**User Guide**

MPM3695-25 Evaluation Kit (EVKT-MPM3695-25-A)

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# Overview

### Introduction

The EVKT-MPM3695-25-A is an evaluation kit for the single-phase configuration of the MPM3695-25. The MPM3695-25 is a 4mm tall, scalable, and fully integrated power module with a PMBus interface. The MPM3695-25 offers a complete power solution that achieves up to 25A of output peak 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 PMBus interface.

### Kit Contents

EVKT-MPM3695-25-A Kit contents: (items listed below can be ordered separately, and the GUI installation file and supplemental documents can be downloaded from the MPS website):

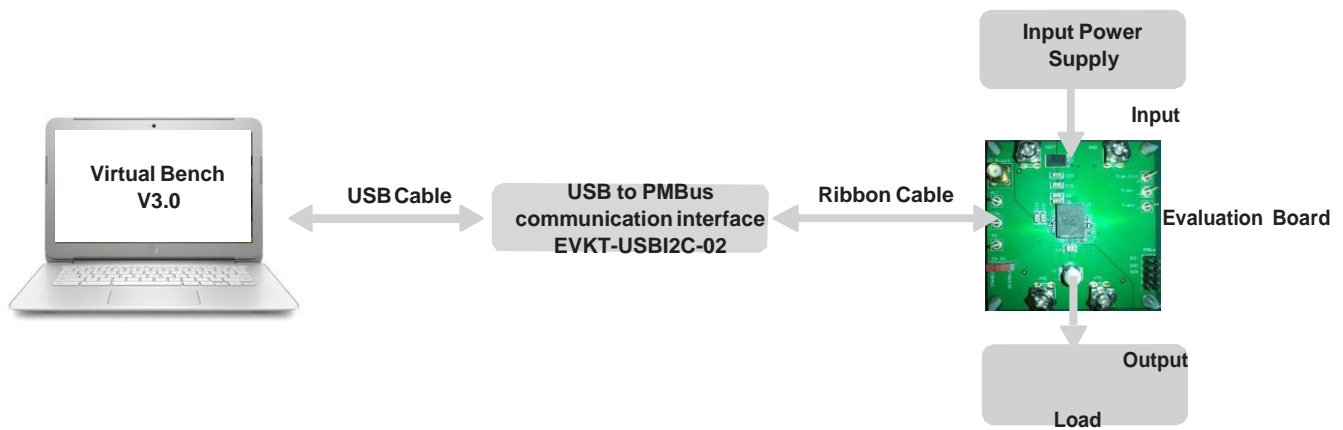| # | Part Number | Item | Quantity |
|---|-------------|------|----------|
| 1 | EVM3695-25-RF-02A | MPM3695GRF-25 single-phase evaluation board | 1 |
| 2 | EVKT-USBI2C-02 | Evaluation kit for the PMBus communication interface | 1 |
| 3 | MPM3695GRF-25-0022 | MPM3695GRF-25 module | 1 |



**Figure 1: EVKT-MPM3695-25-A Evaluation Kit Set-Up**

## Features and Benefits

The MPM3695 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-sown unless they are written into the MTP memory*

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

The key programmable features are highlighted below:

- Current limit
- Switching frequency
- Operation mode – pulse skip mode (PSM) or continuous conduction mode (CCM)
- Output voltage
- Soft-start time
- Fault threshold

## Kit Specifications

| Features | Specification |
| --- | --- |
| Input Voltage | 4V - 16V (without external VCC)<br>3V - 16V (with external 3.3V VCC) |
| Output Voltage | 0.5V to 5V (default: 1.8V) |
| Maximum Output Current | 20A continuous, 25A peak |
| Default Switching Frequency | 600kHz |
| Operating Systems Supported | Windows 7 or later |
| System Requirements | Minimum 22.2 MB free |
| EVB Size (L x W) | 6.4cm x 6.4cm |

# Section 1. Hardware Specifications

## 1.1 Personal Computer Requirements

The following minimum requirement must be met to use the EVKT-MPM3695-25-A.

