# User Guide

## MP8865 Evaluation Kit (EVKT-8865)

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# Overview

## Introduction

The EVKT-8865 is an evaluation kit for the MP8865. The MP8865 is a high-frequency, synchronous, rectified, step-down, switch-mode converter with an $I^2C$ control interface. The MP8865 offers a very compact solution that achieves 6A of continuous output current with excellent load and line regulation over a wide input supply range. The kit allows for quick evaluation of the MP8865. By using the $I^2C$, users can set the output voltage, switching frequency, slew rate, and operation mode.

## Kit Contents

EVKT-8865 kit contents: (items below can be ordered separately).

| # | Part Number | Item | Quantity |
|---|---|---|---|
| 1 | EV8865-Q-00A | MP8865GQ evaluation board | 1 |
| 2 | EVKT-USBI2C-02 | Includes one USB to $I^2C$ communication interface, one USB cable, one ribbon cable | 1 |

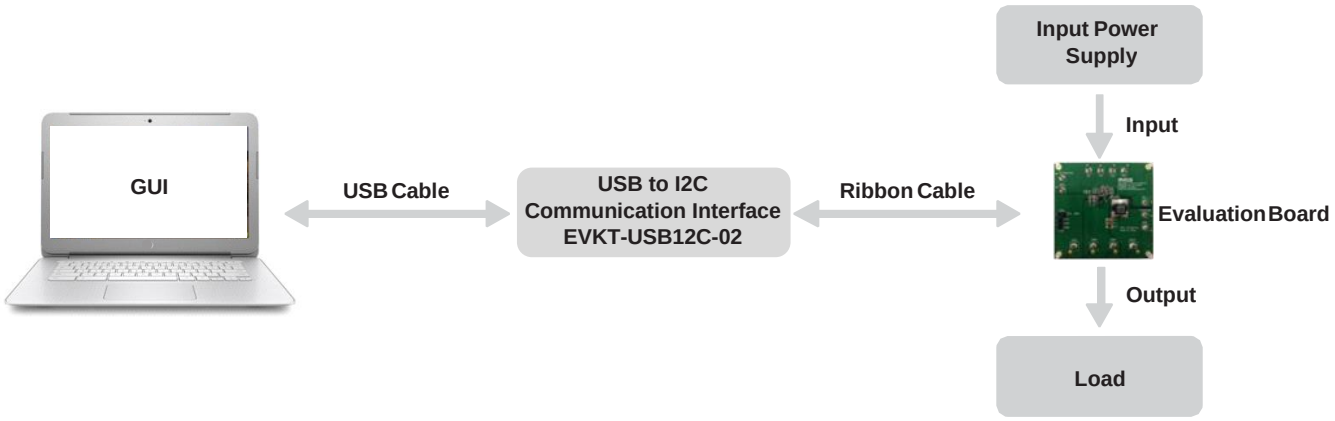


**Figure 1: EVKT-8865 Evaluation Kit Set-Up**


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## Features and Benefits

The MP8865 is highly customizable. Users can program the MP8865 via the MPS I²C GUI.

⚠ All *changes made in I²C mode will NOT be retained once the EVB is powered down.*

Features adjustable under each method are outlined below.

| I2C |
|---|
| • Adjustable output voltage<br>• Selectable slew rate<br>• Selectable switching frequency<br>• Selectable PFM mode<br>• System enable (EN bit)<br>• Status indication: OC, OTEW, OT, PG |

## Kit Specifications

| Feature | Specification |
|---|---|
| Supply for Board | 4.5V - 21V |
| Operating Input Voltage | 4.5V - 21V |
| Operating Systems Supported | Windows XP, 7, and later |
| System Requirements | Minimum 22.2 MB free |
| GUI Software | 2 Register Controls: VSEL, System |
| EVB Size (L x W) | 6.4 cm x 6.4 cm |


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# Section 1. Hardware Specifications

## 1.1 Personal Computer Requirements

The following must be minimally met to use the EVKT-8865:

- 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 EV8865-Q-00A Specifications

The EV8865-Q-00A is an evaluation board for the MP8865GQ. For more information, please refer to the EV8865-Q-00A datasheet.

