User Guide

MP2660 Evaluation Kit (EVKT-MP2660)

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Overview

Introduction

The EVKT-MP2660 is an evaluation kit for the MP2660. This board is designed for the MP2660, 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-2660 kit contents (items below can be ordered separately).

#	Part Number	Item	Quantity
1	EV2660-C-01A	MP2660 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

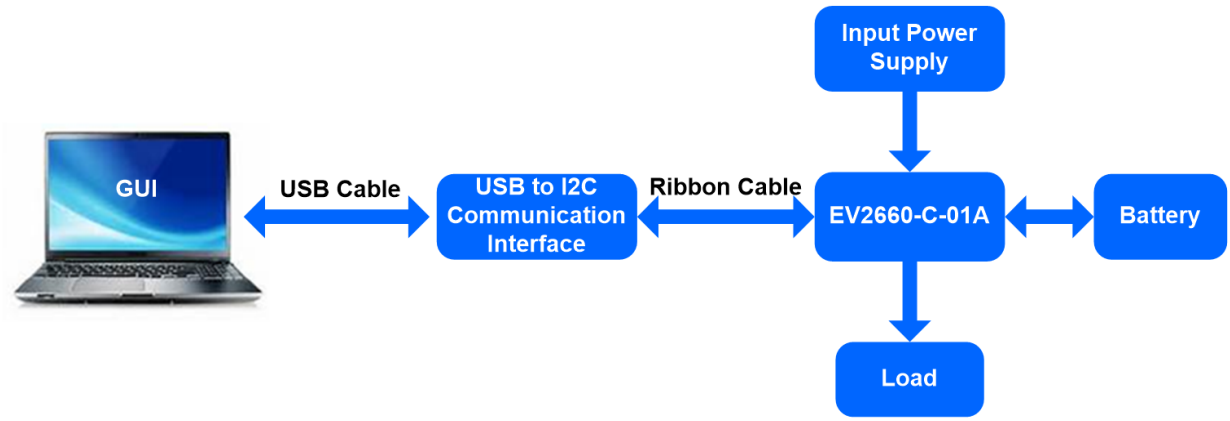


Figure 1: EVKT-MP2660 Evaluation Kit Set-Up

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
- I^2C Interface for Setting Charging Parameters and Status Reporting
- Fully Integrated
  - Power Switches –
    - a 300mΩ LDO MOSFET between IN and SYS
    - a 100mΩ battery MOSFET between SYS and BATT
  - No External Blocking Diode
- Built-In Robust Charging Protection
  - Battery Temperature Monitoring
  - Programmable Timer
  - Thermal Limiting Regulation On-Chip
- System Reset Function
- Built-In Battery Disconnection Function

⚠ All changes made in I^2C mode will NOT be retained once the EVB is powered down.
⚠ Information written in OTP mode CANNOT be changed.

Adjustable features:

I2C	OTP
• Battery Regulation Voltage • Charge Current • Discharge Current • Trickle Current • Input Voltage Regulation • Input Current Limit • BATT UVLO • Charge Timer • Watchdog Timer • Thermal Regulation	• Battery Regulation Voltage • Charge Current • Trickle Current • Watchdog Timer

Kit Specifications

Feature	Specification
Supply for Board	4.6V - 5.5V
Operating Input Voltage	4.6V - 5.5V
Operating Systems Supported	Windows XP, 7, and later
System Requirements	Minimum 22.2 MB free
GUI Software	MP2660 V1.7

Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following must be minimally met to use the EVKT-2660.

- 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 EV2660-C-01A Specifications

The EV2660-C-01A is an evaluation board for the MP2660. For more information, please refer to the EV2660-C-01A datasheet.

Feature	Specification
Supply for Evaluation Board	4.6V - 5.5V
Operating Input Voltage	4.6V - 5.5V
EVB Size (L X W)	6.3cm X 6.3cm

Figure 2: EV2660-C-01A 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.

Figure 3: EVKT-USBI2C-02 Communicaiton 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 MP2660” 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 the installation is complete (see Figure 5).