- 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 EVM3695-10-QQ-03A Specifications

The EVM3695-25-RF-02A is the evaluation board for the MPM3695GRF-25. For more information regarding the evaluation board, please refer to the EVM3695-25-RF-02A datasheet.
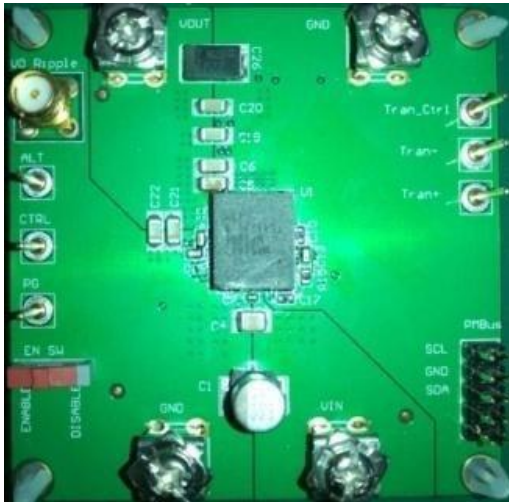


**Figure 2: EVM3695-25-RF-02A Evaluation Board**

| Feature |
| --- |
| Input Voltage |
| Output Voltage |
| Maximum Output Current |
| EVB Size (L x W) |

## 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**

# Section 2. Software Requirements

## 2.1 Software Installation

The MPS Virtual Bench Pro GUI tool provide 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.

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

1. Visit the MPM3695-25 GUI page at https://www.monolithicpower.com/en/virtual-bench-pro-3-0.html
2. Click the "Download" button in the upper right-hand corner.
3. Double click the .exe file to open the set-up guide (see Figure 4).
4. Follow the prompts in the set-up guide.
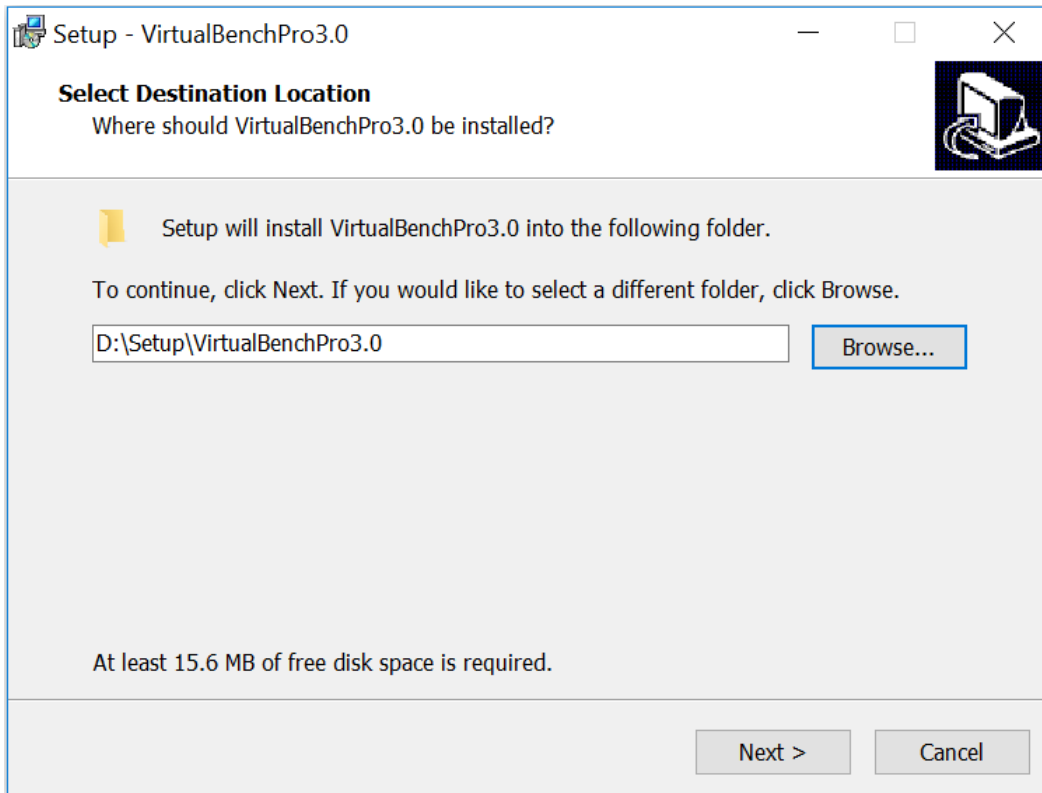5. Wait for status screen to verify that installation is complete.



