User Guide

mEZDPD4506A Evaluation Kit (PKT-mEZDPD4506A)

Table of Contents

Overview 2
Introduction 2
Kit Contents 2
Features and Benefits 3
Kit Specifications 3
Section 1. Hardware Specifications 4
1.1 Personal Computer Requirements 4
1.2 EVmEZDPD4506A-00A Specifications 4
1.3 EVKT-USBI2C-02 Specifications 4
Section 2. Software Requirements 5
2.1 Software Installation 5
Section 3. Evaluation Kit Test Set-Up 6
3.1 Hardware Set-Up 6
3.2 Powering Up the EVB 6
3.3 Software Set-Up 6
3.4 Device Programming Instructions 9
3.5 Troubleshooting Tips 11
Section 4. PMBUS Interface 13
Section 5. Ordering Information 13

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Overview

Introduction

The PKT-mEZDPD4506A is an evaluation kit for the mEZDPD4506A. The mEZDPD4506A is a PCB-based, high-frequency, synchronous, rectified step-down module with a PMBus interface. The mEZDPD4506A offers a complete power solution that achieves up to 6A continuous output current with excellent load and line regulation over a wide input voltage range. MPS's proprietary, multi-phase constant-on-time (MCOT) control provides ultra-fast transient response and simple loop compensation. This kit allows for quick evaluation and module configurations through the PMBus interface.

Kit Contents

PKT-mEZDPD4506A 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	EVmEZDPD4506A-00A	mEZDPD4506A evaluation board	1
2	EVKT-USBI2C-02	Includes one USB to PMBus communication interface device, one USB Male A to B cable, one 10-pin ribbon cable, one 3-pin ribbon cable	1
3	mEZDPD4506A-0001	mEZDPD4506A module with default configuration	1

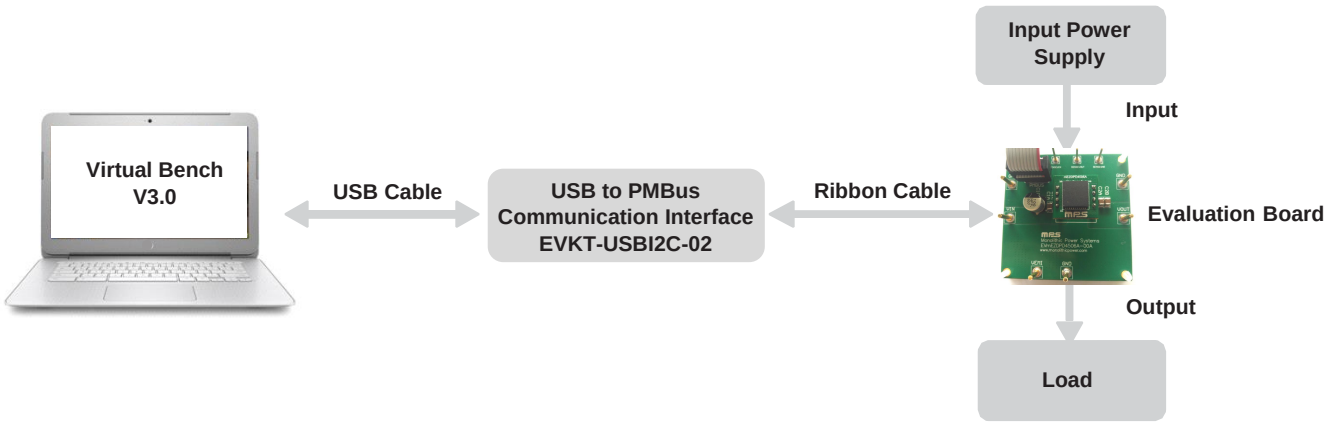

Figure 1: PKT-mEZDPD4506A Evaluation Kit Set-Up

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Features and Benefits

The mEZDPD4506A is highly customizable. Users can program the power module via the MPS PMBus and multi-time programming (MTP) memory.

⚠ Values written to the registers via PMBus will NOT be retained once the module is powered down unless they are written into the MTP memory.

⚠ To write to the MTP memory, the input voltage must be greater than 8V.

Key programmable features:

PMBus
• Switching frequency • Operation mode – AAM or CCM • Output voltage • Soft-start time • Fault threshold

Kit Specifications

Features	Specification
Input Voltage	4V to 45V
Output Voltage	0.6V to 24V (default: 3.3V)
Maximum Output Current	10A continuous, 12A peak
Default Switching Frequency	600kHz
Operating Systems Supported	Windows 7 or later
System Requirements	Minimum 15.6MB free
EVB Size (LxW)	6.4cmx6.4cm

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Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following requirements must be met to use the PKT-mEZDPD4506A:

- Operating system of Windows XP, 7, or later
- Net framework 4.0
- PC with a minimum of one available USB port
- At least 15.6MB of free space

1.2 EVmEZDPD4506A-00A Specifications

The EVmEZDPD4506A-00A is the evaluation board for the mEZDPD4506A. For more information regarding the evaluation board, refer to the EVmEZDPD4506A-00A datasheet.



