User Guide

MP2667 Evaluation Kit (EVKT-MP2667)

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Overview

Introduction

The EVKT-MP2667 is an evaluation kit for the MP2667. This board is designed for the MP2667, which is a highly integrated, single-cell Li-ion/Li-polymer battery charger with a system power path management function. 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-MP2667 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	EV2667-G-00A	MP2667 evaluation board	1
2	EVKT-USBI2C-02-Bag	Includes one USB to I²C communication interface, one USB cable, and one ribbon cable	1

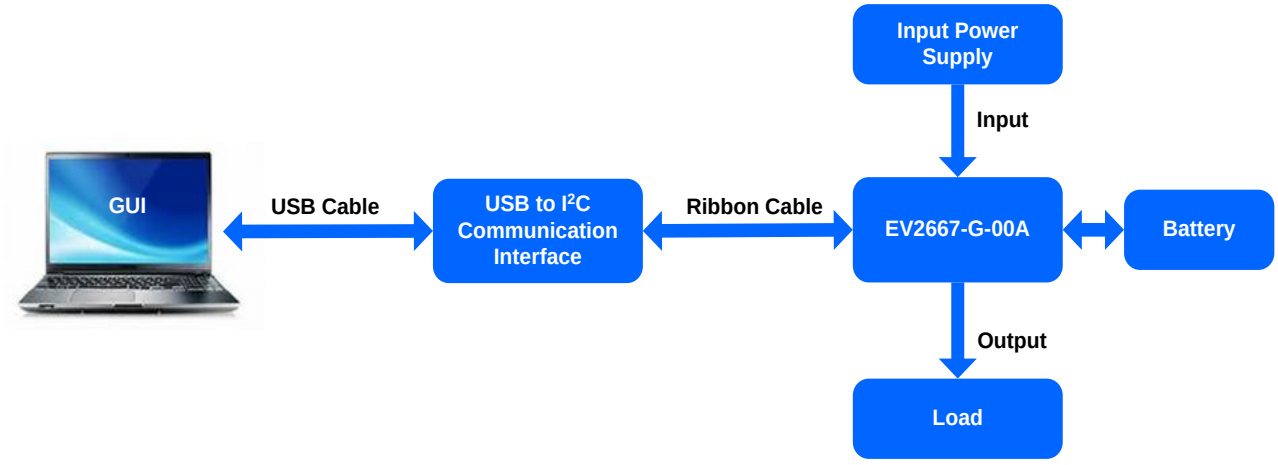

Figure 1: EVKT-MP2667 Evaluation Kit Set-Up

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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 (Accuracy ±0.5%)
  - Charge Current: 26mA to 1049mA (Accuracy ±10%)
  - Input Current: 77mA to 993mA
  - 13V Maximum Voltage for the Input Source
- I²C Interface for Setting Charging Parameters and Status Reporting
- Fully Integrated
- Power Switches: 300mΩ LDO FET between IN and SYS, and 100mΩ battery FET between SYS and BATT
  - No External Blocking Diode
- Built-In Robust Charging Protection
  - Battery Temperature Monitoring
  - Programmable Timer
  - On-Chip Thermal Limiting Regulation
- System Reset Function
- Built-In Battery Disconnection Function

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

Adjustable features are outlined below:

I²C	OTP
• Battery regulation voltage • Fast-charge current • Discharge current • Terminal current • Input minimum voltage • Input current limit • Battery UVLO • Charge timer • Watchdog timer • Thermal regulation	• Battery regulation voltage • Fast-charge current • Terminal current • Watchdog timer

Kit Specifications

Feature	Specification
Supply for Board	4.35V to 5.5V
Operating Input Voltage	4.35V to 5.5V
Operating Systems Supported	Windows XP, 7, and later
System Requirements	Minimum 22.2MB free
GUI Software	MP2667 V1.0

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Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following minimum requirements must be met to use the EVKT-MP2667:

- 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 EV2667-G-00A Specifications

The EV2667-G-00A is an evaluation board for the MP2667. For more information, refer to the EV2667-G-00A datasheet.

Figure 2: EV2667-G-00A 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 I²C communication interface, which connects the EVB, the PC, and its supporting accessories. It provides I²C capabilities. Together with the MPS's 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

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Section 2. Software Requirements

2.1 Software Installation Procedure

Programming occurs through the 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 titled “MP2667 I2C 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).

