User Guide

MPM3593 Evaluation Kit (EVKT-MPM3593)

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Overview

Introduction

The EVKT-MPM3593 is an evaluation kit for the single-phase configuration of the MPM3593. The MPM3593 is a high-frequency synchronous rectified , step-down module with I^2C control interface and a multipage one-time programmable memory .It can achieve up to 3A continuous output current with excellent load and line regulation over a wide input supply range. This kit allows for quick evaluation and module configurations through the I2C interface.

Kit Contents

EVKT-MPM3593 Kit contents: (items listed below can be ordered separately).

#	Part Number	Item	Quantity
1	EVM3593-QY-00B	MPM3593GQ Evaluation Board	1
2	EVKT-USBI2C-02-BAG	Includes one USB to I2C Communication interface device, one USB Cable, and one Ribbon Cable	1
3	MPM3593GQY-0001	This is a module that supports multipage OTP memory for permanent storage	2
4	Tdrive-MPM3593	USB Flash drive that stores the GUI installation file and supplemental documents	1

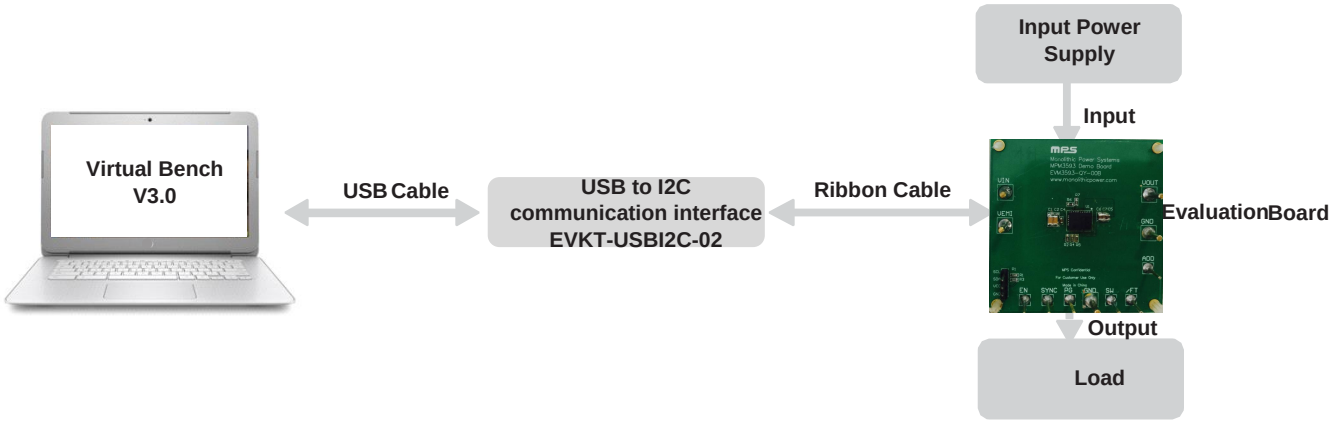

Figure 1: EVKT-MPM3593 Evaluation Kit Set-Up

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Features and Benefits

The MPM3593 is highly customizable. Users can program the power module via the MPS I2C and one–time programming (OTP) memory.

> ⚠ *Values written to the registers via I2C will NOT be retained once the module is powered-down unless they are written into the OTP memory.*

The key programmable features are highlighted below:

- Switching frequency
- Operation mode
- Output voltage
- Soft-start time
- Fault threshold

Kit Specifications

Features	Specification
Input Voltage	3.5V - 45V
Output Voltage	0.6V to 12V (default: 5V)
Maximum Output Current	3A continuous
Default Switching Frequency	500kHz
Operating Systems Supported	Windows 7 or later
System Requirements	Minimum 15.6 MB free
EVB Size (L x W)	6.4cm x 6.4cm

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Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following minimum requirement must be met to use the EVKT-MPM3593

- 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 EVM3593-QY-00B Specifications

The EVM3593-QY-00B is the evaluation board for the MPM3593GQY. For more information regarding the evaluation board, please refer to the EVM3593-QY-00B datasheet.

Figure2: EVM3593-QY-00B Evaluation Board

Feature	Specification
Input Voltage	3.5V - 45V (RECOMMENDED)
Output Voltage	0.6V to 12V (default: 5V)
Maximum Output Current	3A continuous
EVB Size (L x W)	6.4cm x 6.4cm

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 MPS 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 2: EVKT-USBI2C-02 Communication Interface Device

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Section 2. Software Requirements

2.1 Software Installation

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

Note: In the near future, this software can be downloaded from the MPS website. For now, it is provided on a USB thumb drive.