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

# 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 device.

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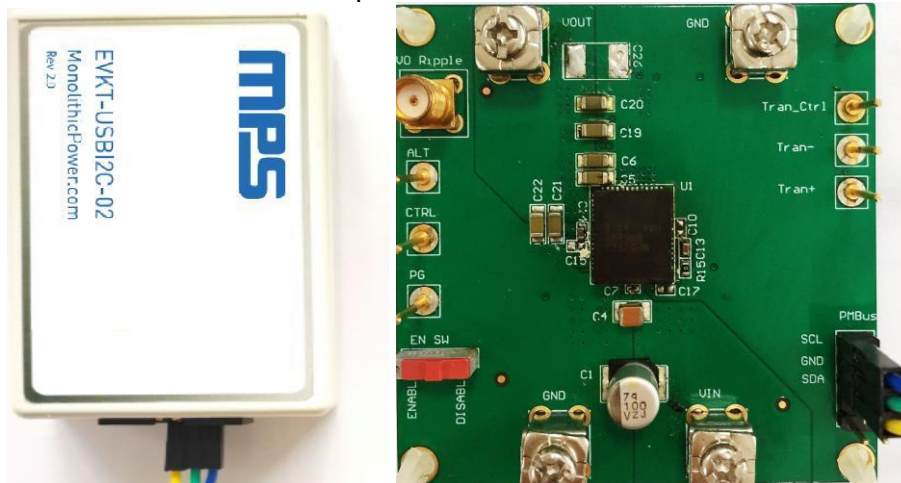


**Figure 5: EVB to MPS I²C Communication Interface Device Wire Connection**

## 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 4V and 16V 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 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 "MPM3695-25" on the left panel. Additionally, the indicator to the left of "MPM3695-25" will turn green (see Figure 6).

   - Please refer to the troubleshooting section if the power module cannot be detected automatically.
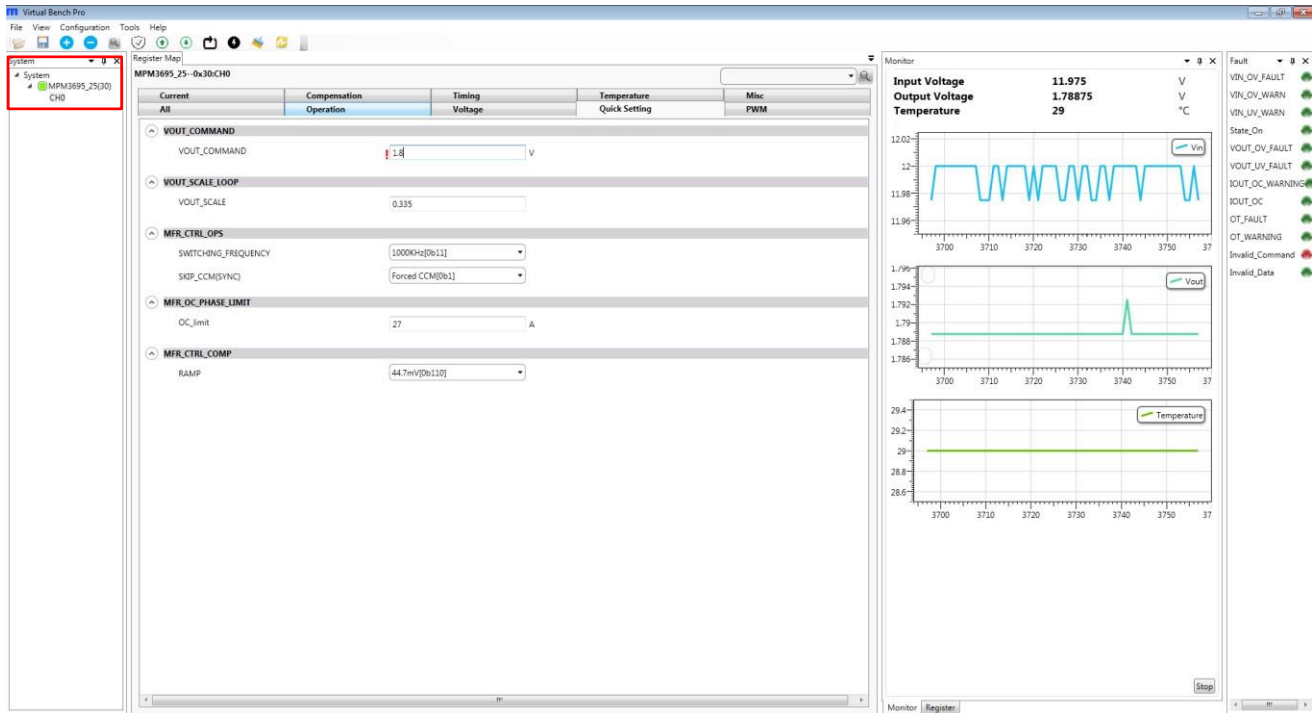
**Figure 6: Green Indicator Shows Successful Connection**

