



MPS

User Guide

MP8833 Evaluation Kit (EVKT-MP8833)

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Overview

Introduction

The EVKT-MP8833 is an evaluation kit for the MP8833, which is a monolithic thermoelectric cooler controller with built-in internal power MOSFETs. The MP8833 provides features such as TEC voltage/current limiting, and can be controlled through an I²C serial interface.

Kit Contents

EVKT-MP8833 kit contents (items listed 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 | EV8833-D-01B | MP8833GD evaluation board | 1 |
| 2 | EVKT-USBI2C-02 | Includes one USB to I ² C communication interface, one USB cable, and one ribbon cable | 1 |



Figure 1: EVKT-MP8833 Evaluation Kit Set-Up

Features and Benefits

The MP8833 is highly customizable. Users can program the MP8833 via the MPS I²C GUI.

△ *Any changes made in I²C mode are not retained once the EVB shuts down.*

Adjustable features are outlined below.

| |
|-----------------------|
| I²C |
|-----------------------|

- Selectable soft-start current
- System on/off control
- Discharge time set after system shutdown
- Selectable heating/cooling output current limit
- Enable or disable heating/cooling output current limit
- Enable or disable VIN over-voltage protection (OVP)
- Selectable heating/cooling output voltage limit
- Enable or disable heating/cooling output voltage limit
- Selectable LDO hiccup current limit
- Selectable buck hiccup current limit
- TEC voltage/current monitor
- Status monitor

Kit Specifications

| Features | Specification |
|-----------------------------|--|
| Start-Up Voltage | 2.7V to 5.5V |
| Output Voltage | Cooling voltage limit to heating voltage limit |
| Operating Systems Supported | Windows XP, 7, or later |
| System Requirements | Minimum 15 MB free |
| GUI Software | 11 register controls: ILIMIT, VLIMIT, IMON, VTEC, STATUS |
| EVB Size (LxW) | 6.3cmx6.3cm |

Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following requirements must be met to use the EVKT-MP8833:

- Operating system of Windows XP, 7, or later
- Net Framework 4.0
- PC with a minimum of one available USB port
- At least 1 MB of free space

1.2 EV8833-D-01B Specifications

The EV8833-D-01B is an evaluation board for the MP8833GD. For more information, refer to the EV8833-D-01B datasheet.



Figure 2: EV8833-D-01B Evaluation Board

| Feature | Specification |
|-------------------------|--|
| Start-Up Voltage | 2.7V to 5.5V |
| Output Voltage | Cooling voltage limit to heating voltage limit |
| EVB Size (LxW) | 6.3cmx6.3cm |

1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the USB to I²C communication interface device, which connects the EVB, the PC, and its supporting accessories. It provides I²C and PMBus capabilities. Together with the 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 I²C GUI. Follow the instructions below to install the software:

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

1. Download the GUI installation file titled “MP8833 GUI” from the MPS website.
2. Extract the zip package and 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. Wait for the status screen to verify that installation is complete (see Figure 5).