1. Plug the USB thumb drive into the computer using any available USB port.
2. Open the folder containing the thumb drive contents.
3. Double click the .exe file to open the set-up guide (see Figure 4).
4. Follow the prompts in the set-up guide.
5. Wait for the status screen to verify that installation is complete.

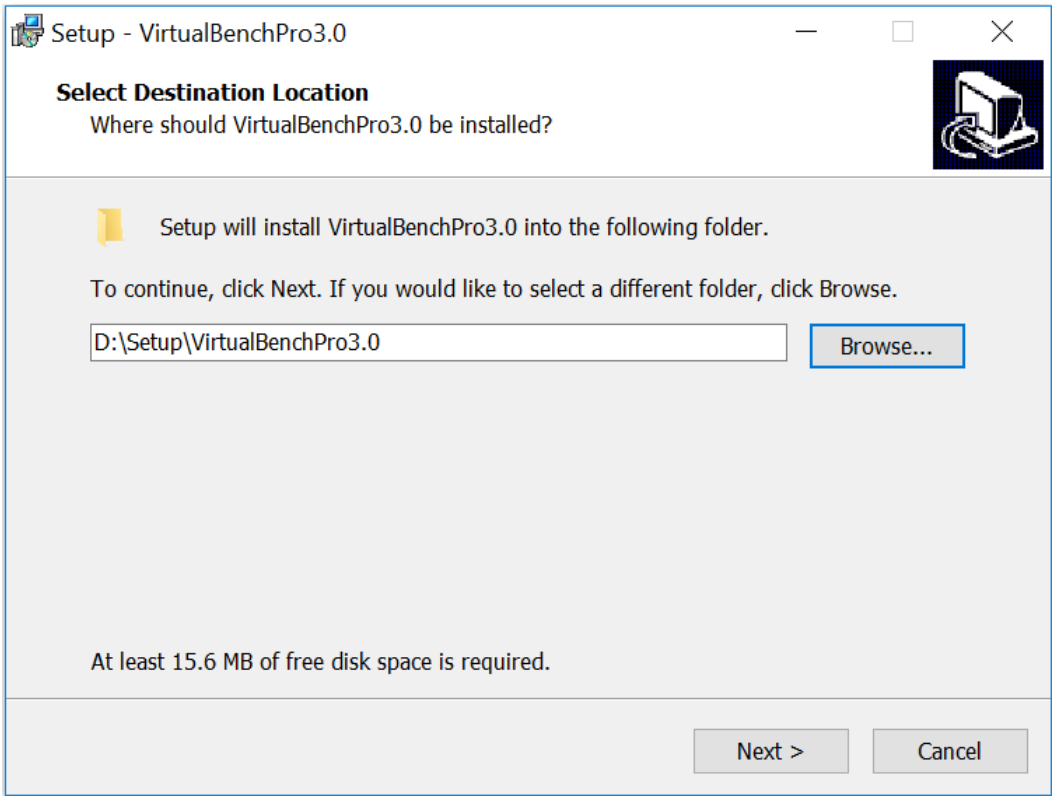

Figure 3: MPS Virtual Bench Pro GUI Set-Up Guide

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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 I2C cable to the evaluation board and the EVKT-USBI2C-02 communication interface device.
2. Connect the EVKT-USBI2C-02 communication interface device to the PC using the USB cable and follow the instructions below to set up the EVB.

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 3.5V 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 according to steps above, please follow the following steps to set up the software.

1. Open Virtual Bench Pro. The software will scan the connected power modules.
   - If the GUI detects the power module, an address will appear below the "MPM3593" on the left panel. Additionally, the indicator to the left of “MPM3593” will turn green (see Figure 6).
   - Please refer to the troubleshooting section if the power module cannot be detected automatically.