Figure 2: EVmEZDPD4506A-00A Evaluation Board

Feature	Specification
Input Voltage	4V to 45V
Output Voltage	0.6V to 24V (default: 3.3V)
Maximum Output Current	10A continuous, 12A peak
EVB Size (LxW)	6.4cmx6.4cm

1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 is the PMBus and I²C communication interface device, which connects the EVB and the PC, and its supporting accessories. Together with the eMotion System™ Virtual Bench Pro GUI tool, 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

The eMotion System™ Virtual Bench Pro GUI tool provides an easy way to access the registers, program the MTP memory, and monitor the key parameters of MPS power modules. Follow the instructions below to install the software:

1. Download the GUI installation file, “Virtual Bench Pro 3.0,” from the MPS website at: https://www.monolithicpower.com/en/virtual-bench-pro-3-0.html
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. Follow the prompts in the set-up guide.
4. Wait for the status screen to verify that installation is complete.

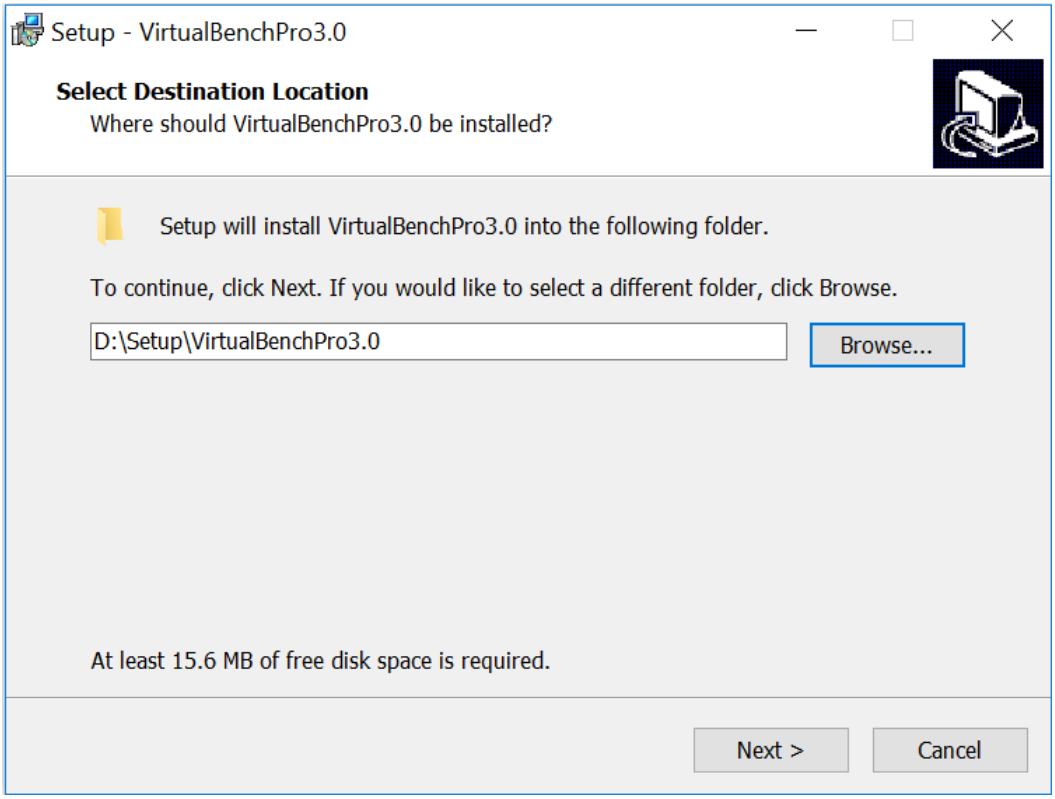

Figure 4: eMotion System™ Virtual Bench Pro GUI Set-Up Guide

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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. Connect the PMBus cable to the evaluation board and the EVKT-USBI2C-02 communication interface (see Figure 5).
2. Connect the EVKT-USBI2C-02 communication interface to the PC using the USB cable.



Figure 5: EVB to MPS I²C Communication Interface Device 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. Set the output voltage of a bench power supply between 4V and 45V before connecting to the EVB to prevent damage, then turn off the power supply.
3. Connect the positive and negative terminals of the power supply to the VIN and GND pins, respectively.
4. Turn the power supply on. The EVB will power up automatically.

3.3 Software Set-Up

After connecting the hardware using the steps above, please follow the steps below to set up the software:

1. Open eMotion System™ Virtual Bench Pro. The software will scan the connected power modules.
   - If the GUI detects the power module, “mEZDPD4506AS” will appear on the left panel, and the indicator to the left of “mEZDPD4506AS” will turn green (see Figure 6).
   - Please refer to the troubleshooting section if the power module is not detected automatically.