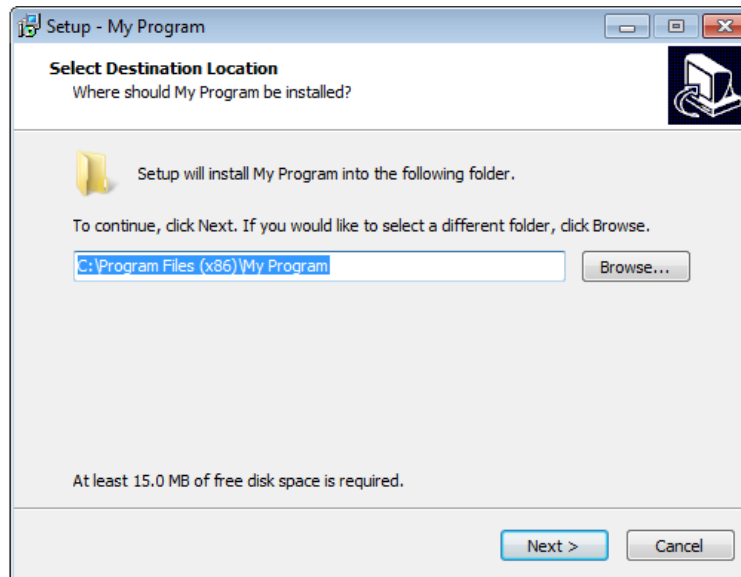


Figure 4: MPS I²C GUI Set-Up Guide

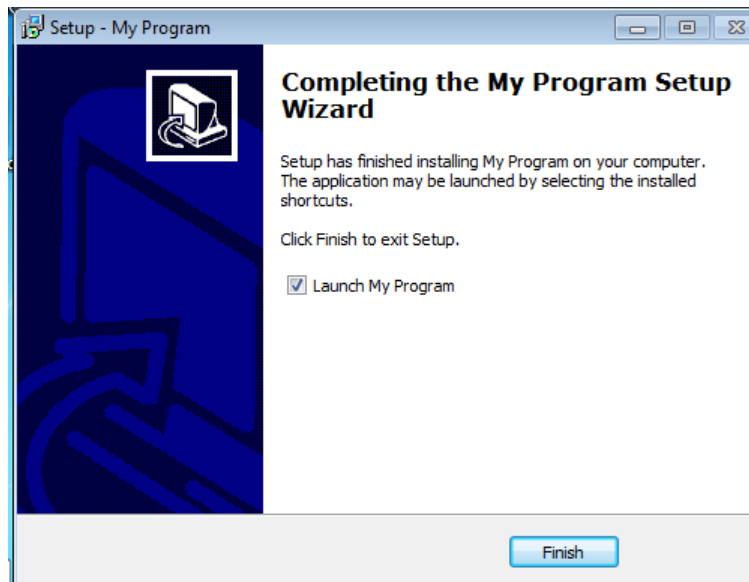


Figure 5: Driver Set-Up Success

Section 3. Evaluation Kit Test Set-Up

3.1 Hardware Set-Up

The hardware must be configured properly 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). Refer to the evaluation board datasheet for further clarification.
3. Use the USB cable to connect the EVKT-USBI2C-02 communication interface to the PC.



Figure 6: EVB to MPS I²C Communication Interface Wire Connection

3.2 Powering Up the EVB

1. Preset the power supply between 2.7V and 5.5V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
 - a. Positive (+): VIN
 - b. Negative (-): GND
4. Connect the load to:
 - a. Positive (+): TEC+
 - b. Negative (-): TEC-
5. Turn the power supply on after making the connections. The board should start up 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 should check the EVB connection automatically.
 - If the connection is successful, the address will be listed in the section titled “Slave Address” (see Figure 7).