2. 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).
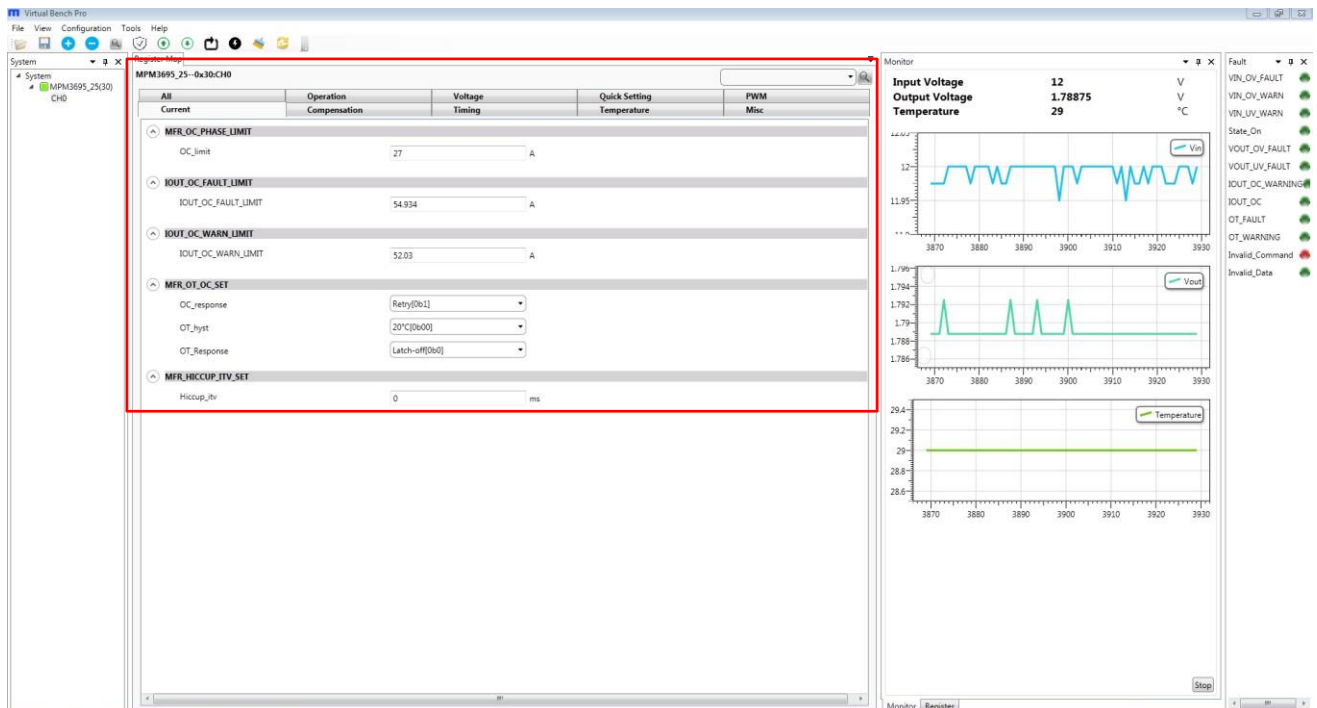


