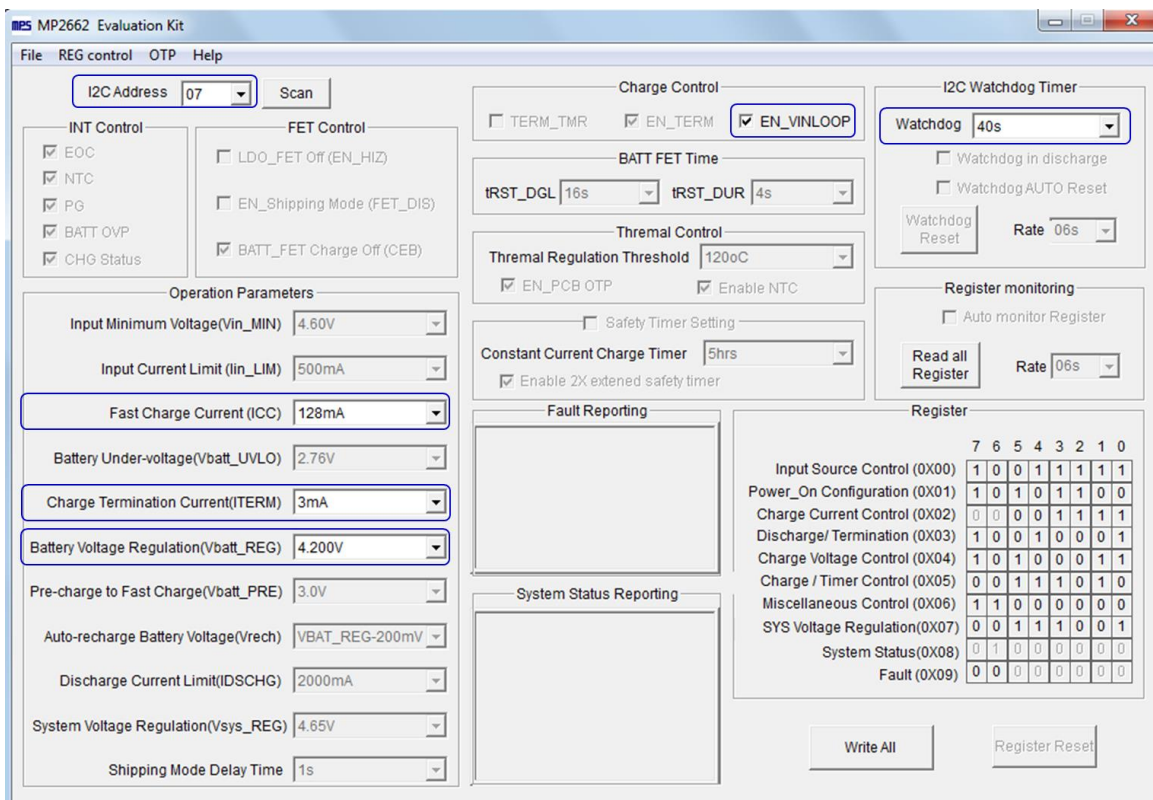
The MP2662-xxxx is a one-time programmable (OTP) part, where “-xxxx” is the register setting option. The factory default is “-0000,” and this content can be viewed in the I<sup>2</sup>C register map. To create and export customized configurations, follow the instructions below:

1. Use a computer to open the MPS GUI software. Ensure that the EVB is powered on.
2. Ensure that the EVB and computer are connected.
3. Select “OTP View” in the toolbar (see Figure 8).



**Figure 8: Select OTP**

4. Enter a new table (see Figure 9). All highlighted parameters can be changed.



**Figure 9: Adjustable Parameters in OTP Mode**

5. Select values from the drop-down menus.
6. Ensure that all the parameters are populated before selecting “Export” in the toolbar. Export the selected configurations by clicking “Export” (see Figure 10).