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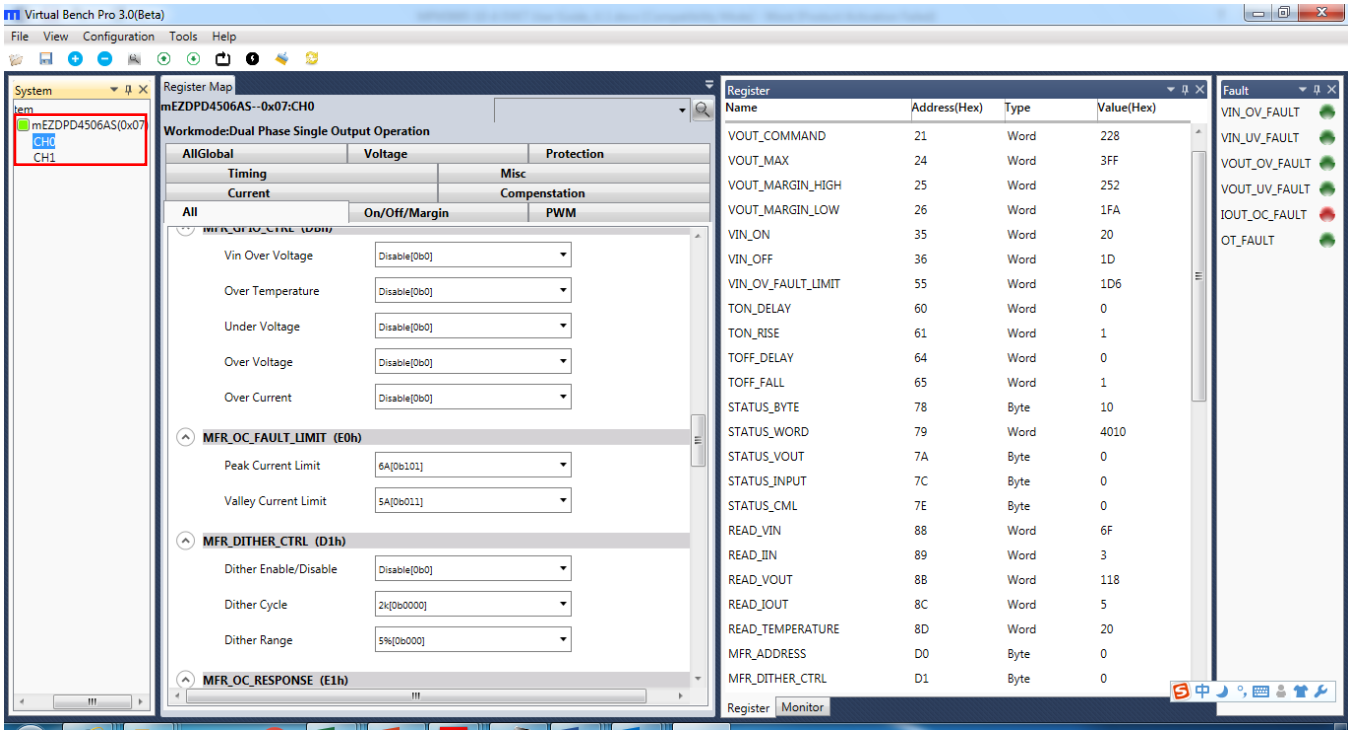

2. **Figure 6: Green Indicator Shows Successful Connection**The Register Control menu will appear in the middle panel. The values stored in the registers of the module are read automatically (see Figure 7).