**Figure 2: EV8865-Q-00A Evaluation Board**

| Feature | Specification |
|---|---|
| Supply for Evaluation Board | 4.5V - 21V |
| Operating Input Voltage | 4.5V - 21V |
| EVB Size (L x W) | 6.4 cm x 6.4 cm |

## 1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the communication interface, which connects the EVB, the PC, and its supporting accessories. It provides $I^2C$ and PMBus capabilities. Together with MPS 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**


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# 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 directly from the MPS website.*

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

1. Visit the MP88xx I²C GUI page at https://www.monolithicpower.com/en/i2c-tool.html.
2. Click the “Download” button in the upper right-hand corner.
3. Once the download has completed, 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.”
4. Follow the prompts in the set-up guide.
5. Wait for the status screen to verify that installation is complete (see Figure 5).

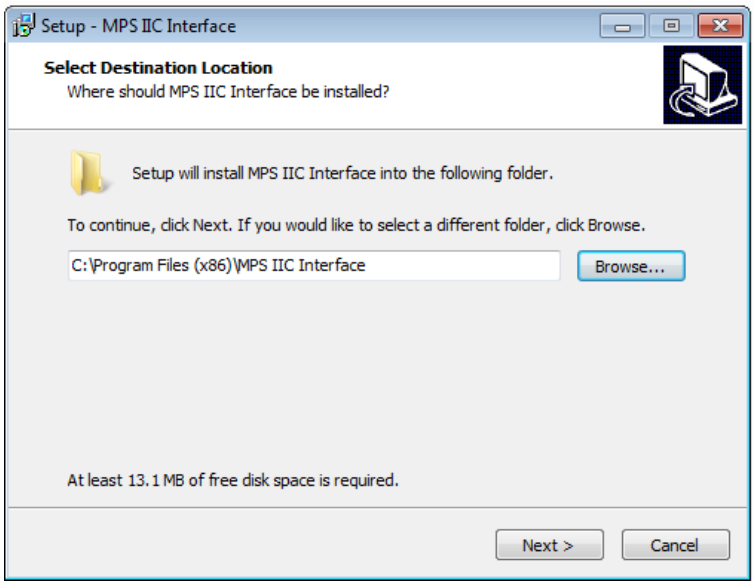


**Figure 4: MPS I²C GUI Set-Up Guide**


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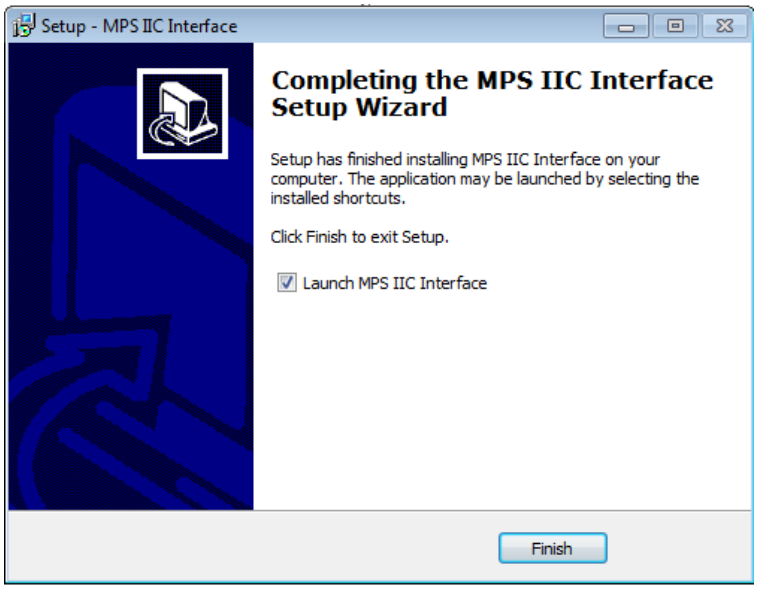


**Figure 5: MPS I²C GUI Set-Up Success**


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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. Use the USB cable to connect the EVKT-USBI2C-02 communication interface to the PC, and 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.