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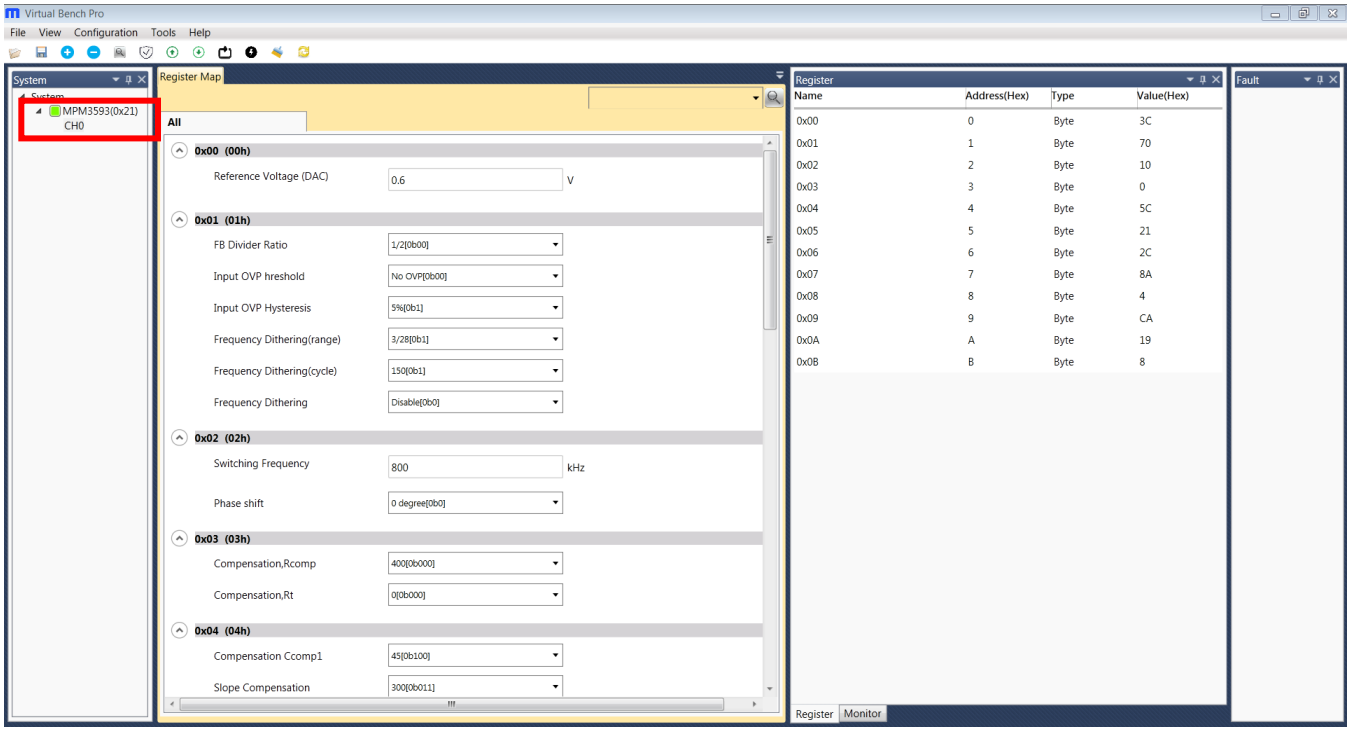

2. **Figure 6: Green Indicator Shows Successful Connection**The Register Control menu will appear in the middle panel. The values stored in the registers of the module will be read automatically (see Figure 7).