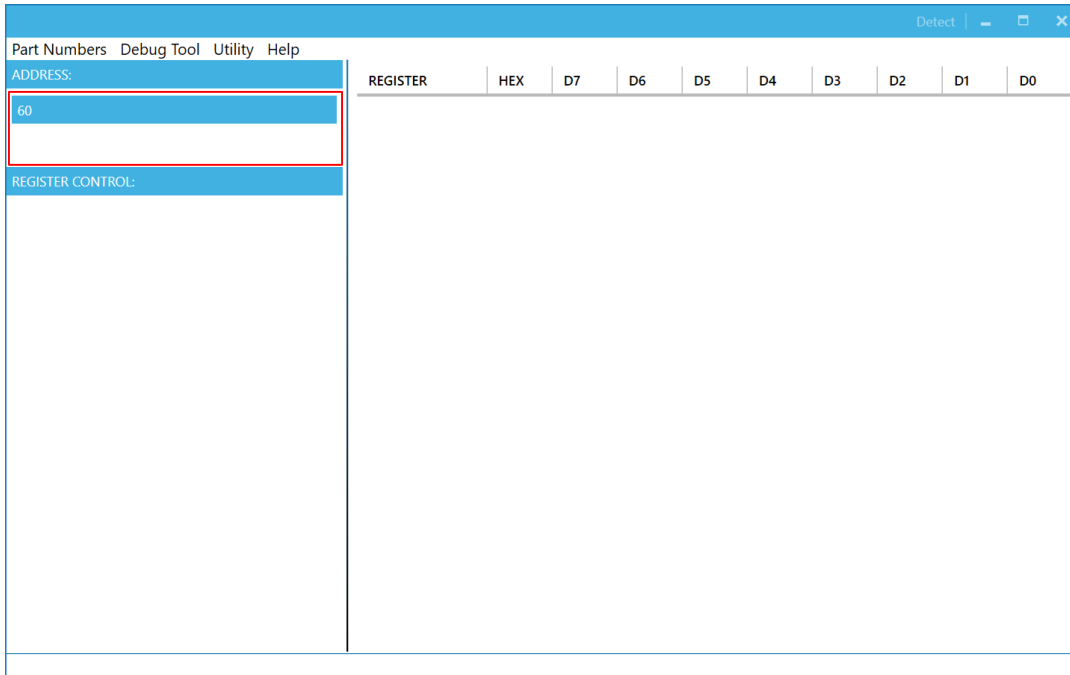


Figure 7: Appearance of Address Indicates Successful Connection

- If the connection fails, one of two warnings can appear at the bottom of the screen:
 - “No Slave Found, Please check the connection!” This means that the evaluation board is not connected (see Figure 8).
 - “Device is not available, Please check the connection!” This means that the USB I²C communication interface is not connected (see Figure 9).

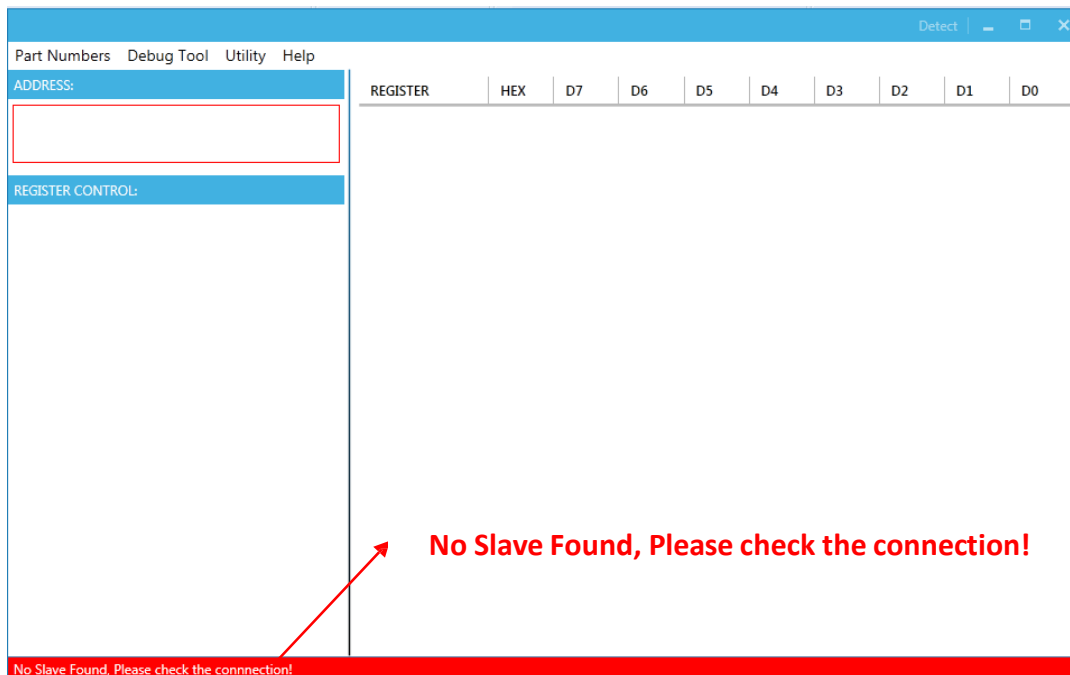


Figure 8: Warning Indicates Unsuccessful Connection – Evaluation Board Not Connected