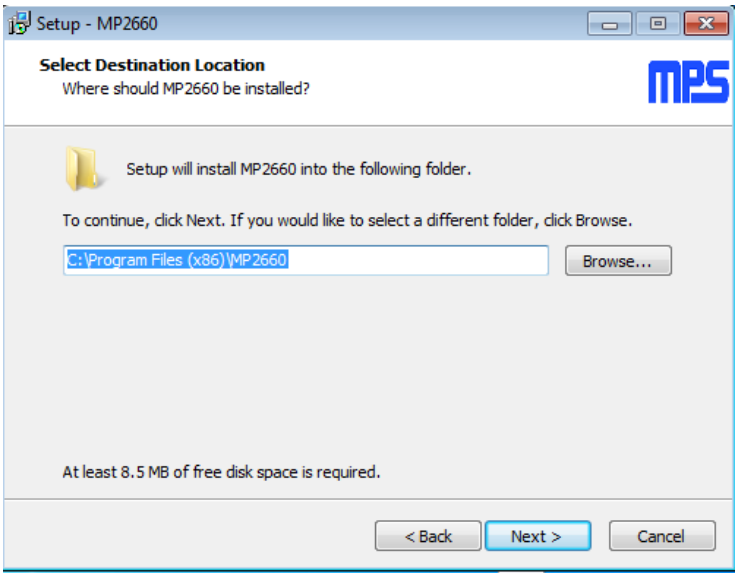


Figure 4: MPS I²C GUI Set-Up Guide

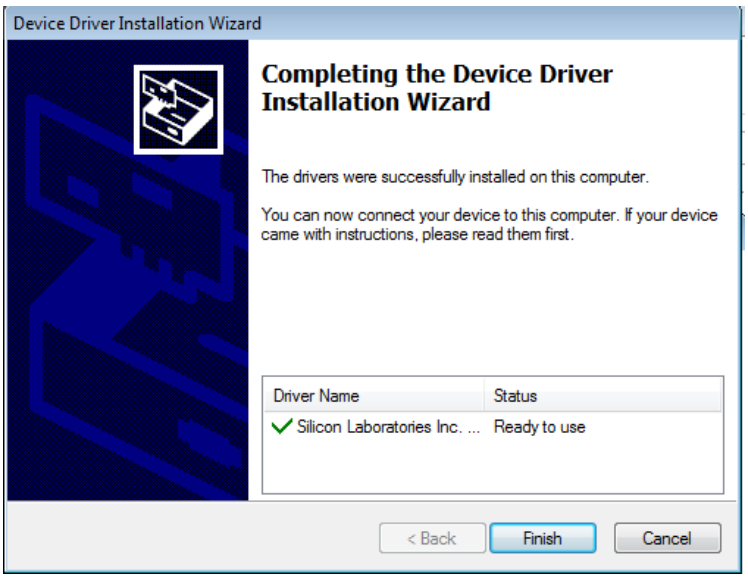


Figure 5: Driver Set-Up Success

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 automatically enter the power on sequence.

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 MP2660 DEMO board statuses are "connected." (see Figure 7).