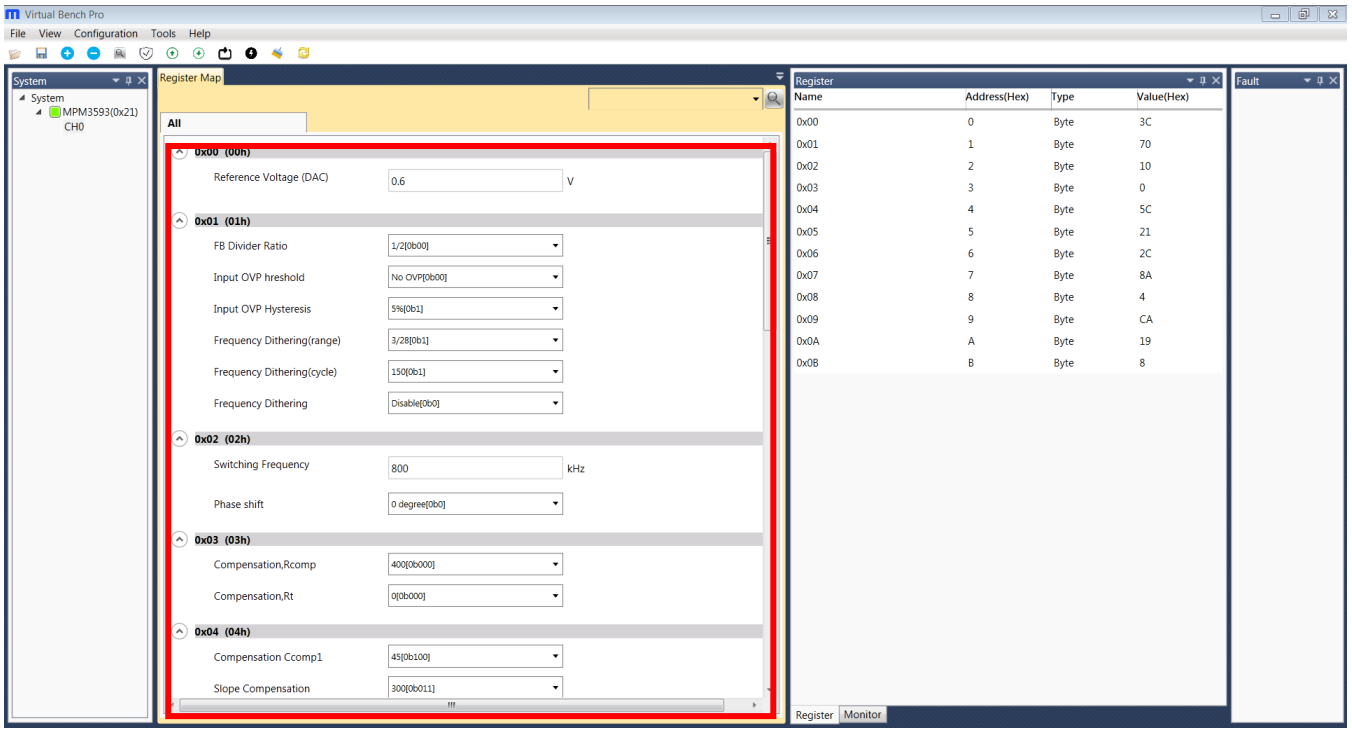

Figure 7: Values in the Register of the Module are Displayed

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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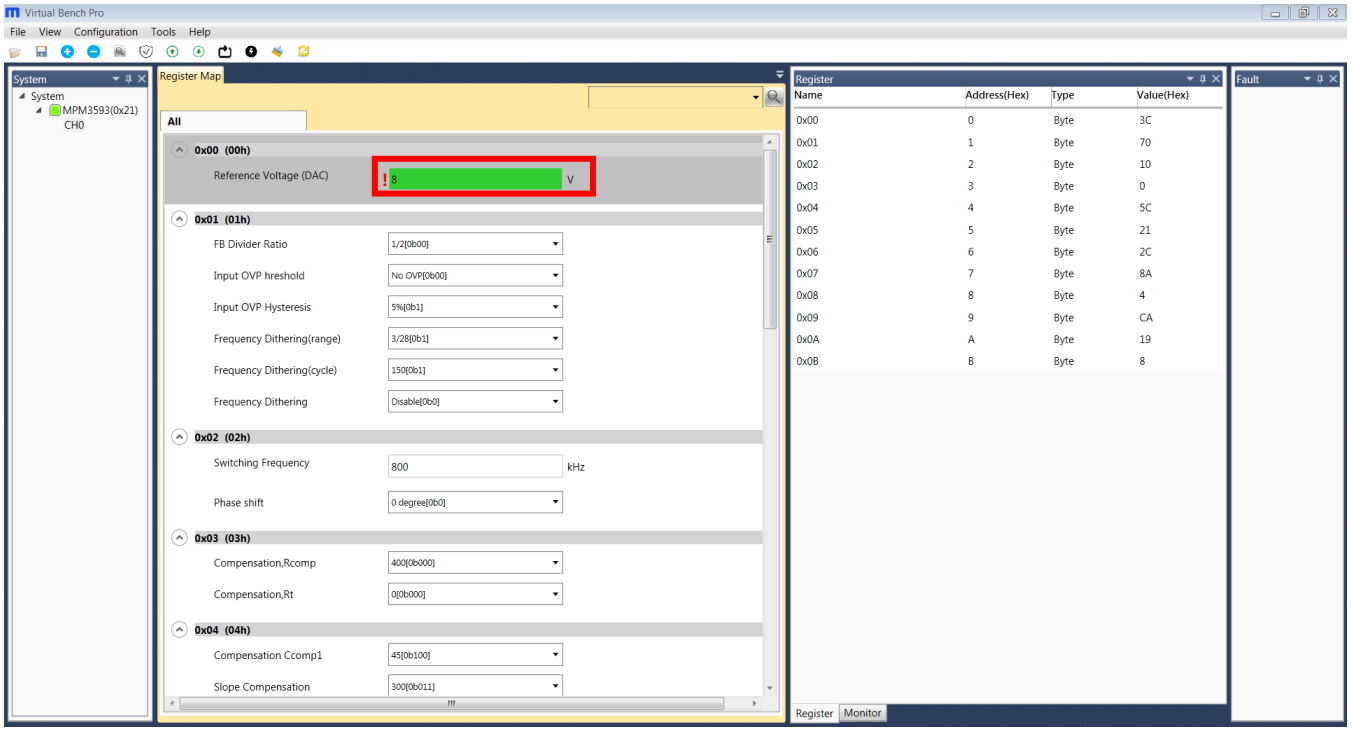