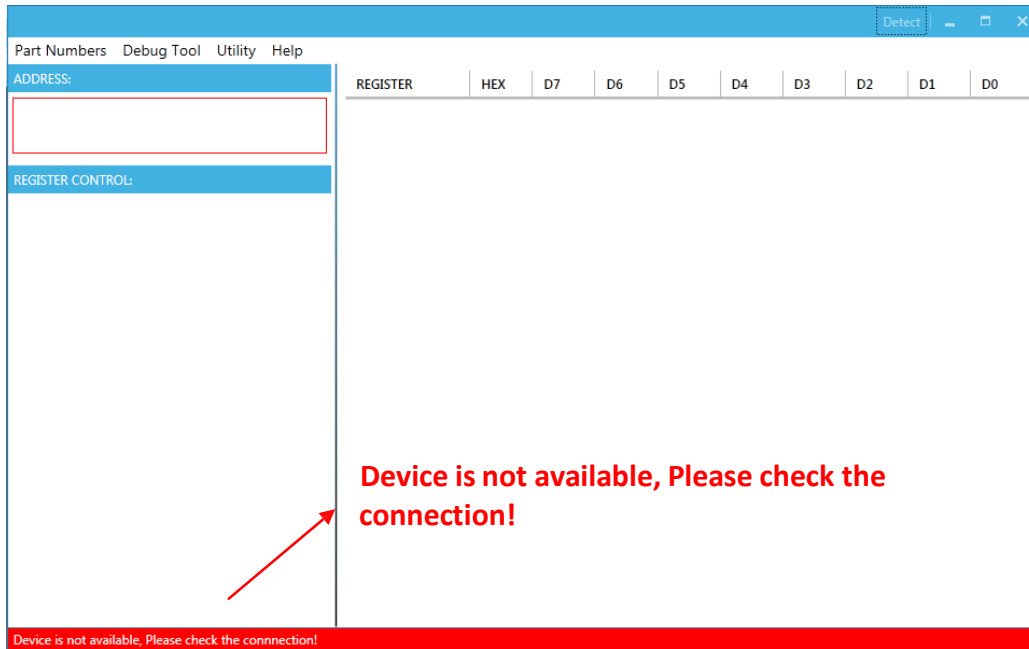


Figure 9: Warning Indicates Unsuccessful Connection – USB I²C Communication Interface Not Connected

2. Establish a successful connection, then proceed to Step 3. If there is no connection, check the connections between the EVB, communication interface, and PC. Re-plug the USB into the PC and restart the GUI.
3. Select the MP8833 from the drop-down menu titled “Part Numbers.” The Register Control menu should appear on the left side. The I²C register values should be read automatically and displayed on the right (see Figure 10).

The screenshot shows the same software window, now titled 'MP8833-1.5A THERMOELECTRIC COOLER CONTROLLER'. The 'ADDRESS:' field contains '60'. The 'REGISTER CONTROL:' section has two dropdown menus: 'ILIM' and 'REGISTER MAP'. The main table on the right is populated with the following data:

| REGISTER | HEX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------------|-----|----|----|----|----|----|----|----|----|
| SYS_SET(0x0) | 11 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ILIM_Heat(0x1) | A6 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| ILIM_Cool(0x2) | A6 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| V LIM_Heat(0x3) | DC | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| V LIM_Cool(0x4) | 9C | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| LIMIT(0x5) | A5 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| ADD(0x6) | C0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| IMON(0x7) | 7E | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| VTEC(0x8) | 46 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| Status(0x9) | 68 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| ID(0xa) | 21 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |

A 'read all' button is located at the bottom right of the table area.