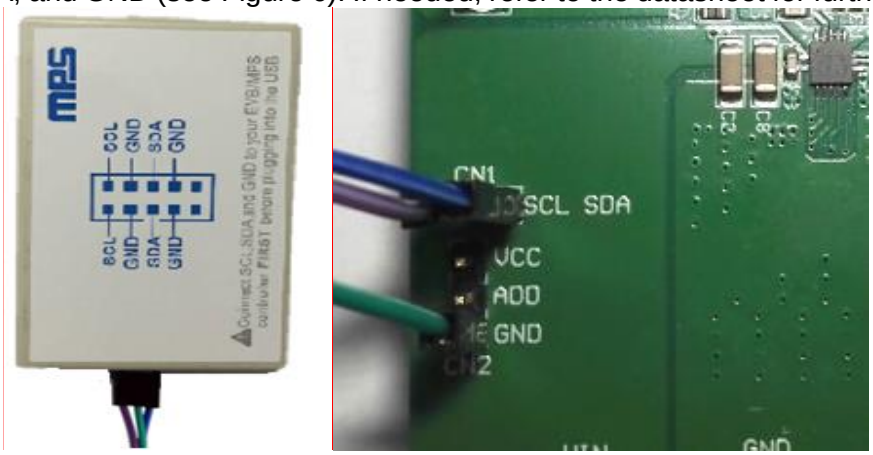


**Figure 6: EVB to MPS I²C Communication Interface Wire Connection**

## 3.2 Powering up the EVB

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output to between 4.5V and 21V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on. The IC will enter the power on sequence automatically.

## 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. It will automatically check the EVB connection.
   - If connection is successful, the address will be listed in the “Slave Address” (see Figure 7).


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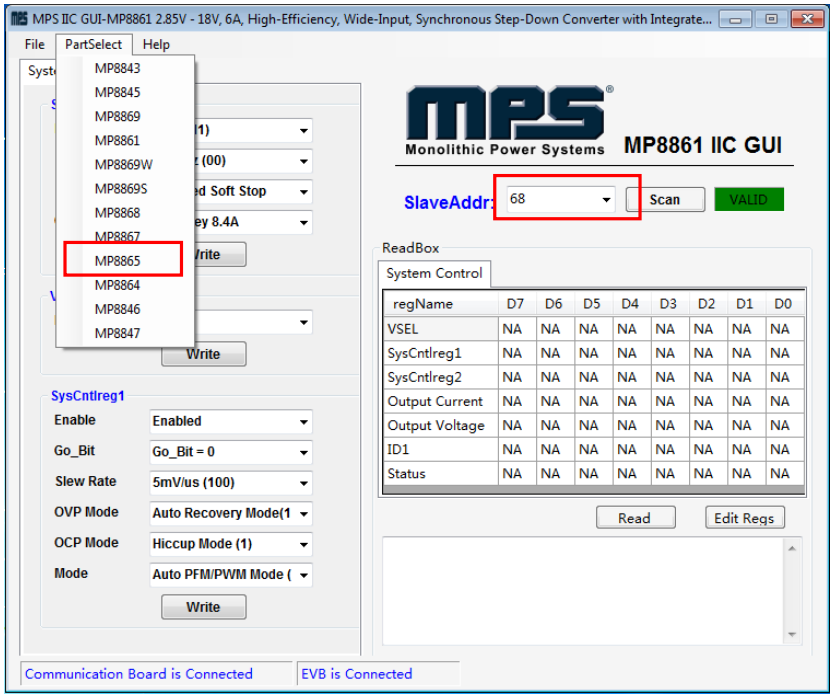


**Figure 7: Appearance of Address Shows Successful Connection**

- If connection is not successful, a warning will appear at the bottom. There are two warnings a user can expect (see Figure 8). Each warning means an invalid connection.
  1) "EVB is Disconnected!" This means that the evaluation board is not connected.
  2) "Communication Board is Disconnected!" This means that the USB $I^2C$ communication interface is not connected.