Figure 8: Enter Desired Values in the Register

4. Click the "**Write to chip**" button to write values to the register (see Figure 9).

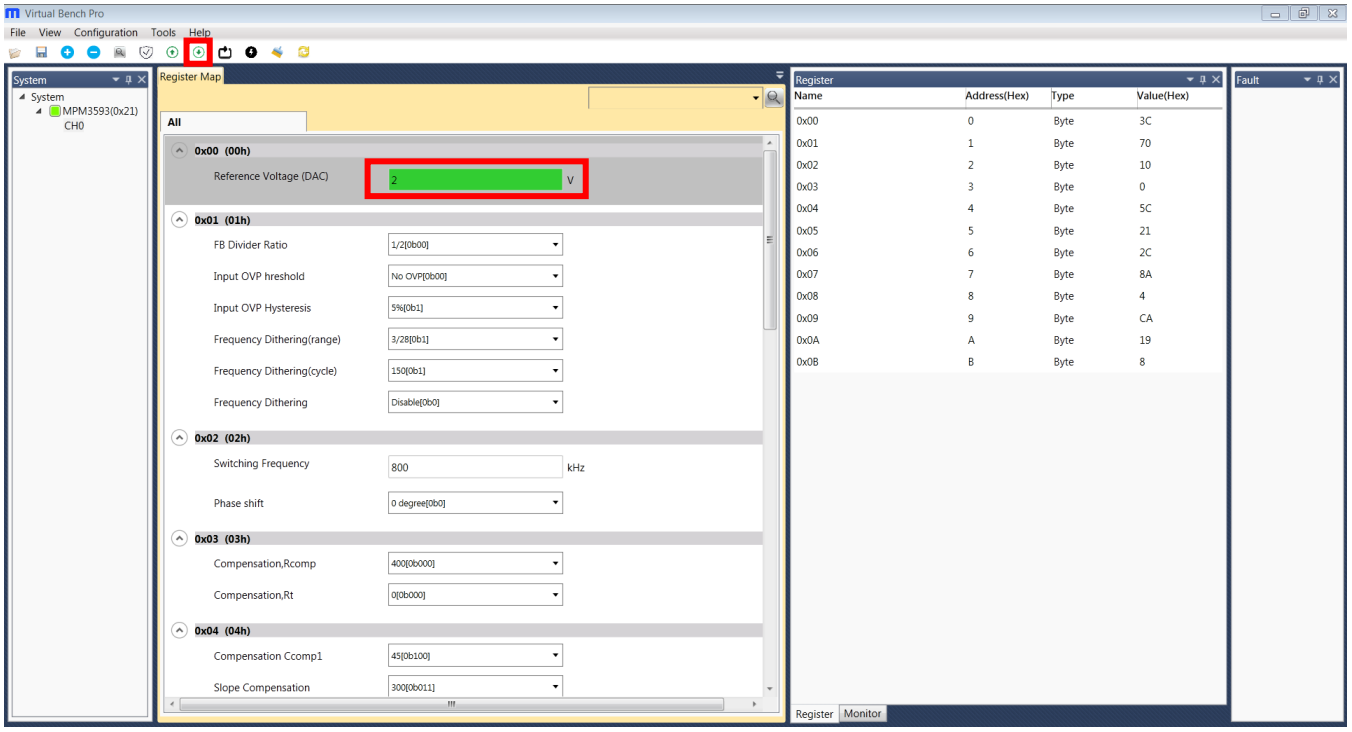

Figure 9: Write Values Steps Shown in Table

⚠ Please note that the values written to the registers will NOT be saved once the EVB is powered down unless they are written into the OTP memory (refer to Section 3.4).

3.4 Device Programming Instructions

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The OTP memory of MPM3593 can be custom-programmed. Follow the instructions outlined below to create and export customized configurations.

1. Connect the EVB to a PC following the steps listed in Section 3.3.
2. Set the register values as desired and upload them into the registers (step 3-4 in Section 3.3).
3. Increase the input voltage of the EVB to 12V.
4. Click the write to OTP button and wait until the writing action is completed (see Figure 10).
5. Turn off the power supply to the EVB, wait three seconds, and turn it on for the new configuration to take effect.