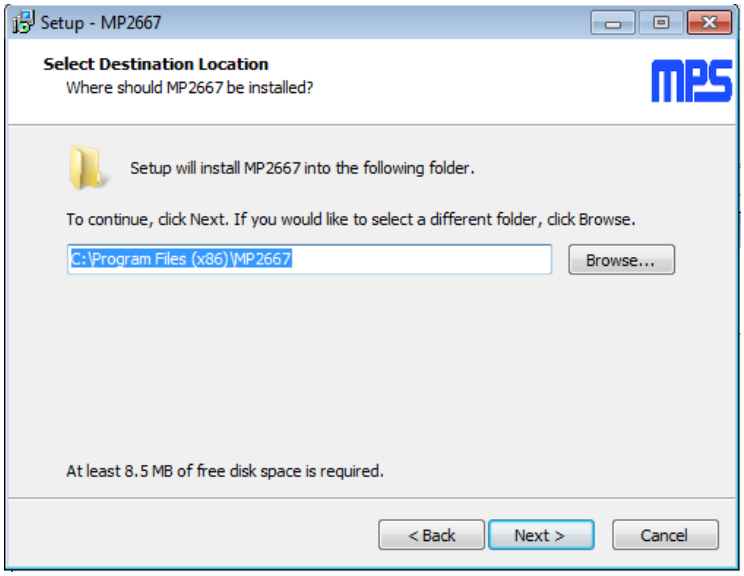

Figure 4: I²C GUI Set-Up Guide

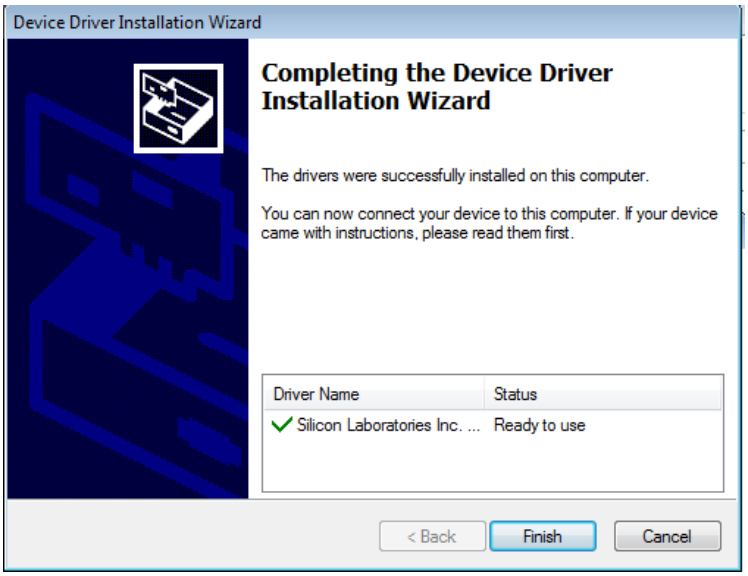

Figure 5: Driver Set-Up Success

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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 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 necessary, refer to the datasheet for further clarification.

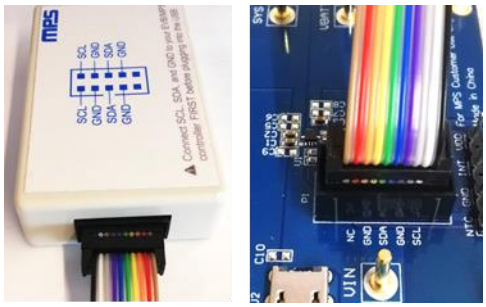

Figure 6: EVB to MPS I²C Communication Interface Wire Connection

3.2 Powering Up the EVB

1. Connect the load terminals 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 terminals to:
    a. Positive (+): VBATT
    b. Negative (-): PGND
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 using a battery simulator, turn on the battery simulator).
8. Turn the power supply on. The board should start up automatically.

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3.3 Software Set-Up

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

1. Start the software. It will automatically check the EVB connection.
   - If the connection is successful, both the USB and MP2667 Demo Board statuses will appear as "Connected" (see Figure 7).