**Figure 7: Values in the Register of the Module are Displayed**

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).
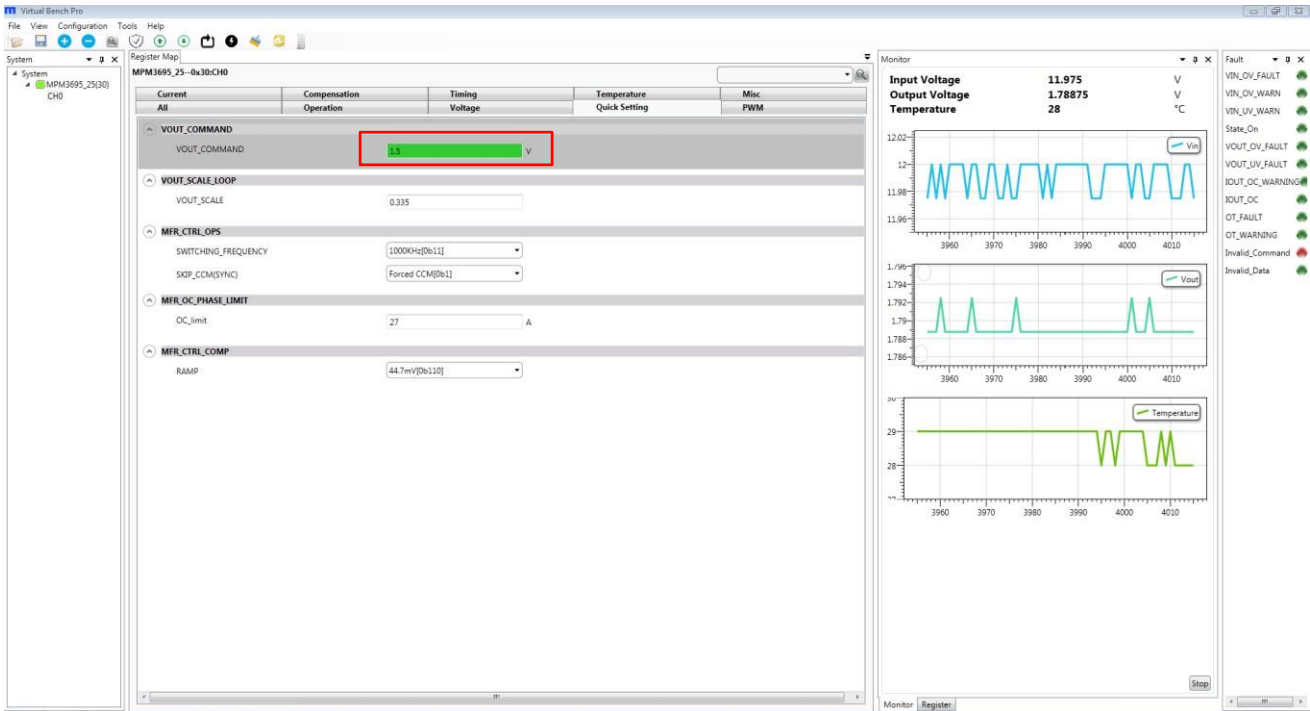
**Figure 8: Enter Desired Values in the Register**

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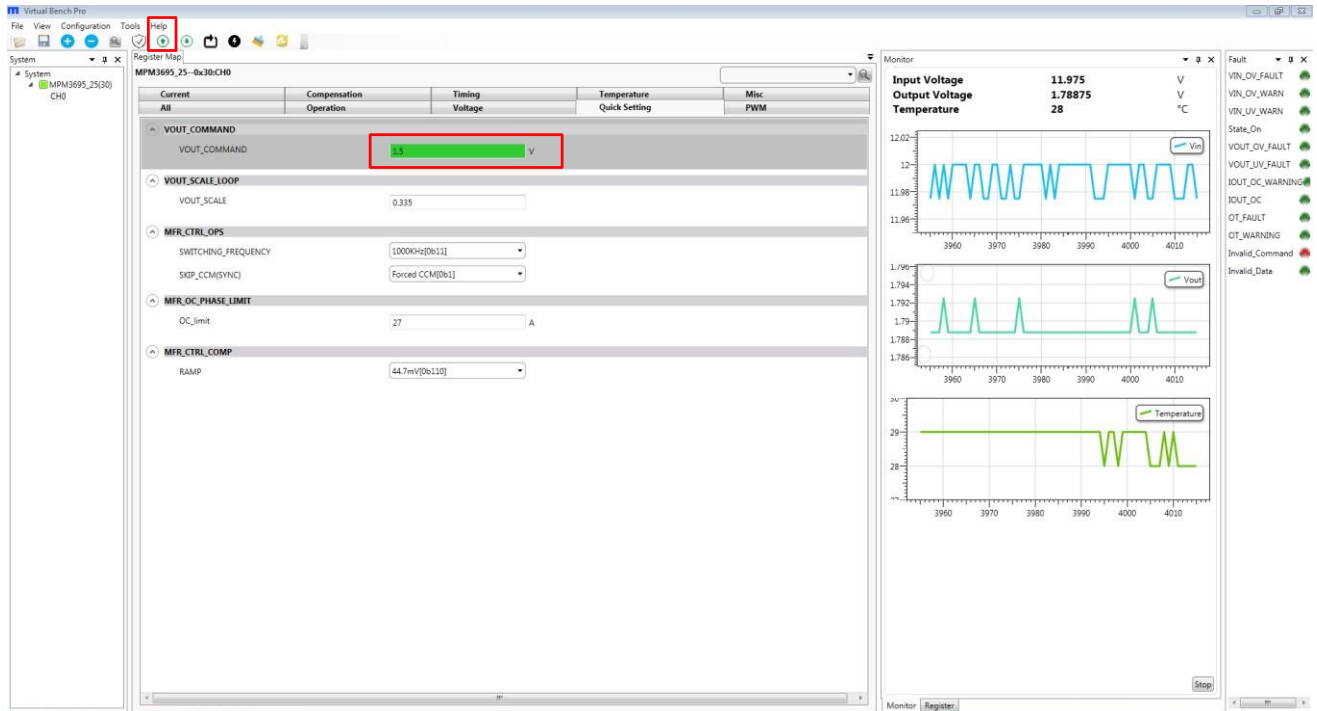