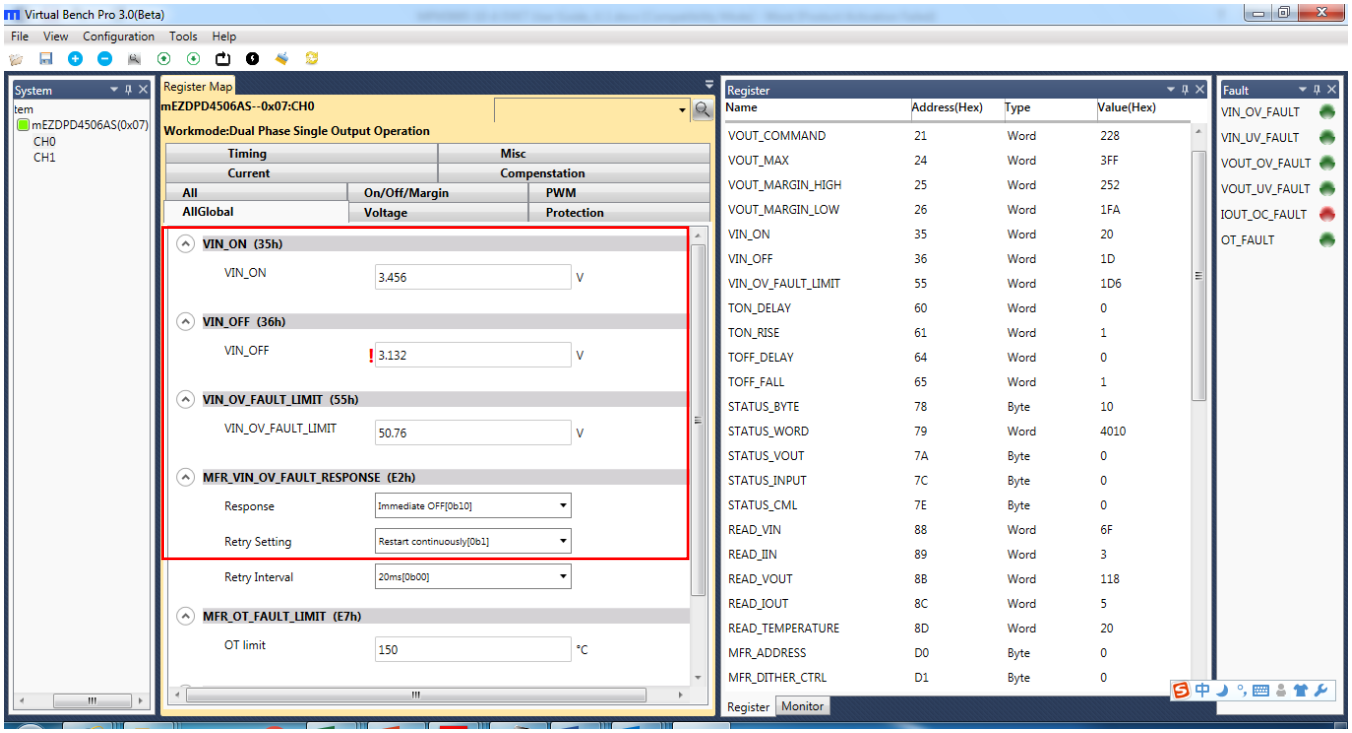

Figure 7: Values Displayed in the Register of the Module

3. Change the register value as desired. A valid input must be entered. Otherwise, an alert will appear, and the entered value will not be accepted (see Figure 8).

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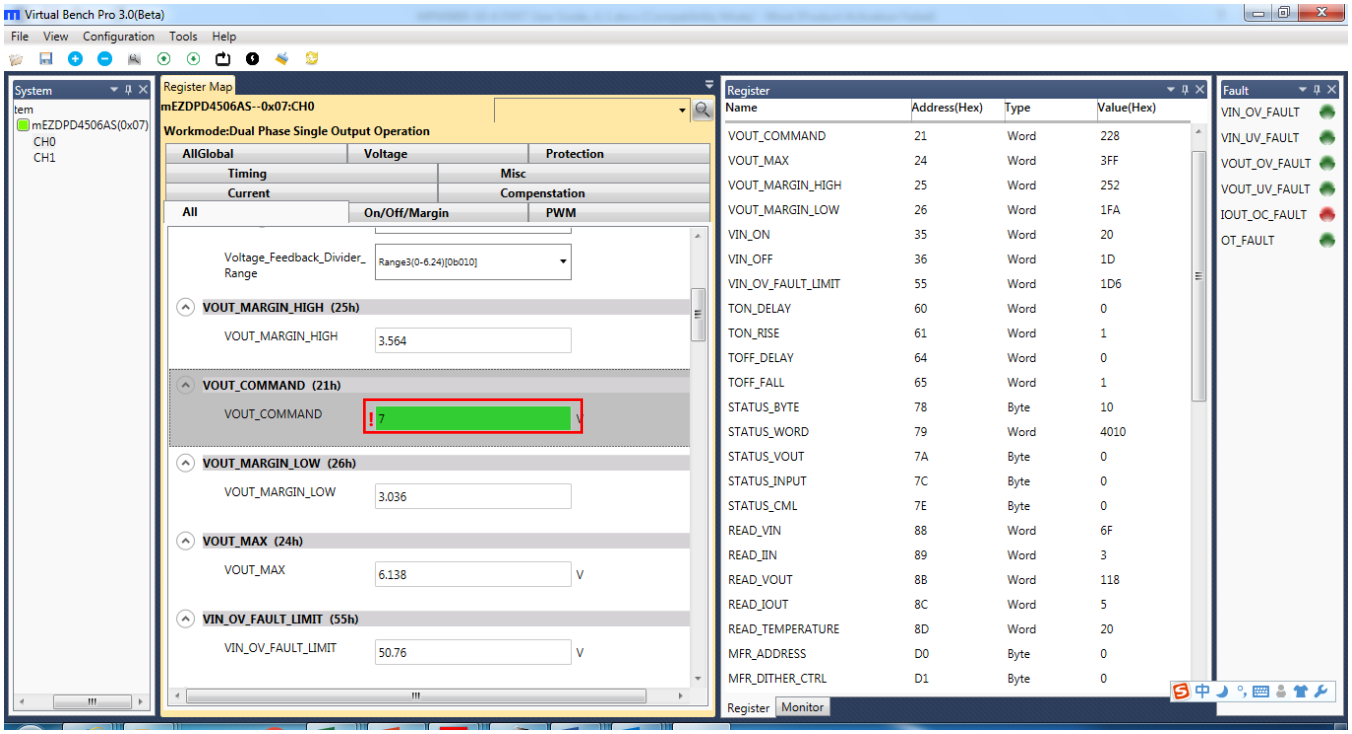

