

MPM3695-25 Evaluation Kit (EVKT-MPM3695-25-A) NOT RECOMMENDED FOR NEW DESIGNS



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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):



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.

 \triangle 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

A 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)
liiput voltage	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.



Feature	Specification
Input Voltage	4V - 16V (without external VCC) 3V - 16V (with external 3.3V VCC)
Output Voltage	0.5V to 5V (default: 1.8V)
Maximum Output Current	20A continuous, 25A peak
EVB Size (L x W)	6.4cm x 6.4cm

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

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.







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.

🕼 Setup - VirtualBenchPro3.0	—		\times
Select Destination Location Where should VirtualBenchPro3.0 be installed?		Q	
Setup will install VirtualBenchPro3.0 into the following folder.			
To continue, click Next. If you would like to select a different folder, c	lick Bro	wse.	
D:\Setup\VirtualBenchPro3.0	B	rowse	
At least 15.6 MB of free disk space is required.			
Next	>	Car	icel

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.



NEW STORY COUNTRY STORY FILL						
	Companyation	Timbre	Turning		Input Voltage	11.975 V
All	Operation	Voltage	Quick Setting	PWM	Temperature	29 °C
VOUT COMMAND						
VOUT_COMMAND	1.8	v			12.02-	- v
~						
· VOUT_SCALE_LOOP					11.98	
VOUT_SCALE	0.335				11 06-	
MFR_CTRL_OPS					1	
SWITCHING_FREQUENCY	1000KH	z[0b11] •			3700 3710	3720 3730 3740 3750
SKIP_CCM(SYNC)	Forced	CM[061] •			1./90-0	Vo
MFR_OC_PHASE_LIMIT					1.792	
OC_limit	27	A			1.79-	
					1.788	
MFR_CTRL_COMP	44.7=1/	061101			1.786-	
DAMP	(44.7114)	001101			3700 3710	3720 3730 3740 3750
					29.4-	Temperatur
					29.2-	Contrast
					29-	
					28.8-	
					28.6-	
					3700 3710	3720 3730 3740 3750
						G

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).



MPM3695_250x30:CH0				-	Monitor	• # >
Current	Compensation	Compensation Timing		Misc	Output Voltage	11.975 V 1.78875 V
All	Operation	Voltage	Quick Setting	PWM	Temperature	28 °C
vout_command					1202-4	
VOUT_COMMAND	15	v				(
VOUT_SCALE	0.335				11.98	
MFR_CTRL_OPS					11.96-	
SWITCHING_FREQUENCY	1000KHz	0611]			3960 3970	3980 3990 4000 4010
SKIP_CCM(SYNC)	Forced O	CM[061] ·			1.796-	Vout
MFR_OC_PHASE_LIMIT					1.792	A A A
OC_limit	27	A			1.79	
MFR_CTRL_COMP		20			1.786-	
RAMP	44.7mV[0	ь110] •)			a,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	3980 3990 4000 4010
					av	
					29	Temperature
						VV \M
					28	
					3960 3970	3980 3990 4000 4010

Figure 8: Enter Desired Values in the Register

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

MPM3695_250x30:CH0					• @	Terrort Valtana	11.075		VIN OV
Current Compe	nsation Timing		Temperature	Misc		Output Voltage	1.78875	v	VIN_OV
All Operat	on Voltage		Quick Setting	PWM		Temperature	28	°C	VIN_UV
 vout_command 						12.02-		\square	State_0
VOUT_COMMAND	1.5	v				12		Vin	VOUT_
➢ VOUT_SCALE_LOOP					-		$W \land / V \land$	$\Box \Lambda$	IOUT_0
VOUT_SCALE	0.335					11.90 111 1000			IOUT_
MFR_CTRL_OPS					_	11.96-			OT_W
SWITCHING_FREQUENCY	[1000KHz[0b11]	•				3960 3970	3980 3990 4000	4010	Invalid
SKIP_CCM(SYNC)	Forced CCM[0b1]	•				1.790-		- Vout	Invalid
MFR_OC_PHASE_LIMIT						1.792			
OC_limit	27	A				1.79-			
MFR_CTRL_COMP						1.788-			
RAMP	[44.7mV[0b110]	•				2060 2070	2080 2000 4000	4010	
						3900 3970	3300 3330 4000	4010	
							-	Temperature	
						29-		٨٨	
						28	V V L		
						3960 3970	3980 3990 4000	4010	

Figure 9: Write Values Steps Shown in Table

 \triangle 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.