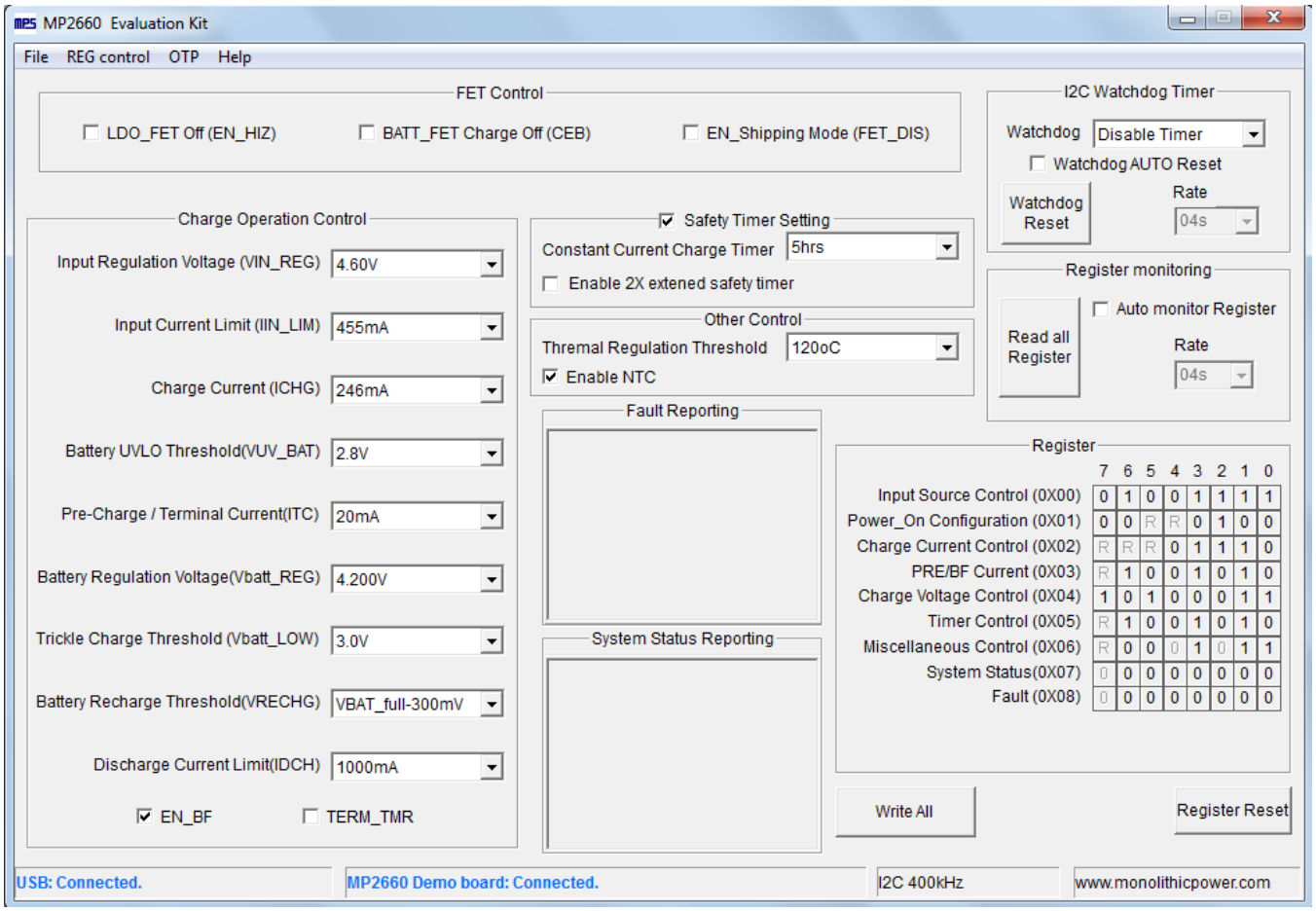


Figure 7: Appearance of USB and MP2660 EVB Board Show Connected

2. 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) MP2660 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.
3. Click the “Read All Register” button to read the I²C register values and the default values are displayed (see Figure 7).
4. Find the item you want to change and select the desired value from the drop down menu.
5. Click the “Write All” button to update values. The changed information of the item will be downloaded to the IC.

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

3.4 Device Programming Instructions

The MP2660-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)