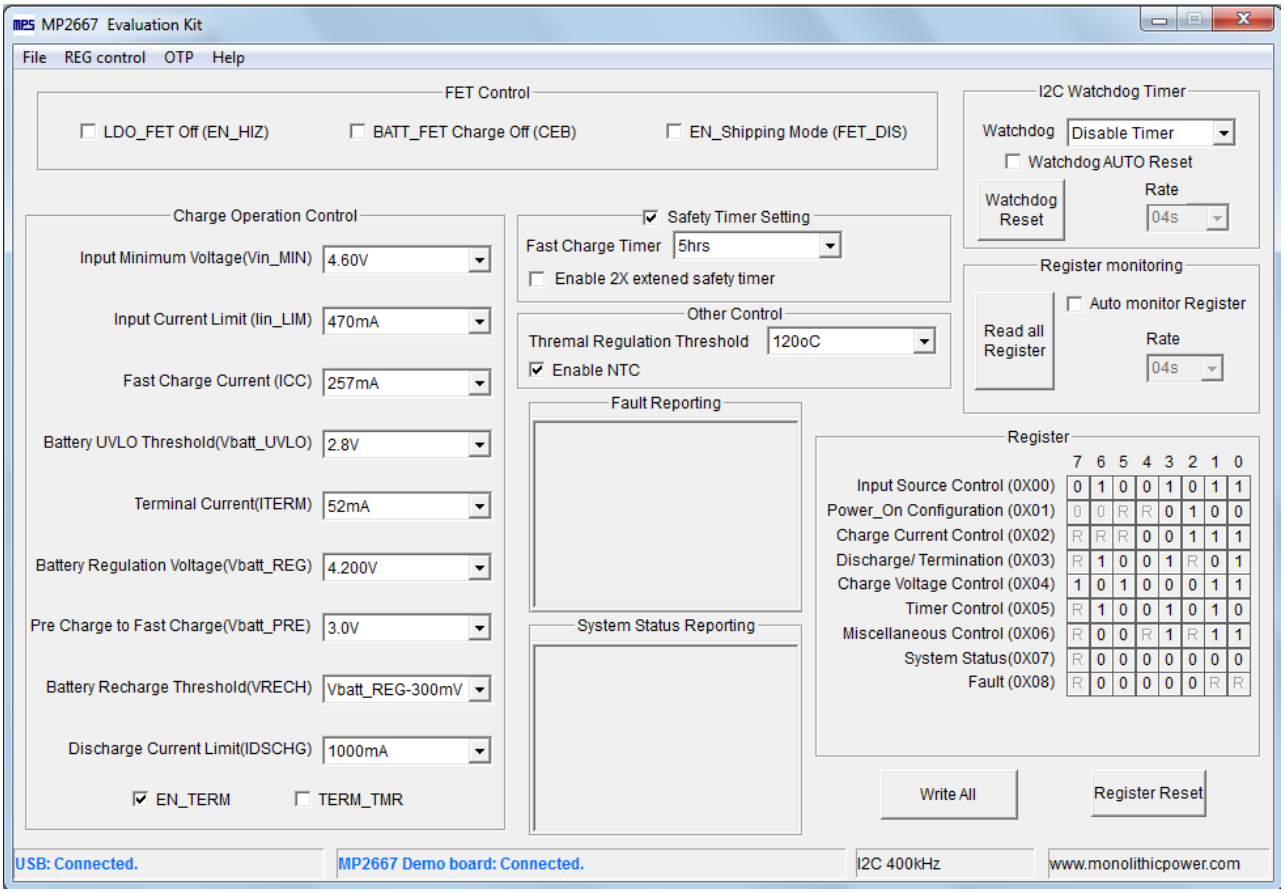

Figure 7: Appearance of USB and MP2667 EVB Board Show Connected

   - If not, they will appear as "Not Connected" in red. Check the connections between the EVB, communication interface, and PC. Re-plug the USB into computer.
     - MP2667 Demo Board "Not Connected" means that the evaluation board is not connected correctly.
     - USB "Not Connected" means that the USB to I^2C communication interface is not connected correctly.
2. Click the "Read All Registers" button to read the I^2C register values. The default values are displayed (see Figure 7).
3. Find the item to be changed, 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 I^2C will be restored to default values once the EVB is powered down.