Figure 8: Enter Desired Values in the Register

4. Click the “Write to Chip” button to write values to the register (see Figure 9).

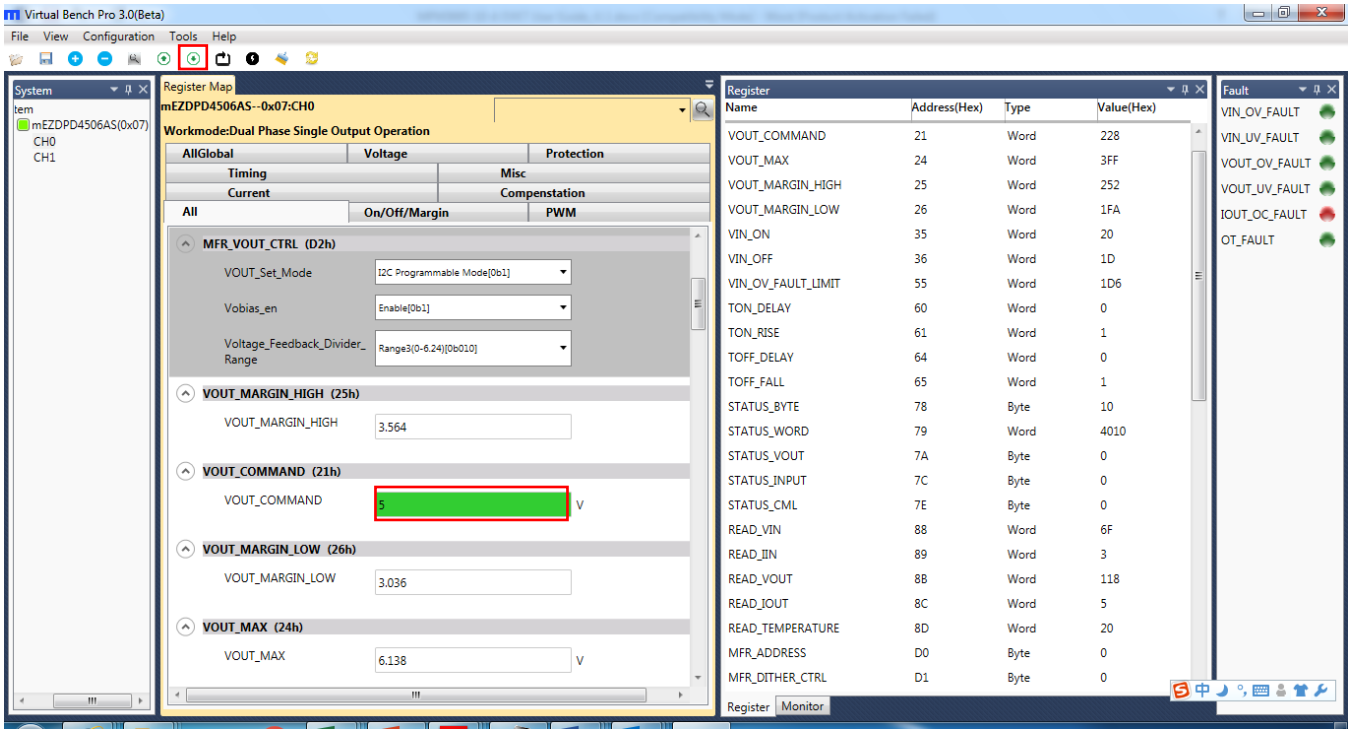

Figure 9: Write Values Steps Shown in Table

⚠ Note that the values written to the registers will NOT be saved once the EVB is powered down unless they are written into the MTP memory (see Section 3.4).

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3.4 Device Programming Instructions

The MTP memory of mEZDPD4506A can be custom programmed. Follow the instructions below to create and export customized configurations:

1. Connect the EVB to a PC following the steps in Section 3.3.
2. Set the register values as desired, and upload them into the registers (steps 3-4 in Section 3.3).
3. Increase the input voltage of the EVB to 8V to 45V.
4. Click the “Write to MTP” button, and wait until the writing action is completed (see Figure 10).
5. Turn off the power supply to the EVB, wait 3 seconds, and turn it on for the new configuration to take effect.