**Figure 9: Write Values Steps Shown in Table**

⚠️*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 MTP memory (refer to Section 3.4).*

## 3.4 Device Programming Instructions

The MTP memory of MPM3695 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 MTP button and wait until the writing action is completed.
5. Turn off the power supply to the EVB, wait three seconds, and turn it on for the new configuration to take effect.
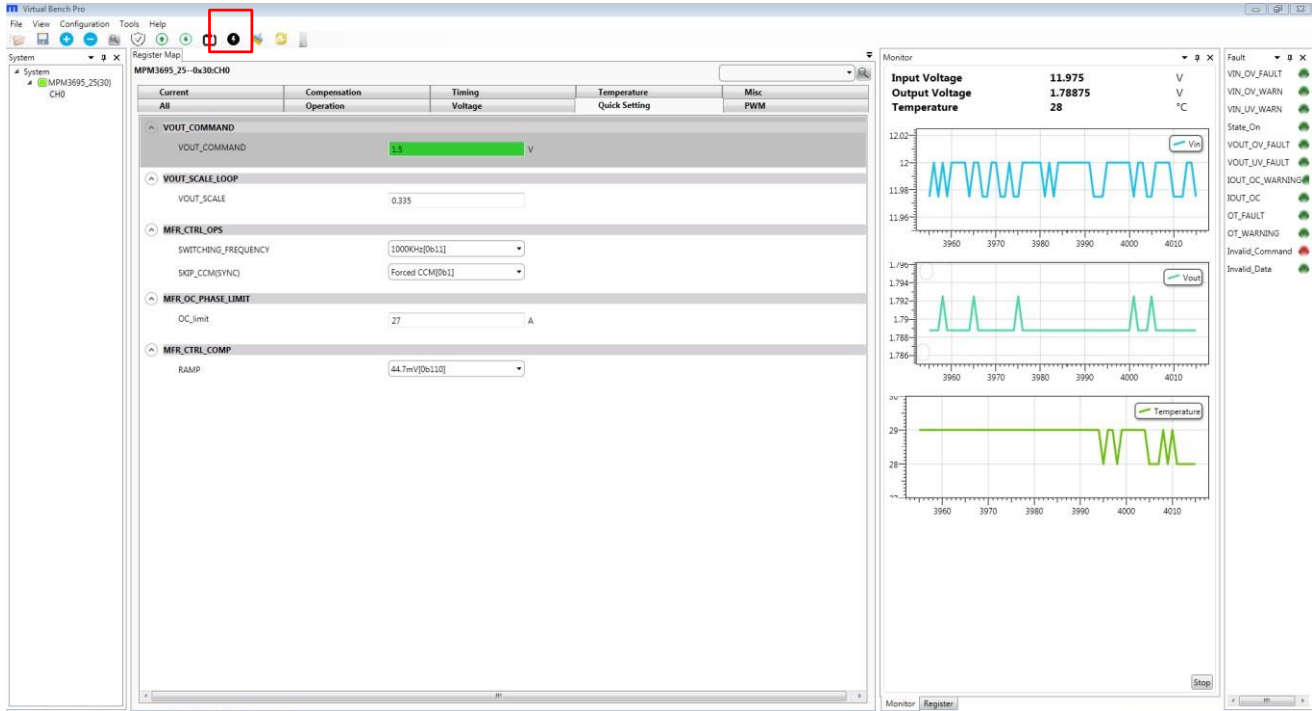