Figure 10: Values from I²C Shown in Table

- Find the item to change, then choose a value from the drop-down menu. The item's changed information should appear on the right side (see Figure 11).

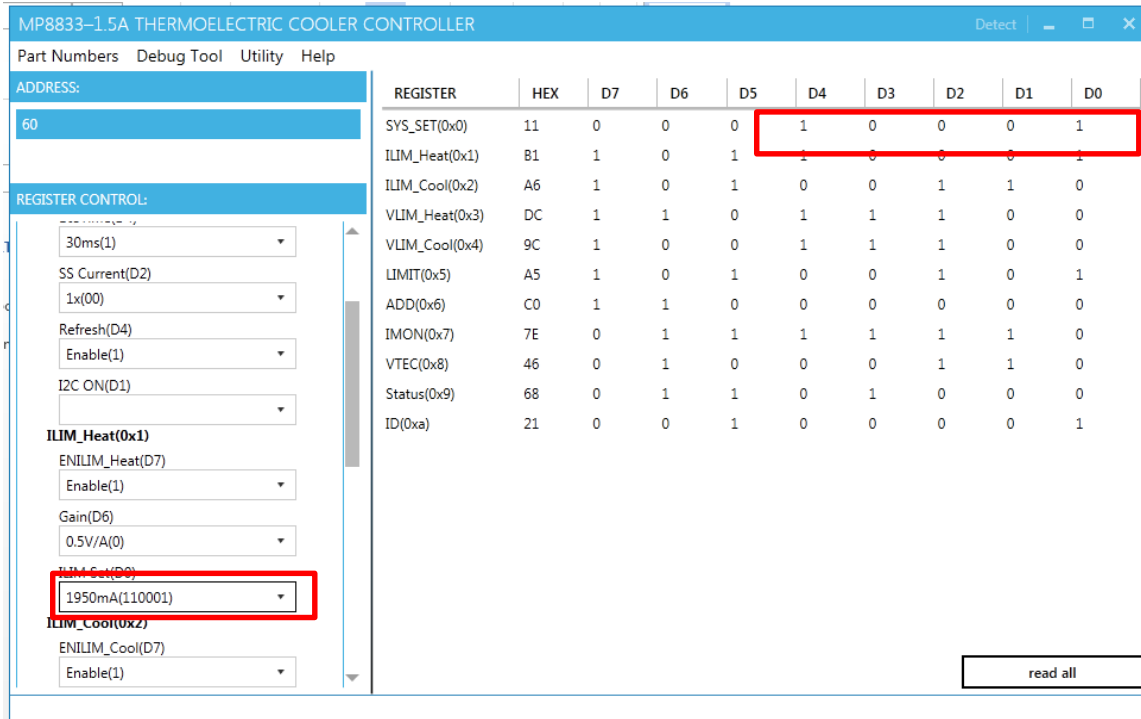


Figure 11: Changing Values Using the Software

⚠ All changes made via the μ C will be restored to default values once the EVB turns off.

3.4 Troubleshooting Tips

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

EVKT-USBI2C-01

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

- Open the Device Manager and select “Update Driver Software” (see Figure 12).
- Click “Browse My Computer for Driver Software,” find the driver, and install.

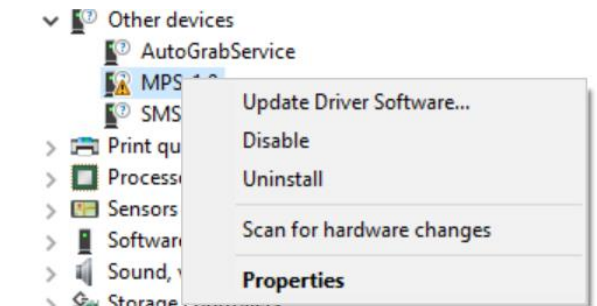
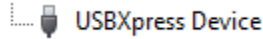


Figure 12: Updating the Driver Software

EVKT-USBI2C-02

If 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. Ensure the driver version matches the newest version (see Figure 13).