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3.4 Device Programming Instructions

The MP2667-xxxx is a one-time programmable (OTP) part, where "-xxxx" is the register setting option. The factory default setting is "-0000", which can be viewed in the I²C register map. Follow the instructions outlined below to create and export customized configurations:

1. Using a computer, open the MPS GUI software. Ensure that the EVB is powered on.
2. Check the connection between the EVB and computer.
3. Select "OTP View" in the toolbar (see Figure 8).

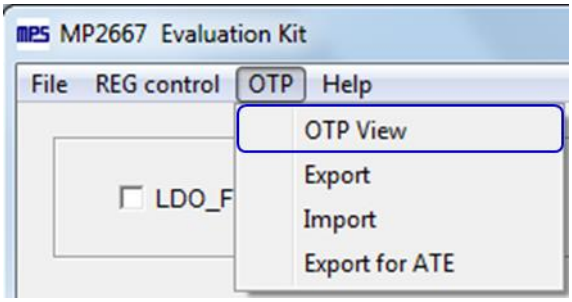

Figure 8: Select OTP

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

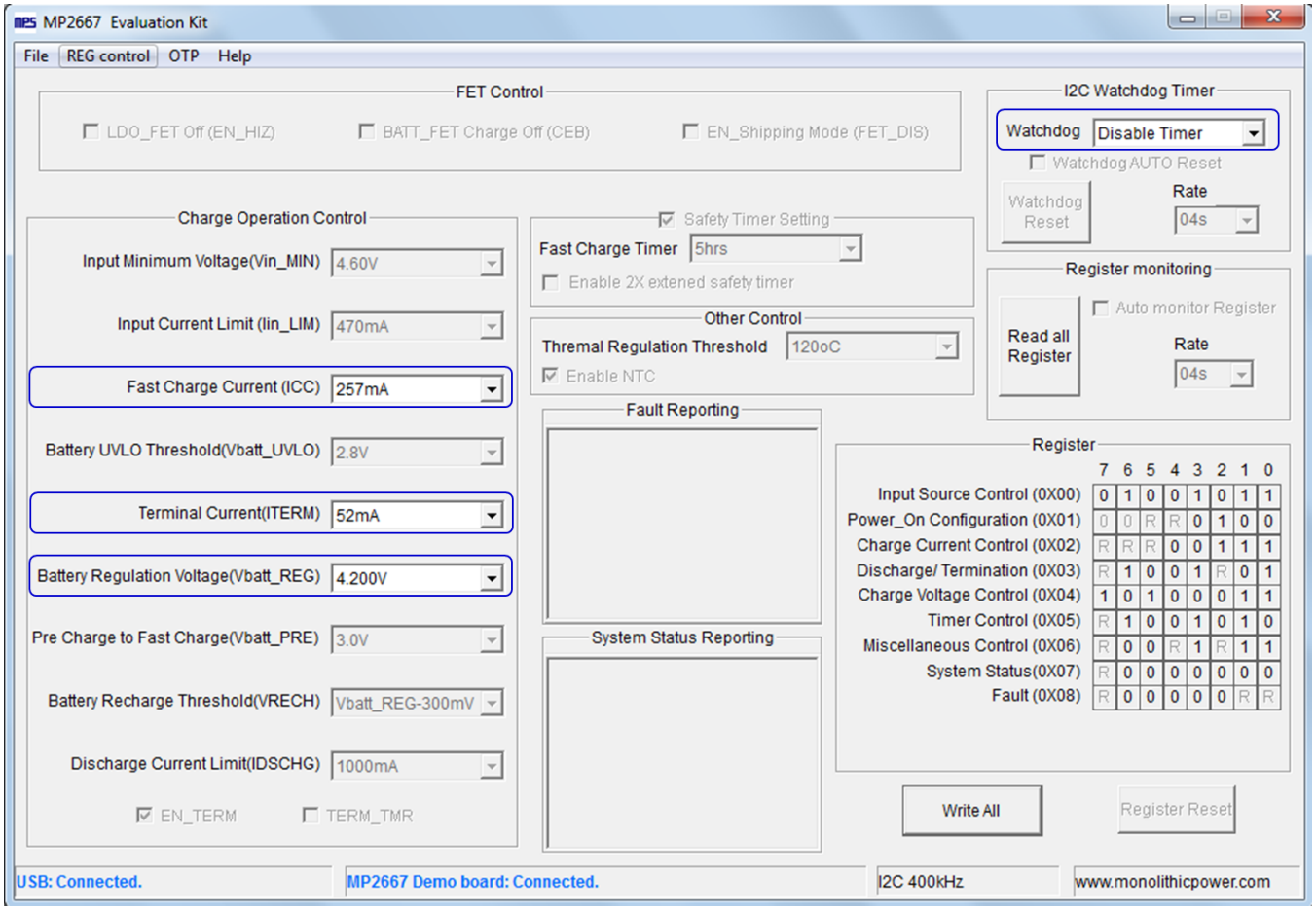

Figure 9: Adjustable Parameters in OTP Mode

5. Select values from the drop-down menus. Be sure all the parameters are populated before exporting. Export the configuration by clicking "Export" in the toolbar (see Figure 10).

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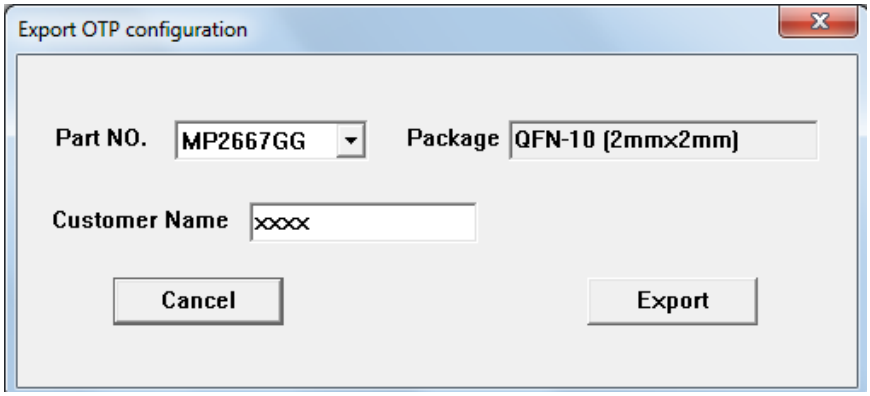

Figure 10: Select "Export"