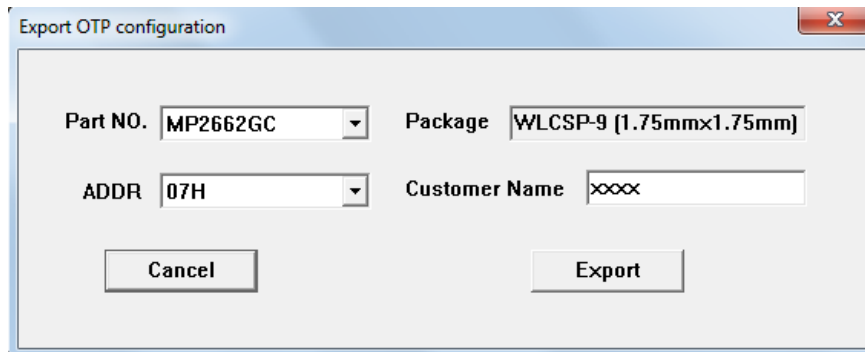


Figure 10: Exporting OTP Configurations

- Find a location for the exported file, then click “Save”. The configurations should be saved in a .txt file (see Figure 11).

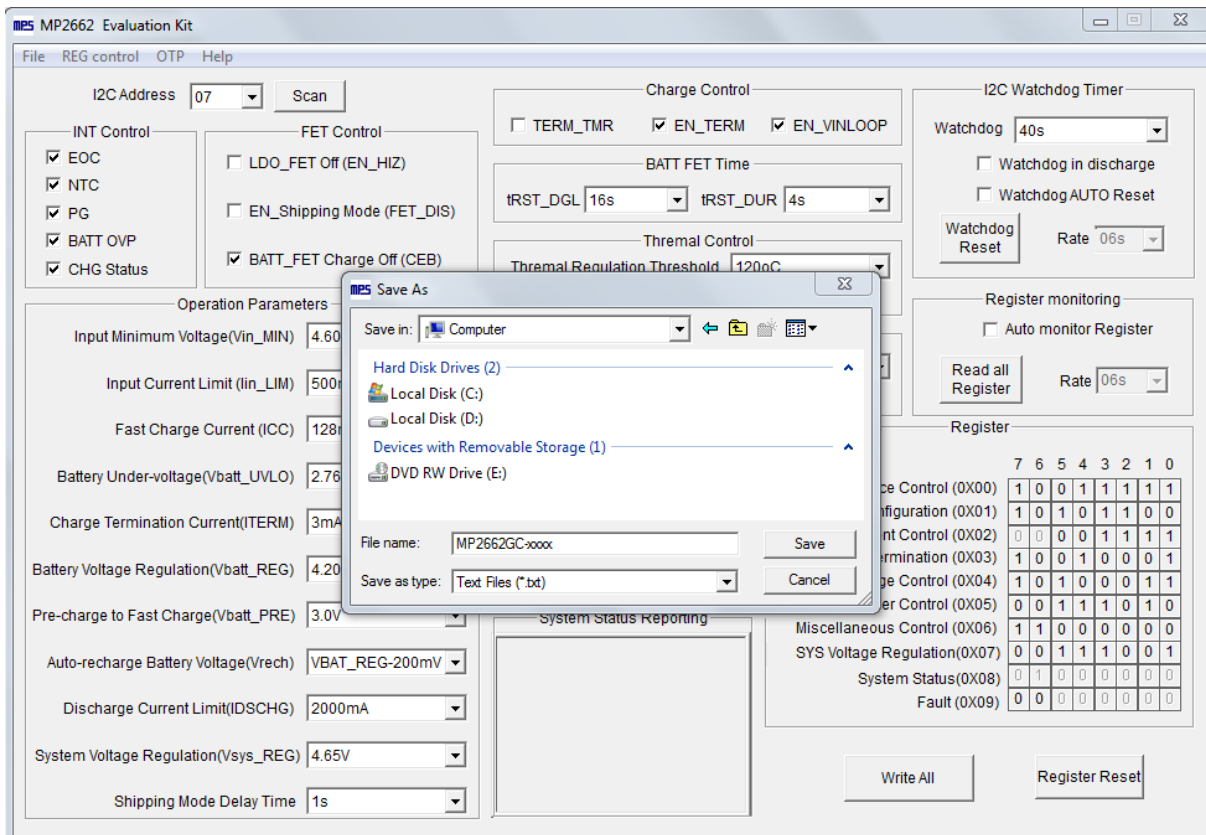


Figure 11: Saving OTP Configurations

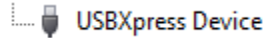
- Send this file to and MPS FAE to apply for the customized “-xxxx” code.

### 3.5 Troubleshooting Tips

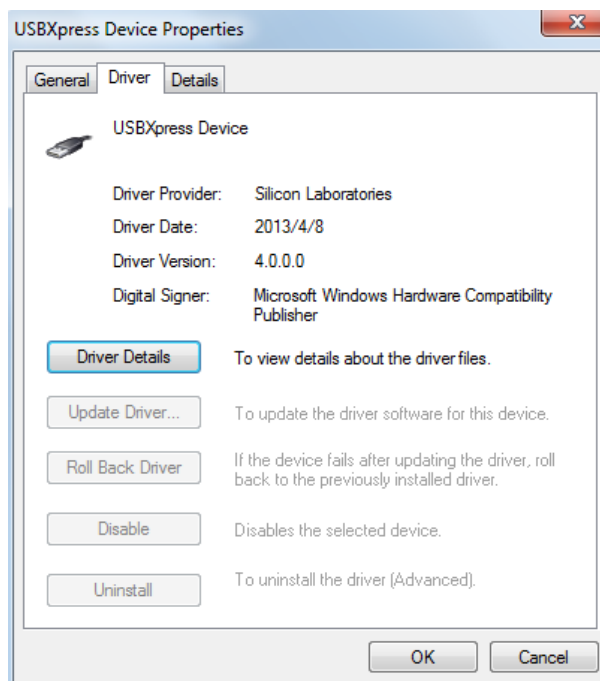
#### EVKT-USBI2C-02 Driver Problem

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

1. Install the correct “.exe” file according to the Windows operating system (32-bit or 64-bit).  
 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 the USB cable.
3. Find “USBXpress Device” in the Device Manager under USB controllers.



*Note: Ensure the driver version matches the newest version. Right-click and view properties. If the PC is running Windows 10, Windows 10 may automatically install the older USB driver, which is not compatible. The correct driver version should be newer than 4.0.0.0 (see Figure 12).*



**Figure 12: Correct Driver Version Should be Newer than 4.0.0.0**

#### No Supply

The IC’s input pin has an under-voltage lockout (UVLO) detection circuit. If the input voltage ( $V_{IN}$ ) is below the UVLO rising threshold, the charging function is disabled.

#### No Charging Event

If the IC detects that the input voltage ( $V_{IN}$ ) is below the under-voltage lockout (UVLO) falling threshold (device enters a no-supply state) or over-temperature protection is triggered (device enters a shutdown state), the IC switches to supplement mode powered by the battery.

#### Thermal Recovery

The MP2662 enters a shutdown state if the die temperature exceeds the thermal protection threshold. The IC initiates a power-on sequence once the die temperature decreases.

## Section 4. Ordering Information

The components of the evaluation kit can be purchased separately, depending on user needs.

Part Number	Description
EVKT-MP2662	Complete evaluation kit
<b>Contents of EVKT-MP2662</b>	
EV2662-C-01A	MP2662-xxxx evaluation board
EVKT-USBI2C-02 bag	Includes one USB to I <sup>2</sup> C communication interface, one USB cable, and one ribbon cable
Online resources	Include datasheet, user guide, product brief, and GUI

**Order directly from [MonolithicPower.com](http://MonolithicPower.com) or our distributors.**

## Revision History

Revision #	Revision Date	Description	Pages Updated
1.01	5/15/2020	Grammar and formatting updates	2 - 11

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