1. Install the correct USBXpress “.exe” file
 - Choose either 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.

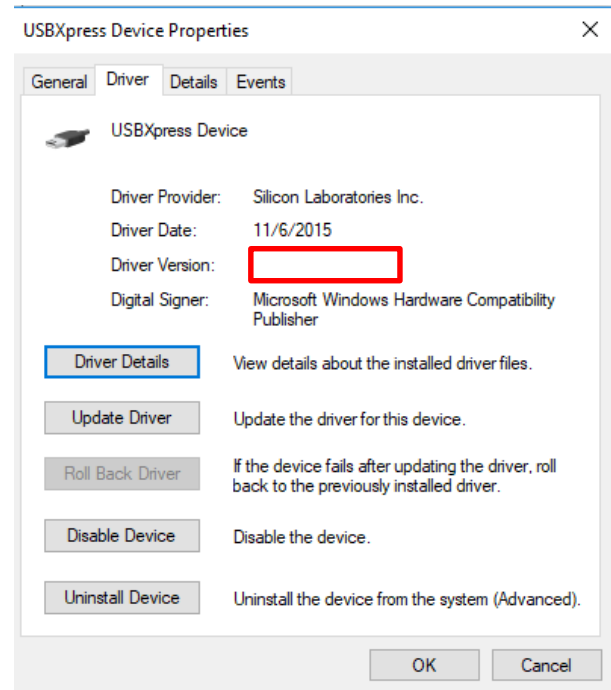


Figure 13: Determining the Driver Software

Section 4. I²C Transfer Data

The MP8833 includes a full I²C slave controller. The I²C slave fully complies with the I²C specification requirements. It requires a start condition, valid I²C address, register address byte, and data byte for a single data update. After receiving each byte, the MP8833 acknowledges by pulling the SDA line low during the high period of a single clock pulse. A valid I²C address selects the MP8833. The MP8833 then performs an update on the falling edge of the LSB byte. Figure 14 and Figure 15 show examples of the I²C read and write commands.

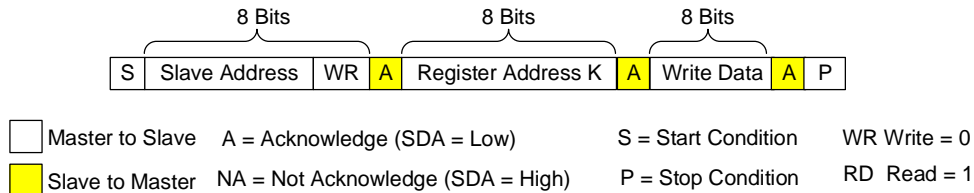


Figure 14: I²C Write Example

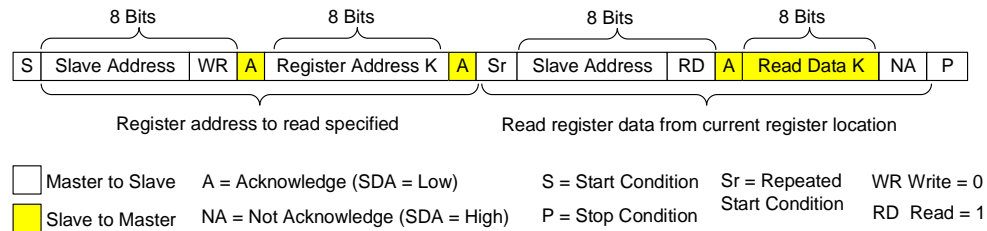


Figure 15: I²C Read Example