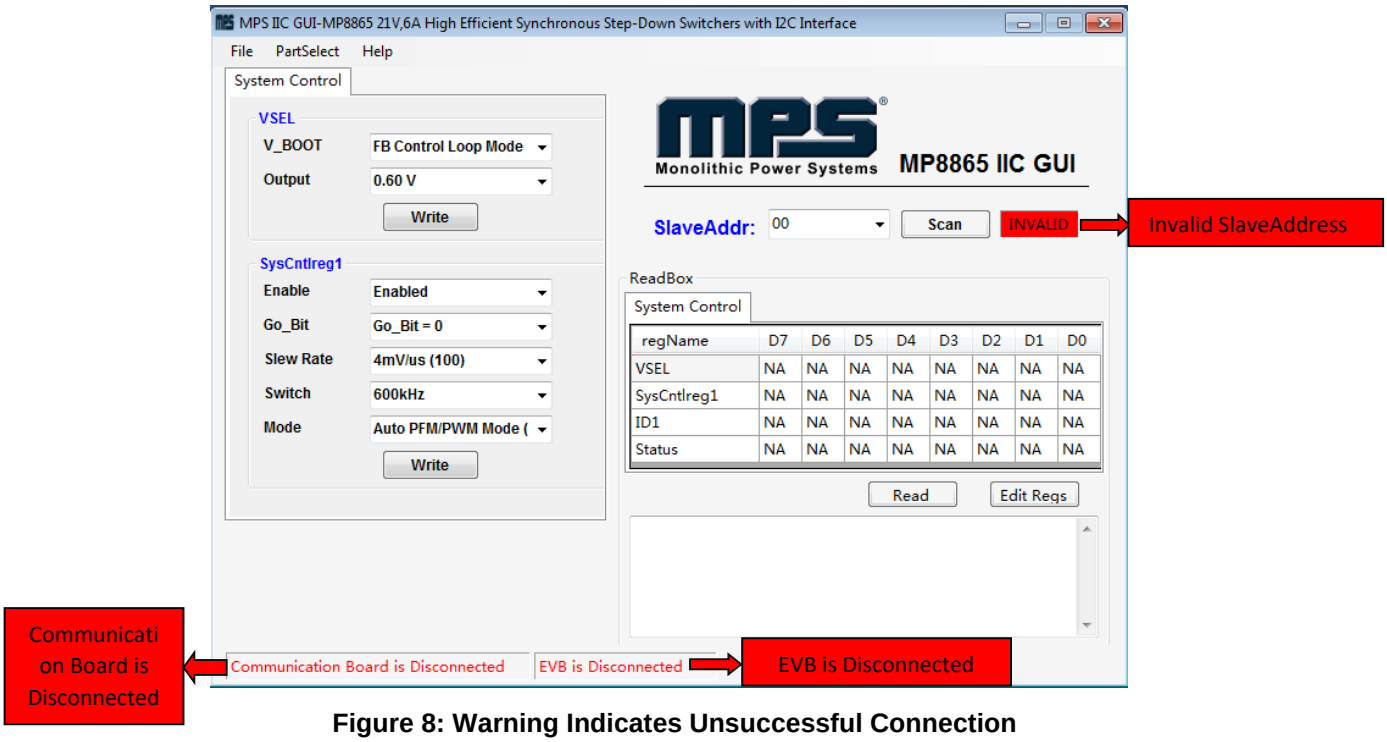


**Figure 8: Warning Indicates Unsuccessful Connection**


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2. If connection is successful, proceed to Step 3. Otherwise, check connections between the EVB, communication interface, and PC. Re-plug the USB into the computer and restart the GUI.
3. Click the "**PartSelect**" button to select the MP8865 (see Figure 7) (The default GUI window is for the MP8861). The Register Control menu will appear on the left side. The I²C register values will be read and displayed on the right sideafter clicking the "**Read**" button (see Figure 9).