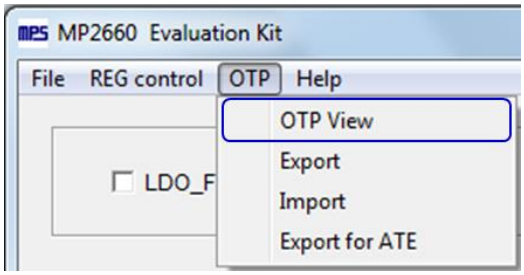


Figure 8: Select OTP

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

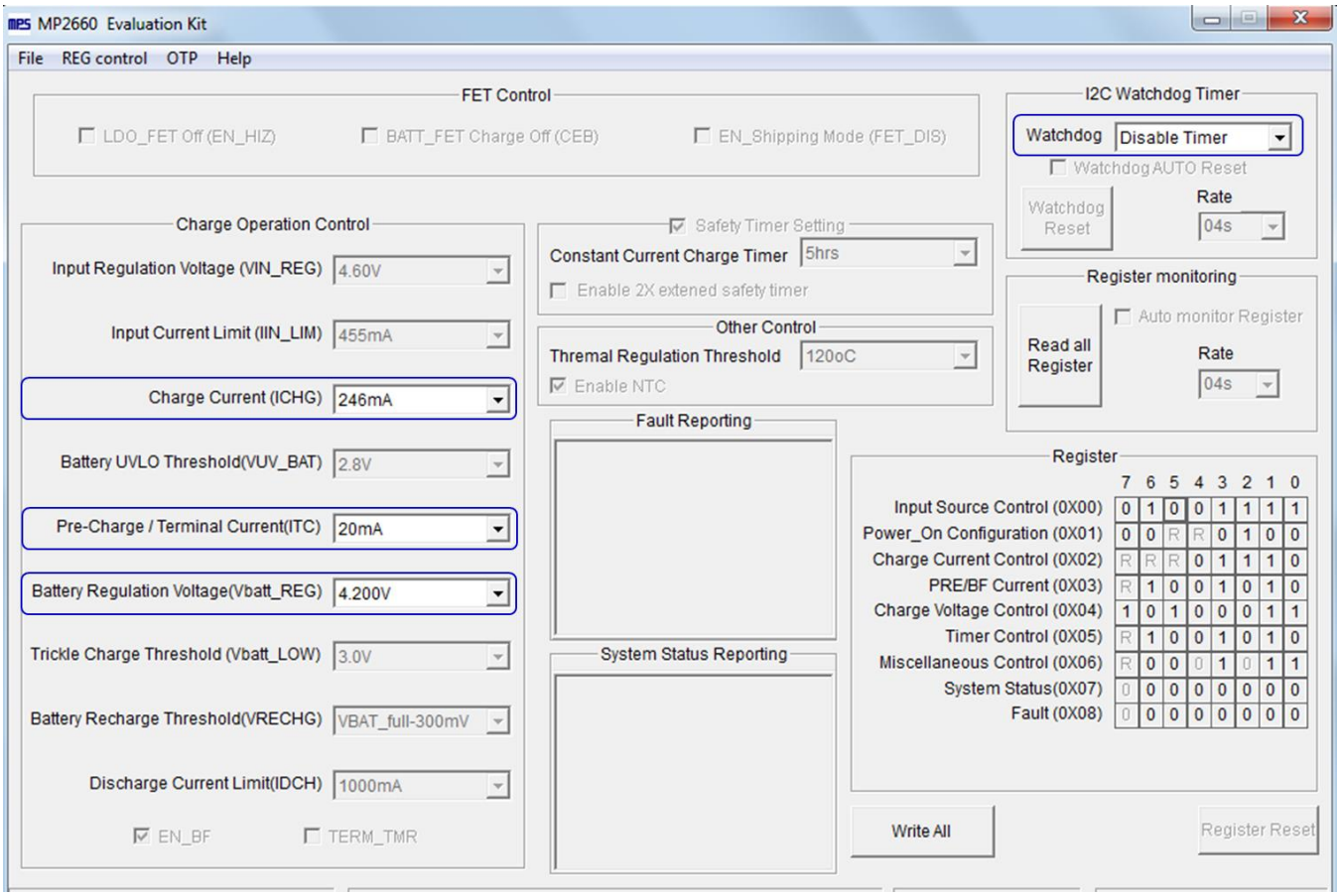


Figure 9: Parameters that can be Adjusted in OTP Mode

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

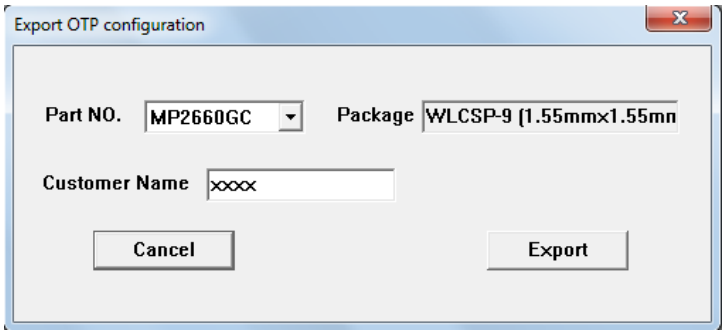


Figure 10: Select "Export"