**Figure 10: Write to the MTP Memory**

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).
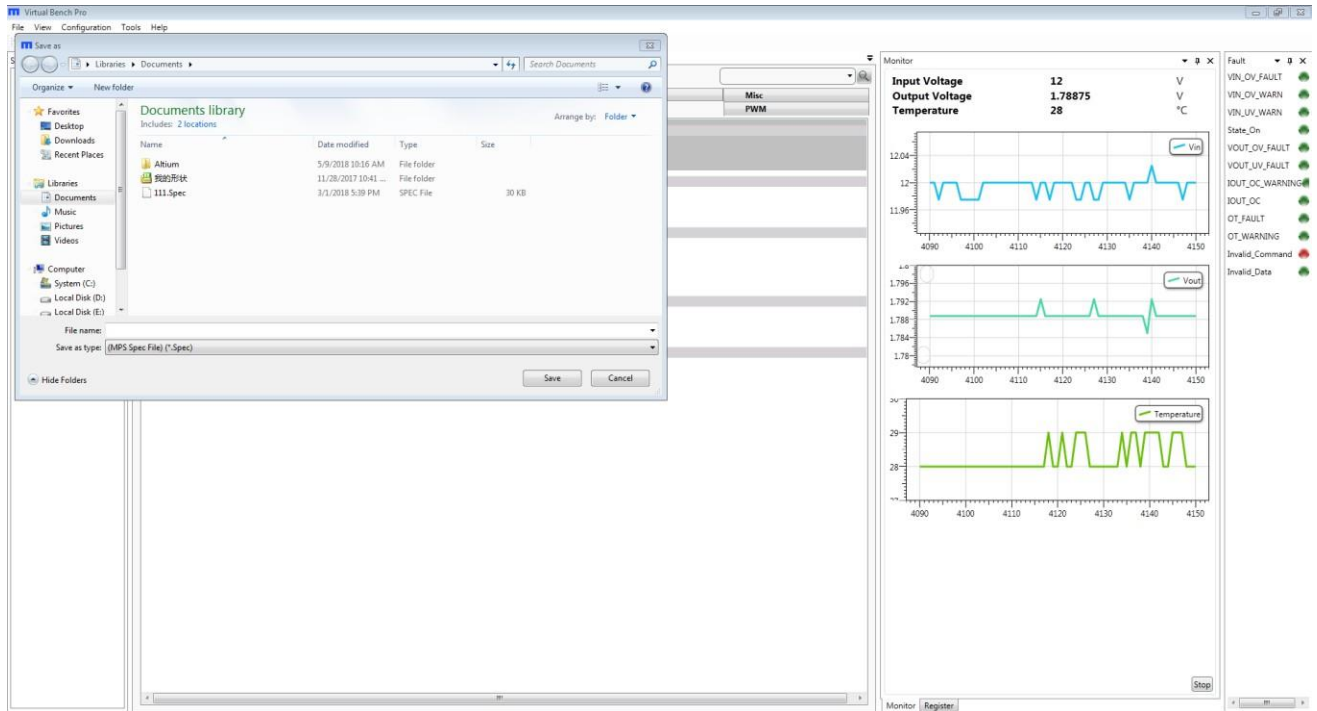
**Figure 11: Select the Directory for Configuration File**

## 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.

### 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.*
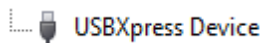


*Right click and view properties. Check to make sure the driver version matches the newest version (see Figure 12).*

1. 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 Dongle to the PC with the USB cable.
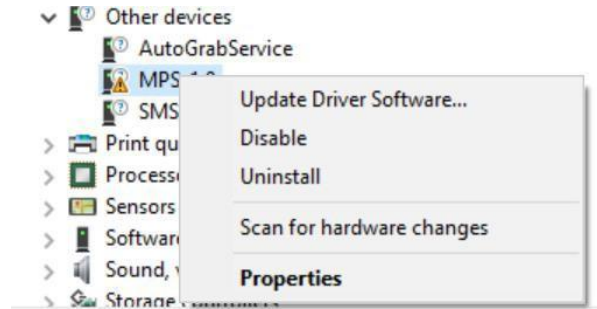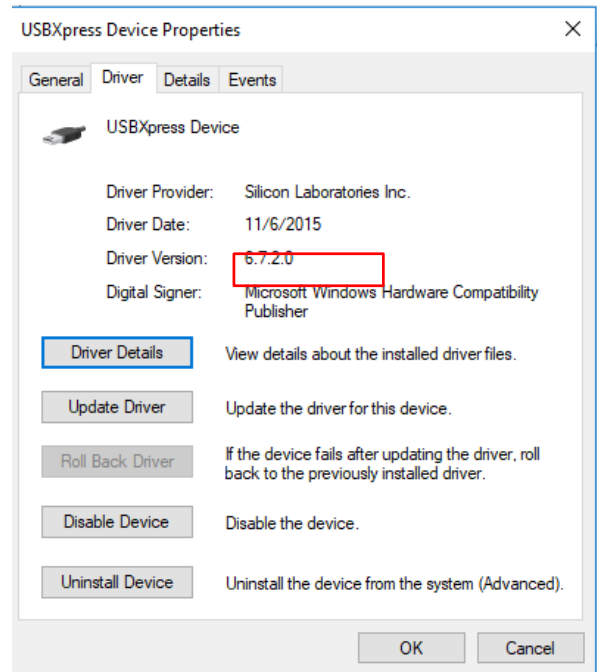