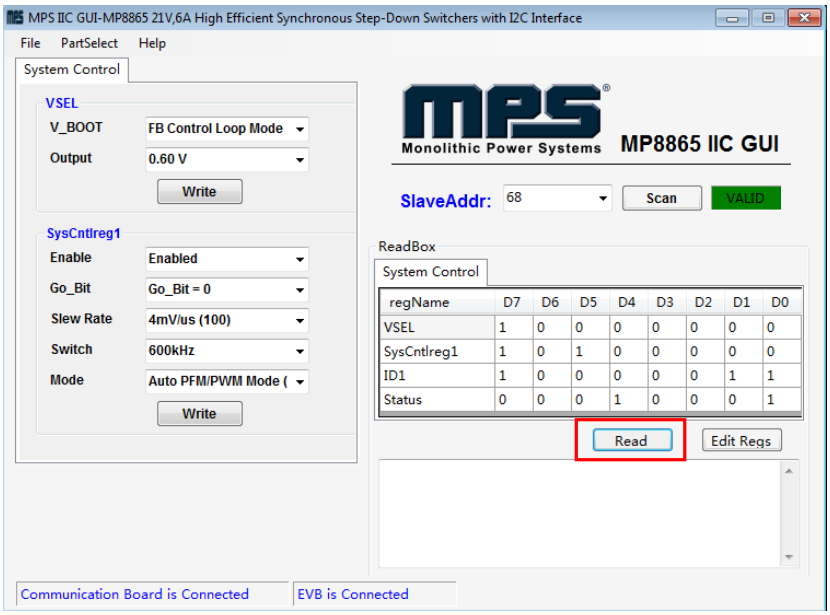


**Figure 9: Values from I²C Shown in Table**

4. Find the item you want to change and select the desired value from the drop down menu.
5. Click the "**Read**" button to update values. The changed information of the item will appear on the right side (see Figure 10).

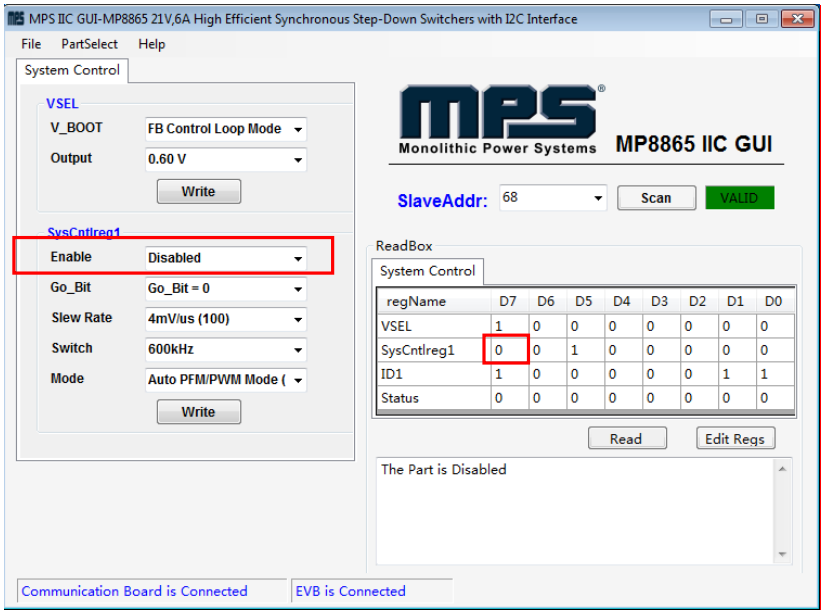


**Figure 10: Refer to Datasheet to Translate 0's and 1's**

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


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### 3.4 Troubleshooting Tips

*Note: USBI2C-02 and USBI2C-01 drivers are not compatible. USBI2C-02 uses USBXpress and USBI2C-01 uses Cyusb3. USBI2C-02 is the recommended device for the MPS PMBus and I²C.*

**EVKT-USBI2C-01**

In case the USBI2C-01 driver is not properly installed, manual installation is required. Follow the steps below:

1. Open the Device Manager and select update driver software (see Figure 11).
2. Click "Browse my computer for driver software." find the downloaded driver, and install.