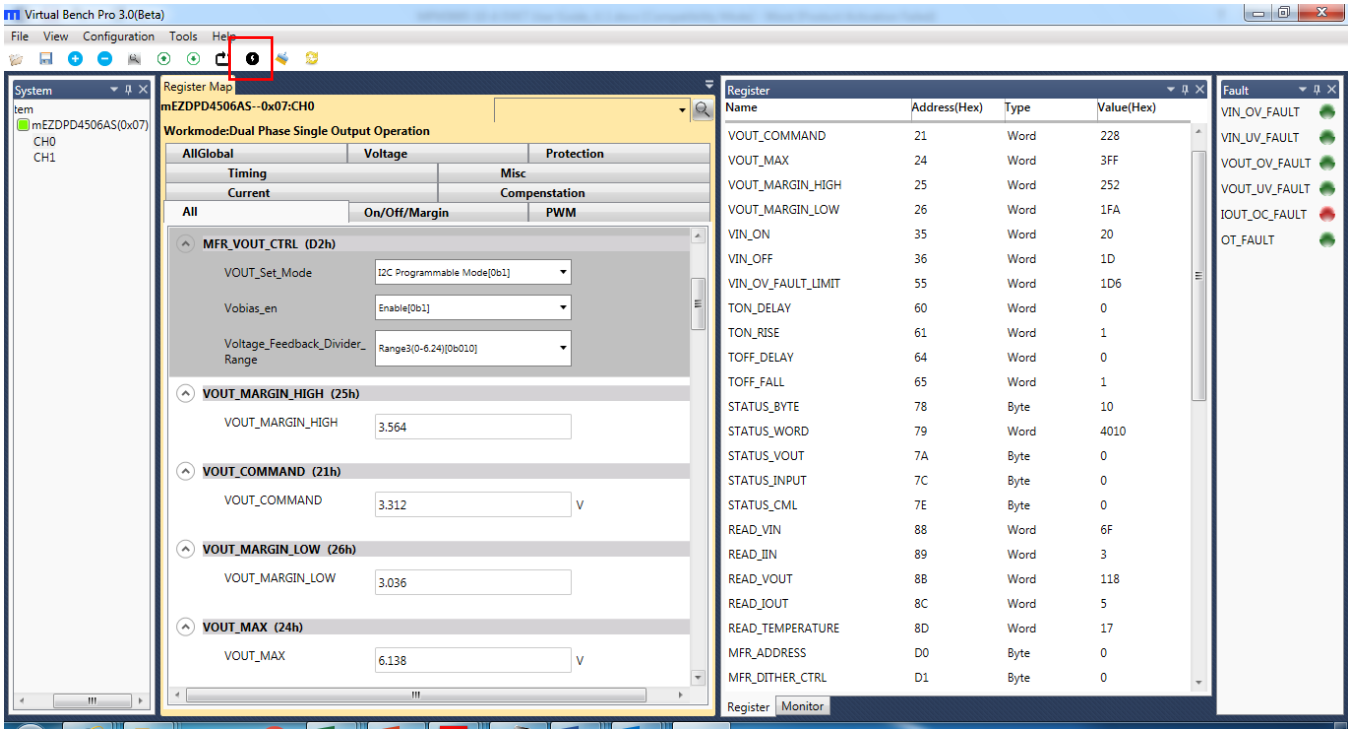

Figure 10: Write to the MTP Memory

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6. Export the configuration by clicking “Save Configuration.” Select the desired directory for the exported file and click “OK.” New configurations will be saved in a text file (see Figure 11).