**Figure 11: Updating the Driver Software**

- **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 "MPM3595-25" on the left pane. Click "change chip address" and enter the value of "slave(0x)". The module will be added manually.
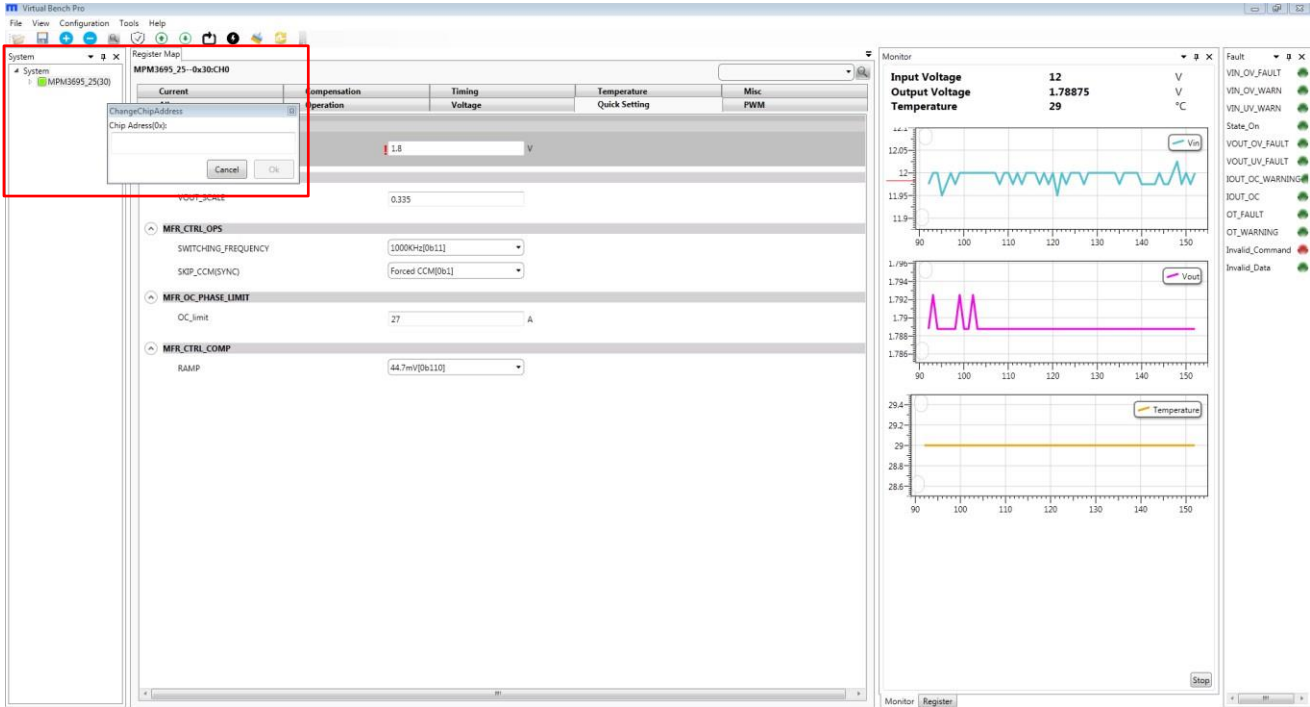


**Figure 14: Change the Chip Address and the Indicator Turns Green to Indicate Successful Connection**

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 MPM3695-25 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 MPM3695-25 datasheet for details of any specific fault.

# Section 4. Ordering Information

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

| Part Number | Description |
| --- | --- |
| EVKT-MPM3695-25-A | Complete evaluation kit |
| Contents of EVKT-M3695-10-A | |
| EVM3695-25-RF-02A | MPM3695GRF-25 single-phase evaluation board |
| EVKT-USBI2C-02 | PMBus communication interface kit |
| MPM3695GRF-25-0022 | MPM3695GRF-25 module |

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