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

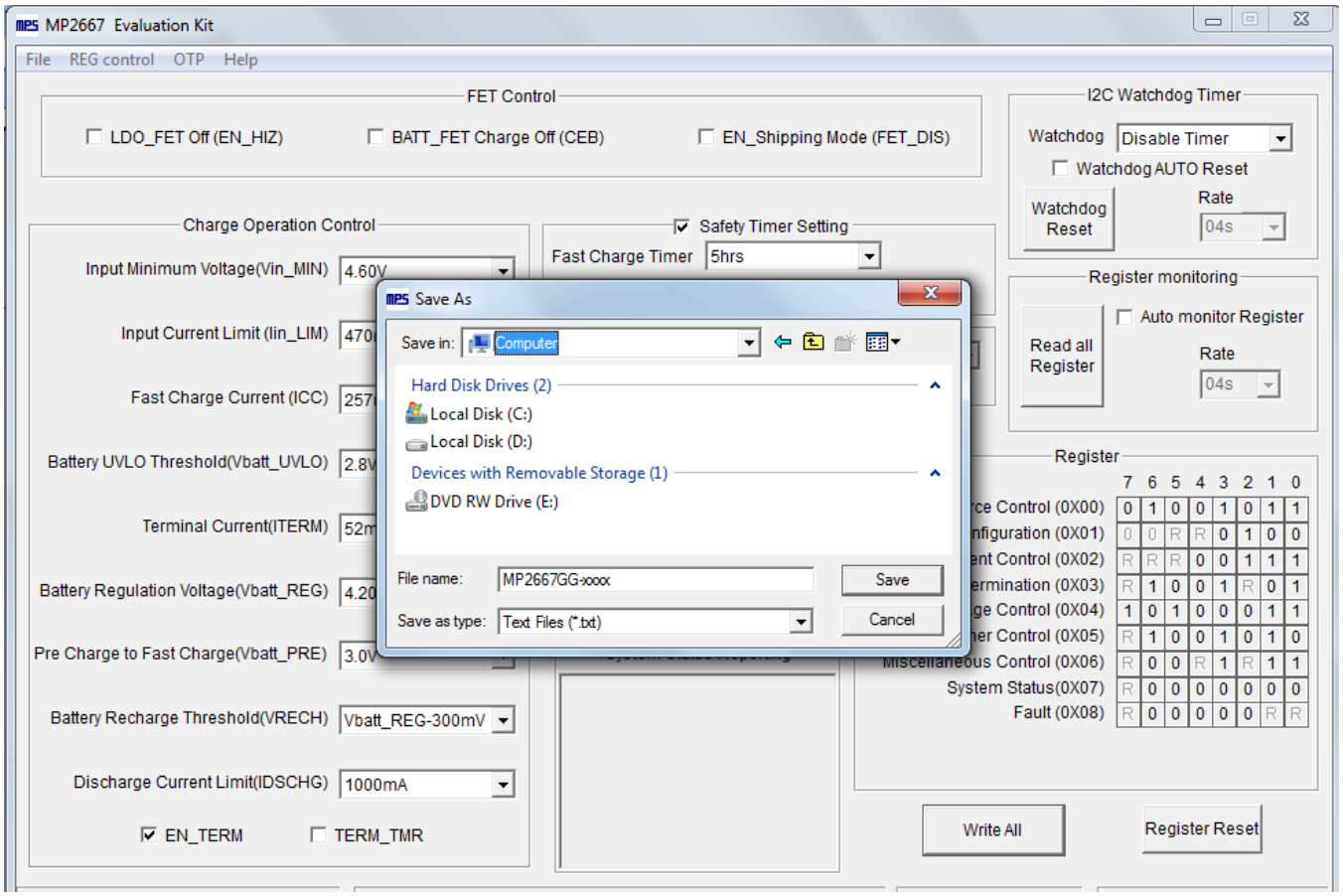

Figure 11: Saving OTP Configurations

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

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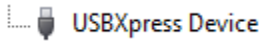
3.5 Troubleshooting Tips

EVKT-USBI2C-02

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 operation 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 a 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 will 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).

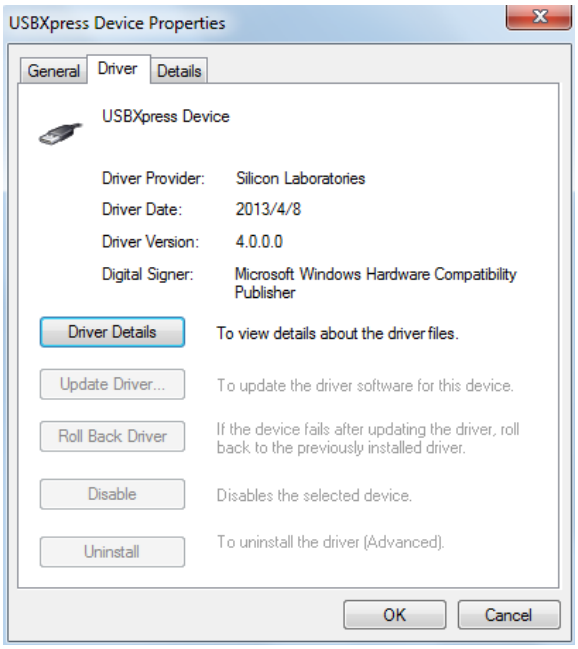


Figure 12: Correct Driver Version Should be Newer than 4.0.0.0

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 UVLO falling threshold (enter no supply state) or over-temperature protection is triggered (enter shutdown state), the IC switches to supplement mode, powered by the battery.

Thermal Recovery

If the MP2667 is in a shutdown state due to the die temperature exceeding the thermal protection threshold, the IC powers on again once the die temperature decreases.

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Section 4. Ordering Information

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

Part Number	Description
EVKT-MP2667	Complete evaluation kit
Contents of EVKT-MP2667	
EV2667-G-00A	MP2667-xxxx evaluation board
EVKT-USBI2C-02 Bag	Includes one USB to I^2C communication interface, one USB cable, and one ribbon cable
Online Resources	Include datasheet, user guide, product brief, and GUI

Order directly from MonolithicPower.com or our distributors.

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	2/8/2021	Initial Release	-
1.1	4/15/2021	Updated Figure 1	2
		Updated the name and download location of the GUI software	5
		Simplified the “Powering Up the EVB” description	6
		Added “-xxxx” definition	8
		Formatting updates	All

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