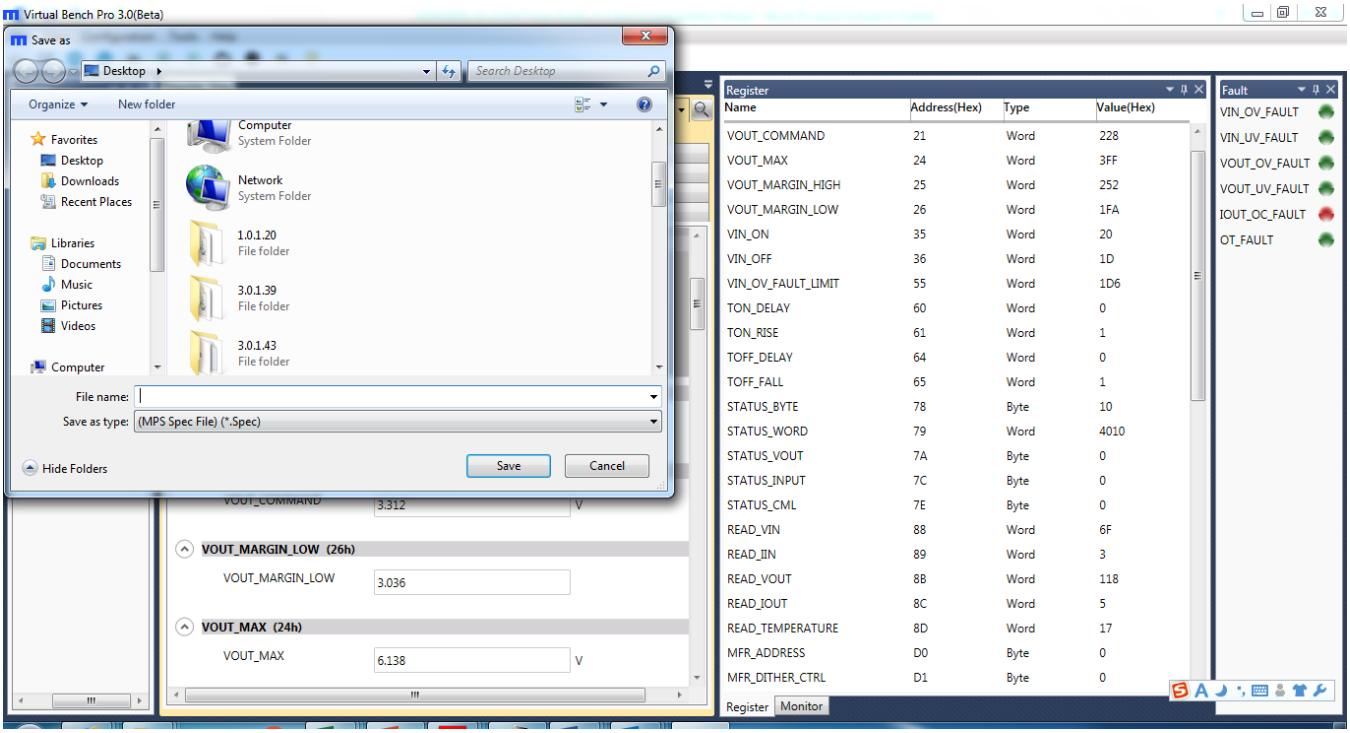

Figure 11: Select the Directory for Configuration File

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3.5 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 MPS PMBus and I²C.

EVKT-USBI2C-01

If 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 12).
2. Click “Browse My Computer for Driver Software,” find the downloaded driver, and install.

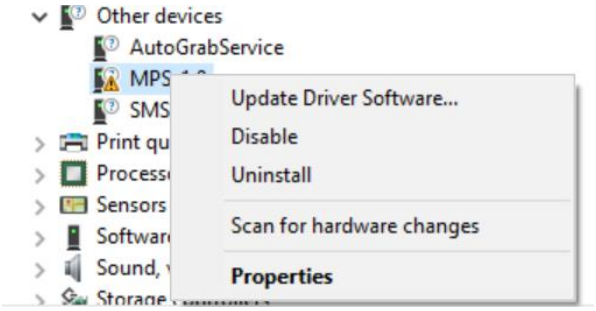
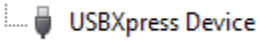


Figure 12: Updating the Driver Software

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. Check to make sure the driver version matches the newest version (see Figure 13).

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.

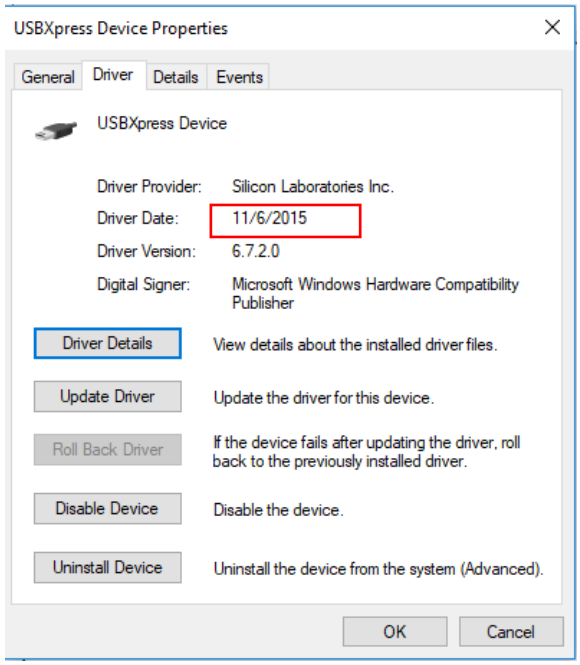


Figure 13: Correct Driver Version

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EVB Connection Issue

If the power module cannot be automatically detected, follow the steps below to troubleshoot:

- Click on “Tools” → “PMBus Tool” → “Scan,” then read the value of the slave (0x).
- Right-click the “mEZDPD4506AS” on the left panel. Click “Change Chip Address” and enter the value “slave(0x)” (see Figure 14). The module will be added manually.