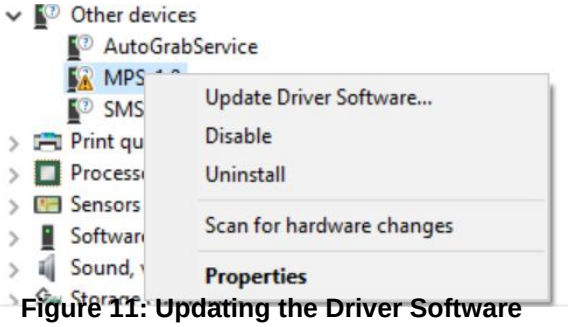
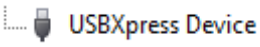



**Figure 11: Updating the Driver Software**

**EVKT-USBI2C-02**

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

*Note: Check driver version. Find "USBXpress" Device in the Device Manager under USB controllers.*




*Right click and view properties. Check to make sure the driver version matches the newest version (see Figure 12).*

1. Install the correct USBXpress ".exe" file.
   Choose either the 32 bit or 64 bit operating system:
   32-bit: USBXpressInstaller_x86.exe
   64-bit: USBXpressInstaller_x64.exe
2. Connect the EVKT-USBI2C-02 communication interface to the PC with the USB cable.

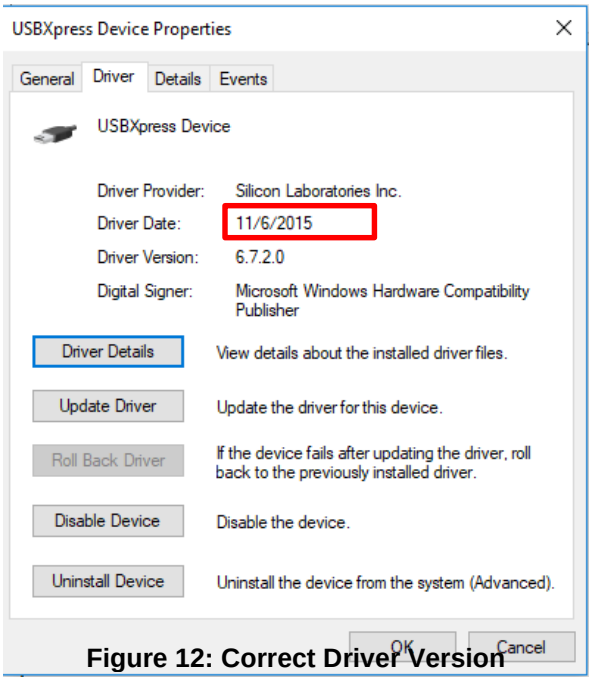



**Figure 12: Correct Driver Version**

- **No Supply**

The MP8865's input pin has an under-voltage lockout (UVLO) detection circuit. If the input voltage (AVIN) is lower than the UVLO rising threshold, the MP8865's functions are disabled.

- **Shutdown Event**

If the MP8865 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 power-off state), the IC switches to no supply state or power-off state, regardless of the current state.

- **Thermal Recovery**

If the MP8865 is in a power-off state due to the die temperature exceeding the thermal protection threshold, the MP8865 enters a power-on sequence when the die's temperature decreases.

- **Shutdown Sequence**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When the input voltage is lower than the UVLO falling threshold, or the MP8865 is over-temperature, the MP8865 enters the shutdown sequence directly.


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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-8865 | Complete evaluation kit |
| **Contents of EVKT-8865** | |
| EV8865-Q-00A | MP8865GQ evaluation board |
| EVKT-USBI2C-02 | Includes one USB to $I^2C$ communication interface, one USB cable, one ribbon cable |

**Order directly from MonolithicPower.com or our distributors.**


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