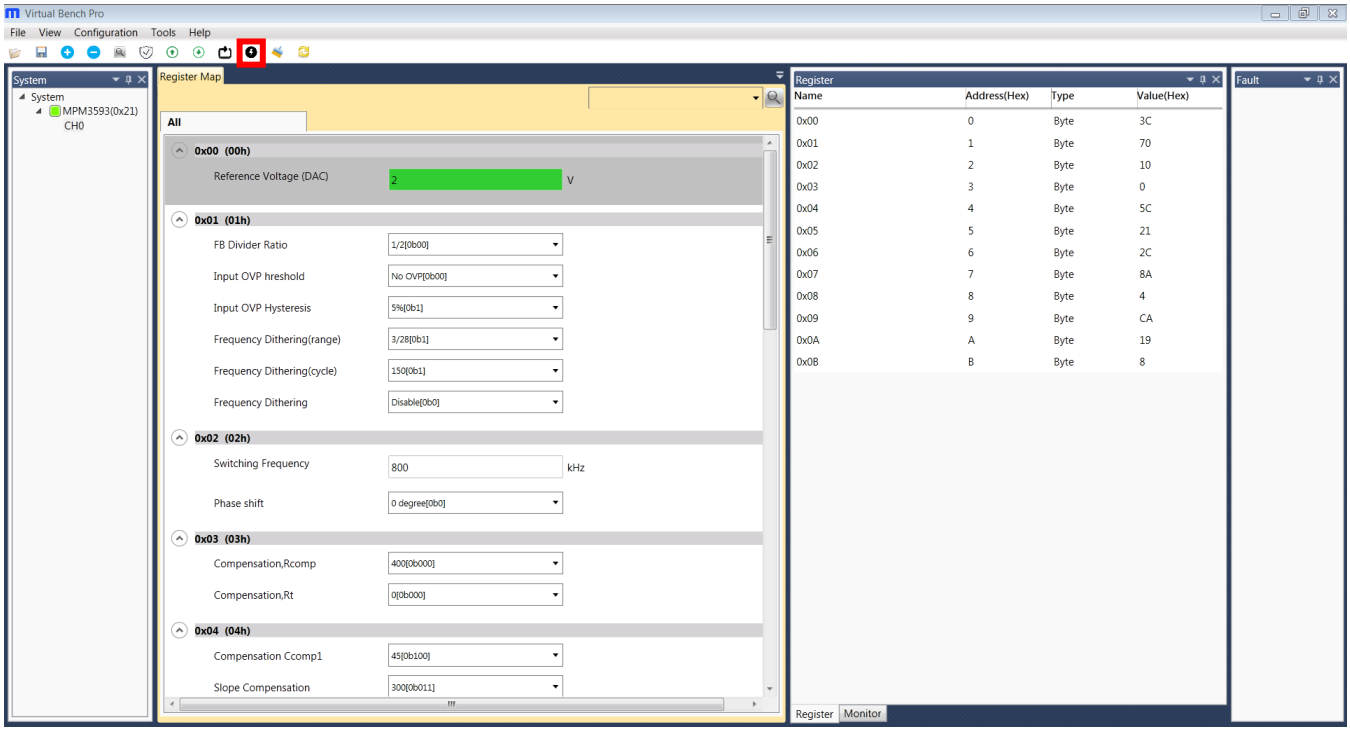

Figure 10: Write to the OTP Memory

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

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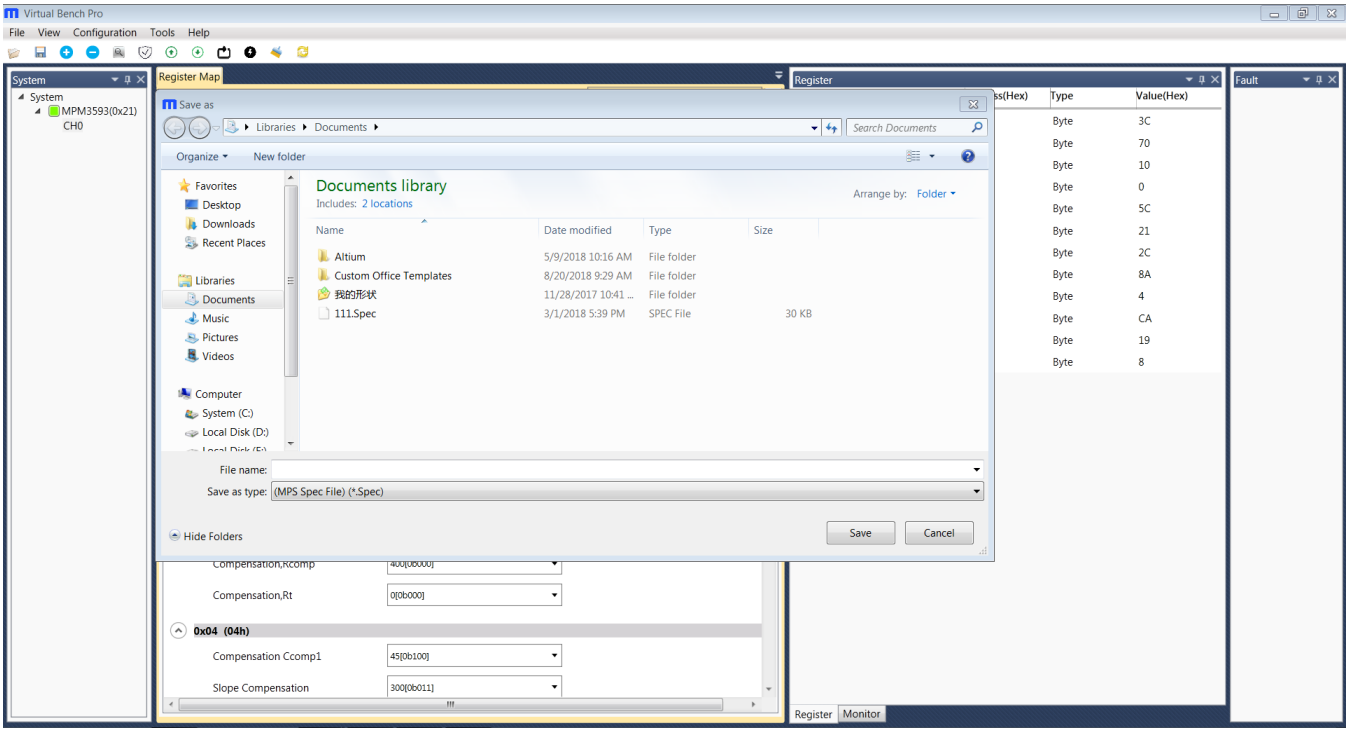

Figure 11: Select the Directory for Configuration File

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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

In case that 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” and find the driver located on thumb drive and install.

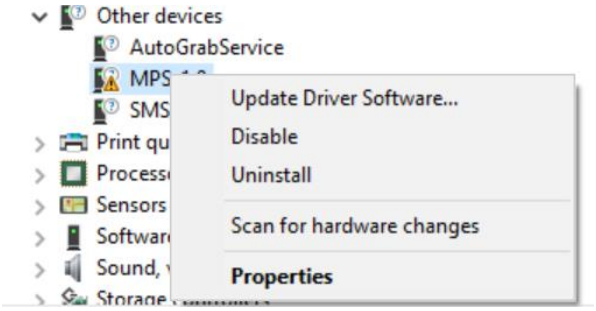
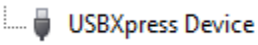


Figure 11: Updating the Driver Software

EVKT-USBI2C-02