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

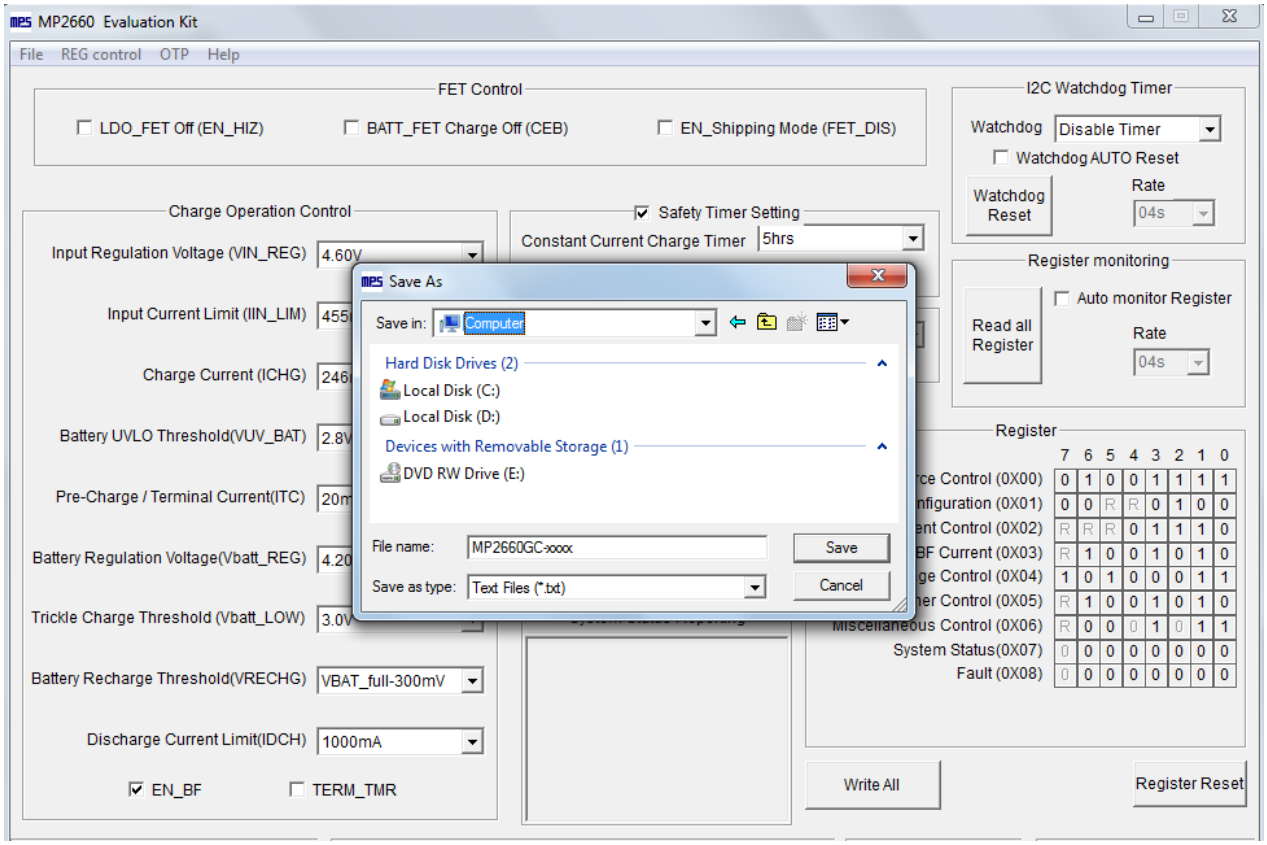


Figure 11: Various Export Locations Available

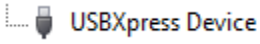
7. Send this file to an FAE and apply for the customized "xxxx" code.

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.

1. 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.



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).

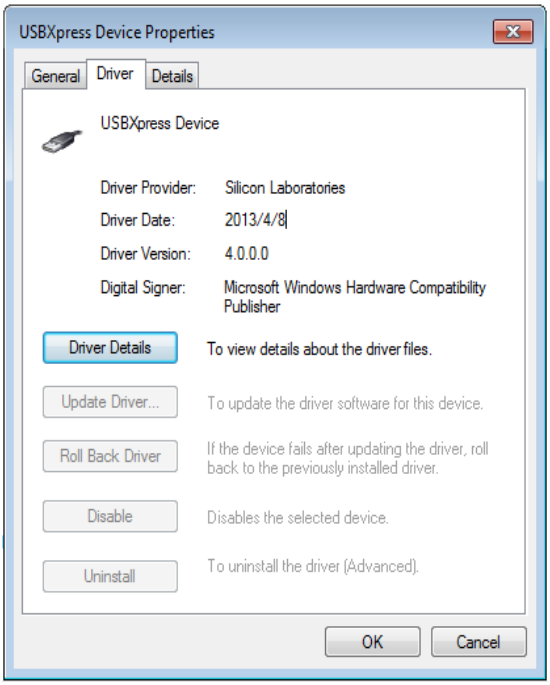


Figure 12: Correct Driver Version is 4.0.0.0

- **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 MP2660 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-MP2660	Complete evaluation kit
Contents of EVKT-2660	
EV2660-C-01A	MP2660-xxxx evaluation board
EVKT-USBI2C-02	Includes one USB to I^2C communication interface, one USB cable, one ribbon cable,
Online resources	Includes: datasheet, user guide, product brief, and GUI

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EVKT-MP2660