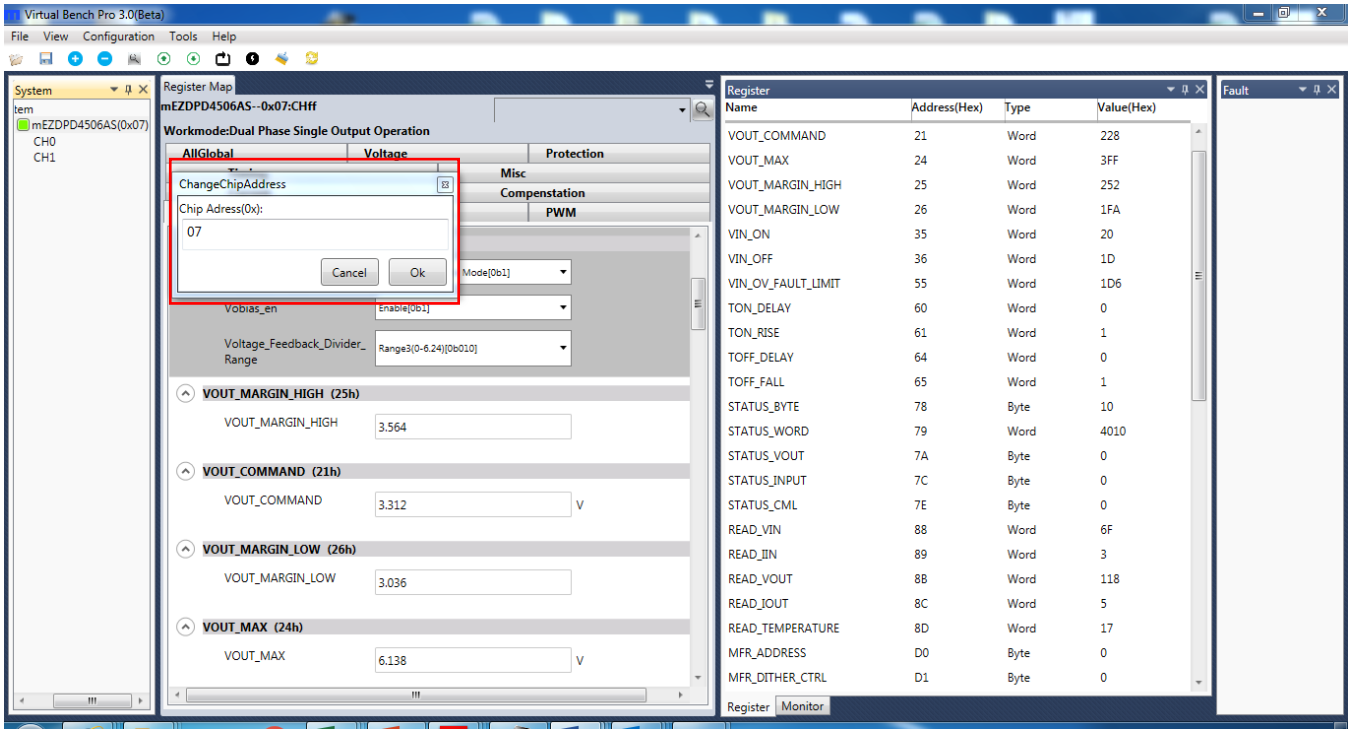

Figure 14: Change the Chip Address and the Indicator Turns Green to Show Successful Connection

If the power module still is not be detected, check the connections between the EVB, communication interface, and PC. Re-plug the USB into the computer and restart the GUI.

No Output Voltage

The mEZDPD4506A offers many protection features. If any of the protection functions are triggered, the power module may latch off. The indicator on the right panel indicates the specific fault. A red indicator signifies that a fault has been triggered. Refer to the mEZDPD4506A datasheet for details regarding specific faults.

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Section 4. PMBUS Interface

The power management bus (PMBus) is a two-wire, bidirectional serial interface, consisting of a data line (SDA) and a clock line (SCL). The lines are externally pulled to a bus voltage when they are idle. Connecting to the line, a master device generates the SCL signal and device address, and arranges the communication sequence. It is based on the principles of I^2C operation.

The mEZDPD4506A interface is a PMBus slave, which supports both the standard mode (100kHz) and fast mode (400kHz and 1000KHz). The PMBus interface adds flexibility to the power supply solution.

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Section 5. Ordering Information

The components of the evaluation kit can be ordered separately. The GUI installation file and supplemental documents can be downloaded from the MPS website.

Part Number	Description
PKT-mEZDPD4506A	Complete evaluation kit
Contents of PKT-mEZDPD4506A	
EVmEZDPD4506A-00A	mEZDPD4506A evaluation board
EVKT-USBI2C-02	Includes one USB to PMBus communication interface device, one USB Male A to B cable, one 10-pin ribbon cable, and one 3-pin ribbon cable
mEZDPD4506A-0001	mEZDPD4506A module(DIP) with default configuration

Order directly from MonolithicPower.com or our distributors.

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