In the case that 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. Browse the thumb drive contents and open the driver’s folder.
2. 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

3. Connect the EVKT-USBI2C-02 Dongle to the PC with the USB cable.

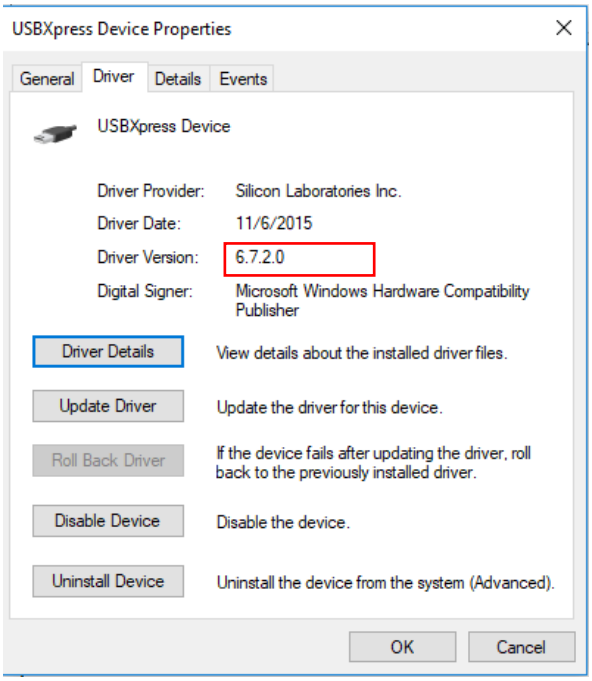


Figure 12: Correct Driver Version

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- **EVB Connection Issue**

In case that the power module cannot be automatically detected, follow the steps below to trouble-shoot:

- Click on Tools → PMBus Tool → scan, and read the value of the slave (0x).
- Right click the "MPM3593" on the left pane. Click “change chip address” and enter the value of "slave(0x)". The module will be added manually.

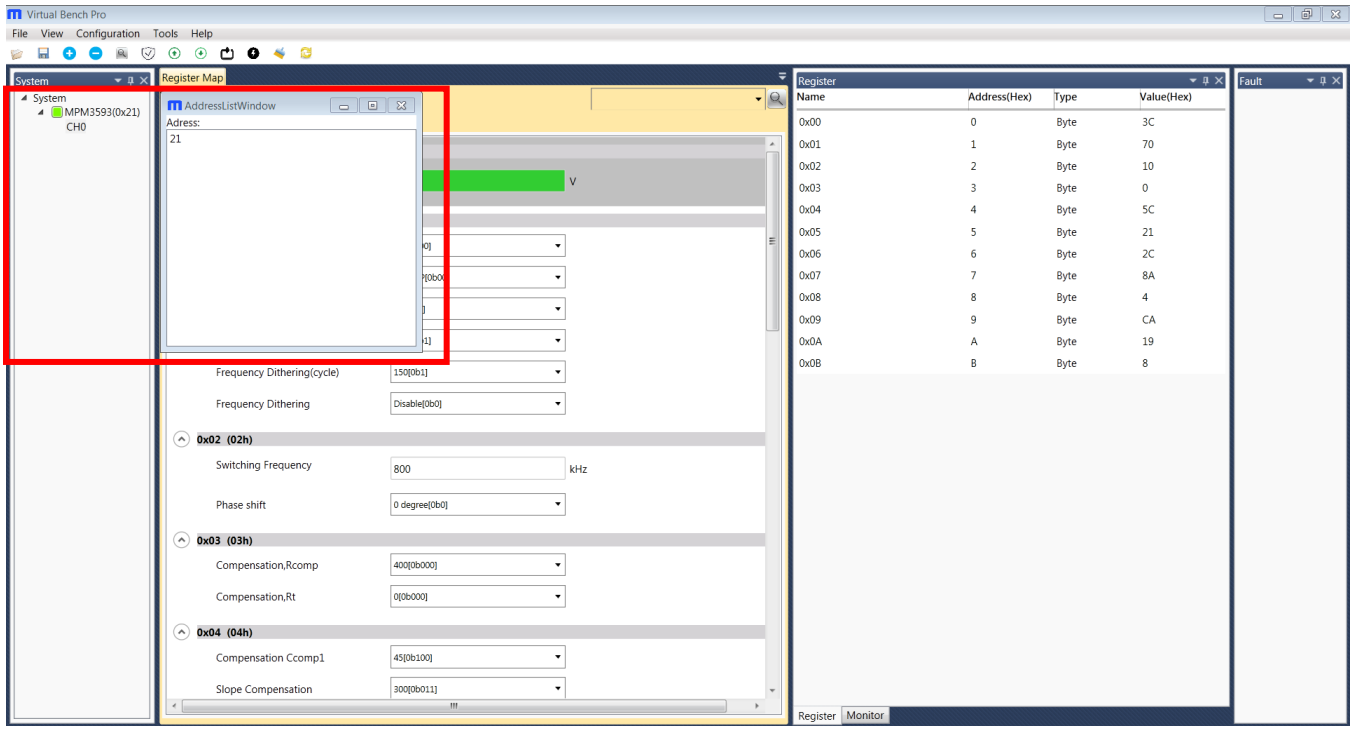

Figure 14: Change the Chip Address and the Indicator Turns Green to Indicate Successful Connection

If the power module still cannot be detected, check the connections between the EVB, dongle, and PC. Re-plug the USB into the computer and restart the GUI.

- **No Output Voltage**

The MPM3593 features 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. Please refer to the MPM3593 datasheet for details of any specific fault.

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Section 4. Ordering Information

The components of the evaluation kit can be ordered separately.

Part Number	Description
EVKT-MPM3593	Complete evaluation kit
Contents of EVKT-MPQ8883	
EVM3593-QY-00B	MPM3593GQY Evaluation Board
EVKT-USBI2C-02-BAG	Includes one USB to I2C Communication interface device, one USB Cable, and one Ribbon Cable
MPM3593GQY-0001	This is a module that supports multipage OTP memory for permanent storage
Tdrive-MPM3593	USB Flash drive that stores the GUI installation file and supplemental documents

Order directly from MonolithicPower.com or our distributors.

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