MPM3695_250x30:CH0			•]@	Monitor	• • •
Current Con All Ope	rensation Timing	Temperature Quick Setting	Misc PWM	Output Voltage	11.975 V 1.78875 V 28 °C
vout_command					
VOUT_COMMAND	15 V			12.02	Vin
VOUT_SCALE_LOOP					
VOUT_SCALE	0.335			11.98	
MFR_CTRL_OPS				11.96	
SWITCHING_FREQUENCY	(1000KHz[0b11] •			3960 3970	3980 3990 4000 4010
SKIP_CCM(SYNC)	Forced CCM[0b1]			1.790-	Vout
MFR_OC_PHASE_LIMIT				1.792	A A A
OC_limit	27 A			1.79	
MFR_CTRL_COMP				1.786-	
RAMP	44.7mV[0b110]			3960 3970	3980 3990 4000 4010
				av	()
				29-	- Temperature
					VV \M
				28	
				2060 2070	2980 2990 4000 4010
				3300 3370	3300 2330 4000 4020

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



3.5Troubleshooting 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.

🛄 🕛 USBXpress Device

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

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

✓	es
AutoGra	abService
MPS	Update Driver Software
SMS	
> 🚍 Print qu	Disable
> D Process	Uninstall
> 🔚 Sensors	Court for board and a board
> Software	Scan for hardware changes
> 🖬 Sound, 1	Properties
S Storage	

Figure 11: Updating the Driver Software

USBXpress Device Prop	erties X
General Driver Detai	ils Events
USBXpress D	levice
Driver Provide	er: Silicon Laboratories Inc.
Driver Date:	11/6/2015
Driver Version	n: 6.7.2.0
Digital Signer	: Microsoft Windows Hardware Compatibility Publisher
Driver Details	View details about the installed driver files.
Update Driver	Update the driver for this device.
Roll Back Driver	If the device fails after updating the driver, roll back to the previously installed driver.
Disable Device	Disable the device.
Uninstall Device	Uninstall the device from the system (Advanced).
_	OK Cancel



EVB Connection Issue

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

- Click on Tools \rightarrow PMBus Tool \rightarrow 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.

System Imput Voltage 12 V V Caread mpenalion Impling Temperature Mix Dispective fielders: mpenalion Impling Compenalion Mix Dispective fielders: mpenalion Impling Compenalion Mix Dispective fielders: mpenalion Impling Compenalion Mix Note fielders: Impling Compenalion Impling Compenalion Impling Compenalion Note fielders: Impling Impl	• 4 ×	Register Map					Monitor		• # X	Fault
Carrent Temperature Mix Valage Quick Setting PMM Ocjuit Quick Setting PMM Ocjuit Quick	040406 05/00	MPM3695_250x30:CH0					Input Voltage	12	v	VIN_OV_F
CompetChaptadares Voltage Quick Setting PMM ImageChaptadares	PM3093_23(30)	Current	Compensation	Timing	Temperature	Misc	Output Voltage	1.78875	v	VIN_OV_V
Output densition 1.8 v 1.00 <td>Cha</td> <td>ngeChipAddress (9)</td> <td>operation</td> <td>Voltage</td> <td>Quick Setting</td> <td>PWM</td> <td>Temperature</td> <td>29</td> <td>°C</td> <td>VIN_UV_V</td>	Cha	ngeChipAddress (9)	operation	Voltage	Quick Setting	PWM	Temperature	29	°C	VIN_UV_V
13 V Viol Jonet 0.35 MRR_CIRL_OPS 0.000+([]0.51]] Subgroups (ANK) 1000+([]0.51]] O_Linit 27 AMP 447m/(0.510] BAUP 447m/(0.510]	Chip	Adress(0x):					+4+ 4			State_On
Image: Instance Image: Ins			1.8	v			1205		- Vin	VOUT_OV
VOOTJOOLI 0.335 (*) MERCINLOMS 10000400511 SUPLCCMUTVAQ Forced CCM[161] OCJINIK 27 AMP 447mV00100		Canval		16					٨	VOUT_UV
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MRQ_CTRL_COPS SWTCHURQ_FRIQUINCY ISOUCHURDII] • SWTCHURQ_FRIQUINCY ISOUCHURDII] • SWTCHURQ_FRIQUINCY ISOUCHURDII] • OLMER_CTRL_COMP • • SAUP 447mV(DEIL0] •		VOUT_SCALE	0.335				11.95-			IOUT_OC
MARCHIN.COMS 100000000111 - <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11.9-</td> <td></td> <td></td> <td>OT_FAUL</td>							11.9-			OT_FAUL
SWTCHERG_FREQUENCY 100000000000101 • In		MFR_CTRL_OPS					400 100 11	0 120 130	140 150	OT_WAR
SDP_CCM(SYNC) Reved CCM[D61] Image: Comparison of the second of the sec		SWITCHING_FREQUENCY	(1000K)	Hz[0b11] •			90 100 11	0 110 150	140 150	Invalid_C
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OC,imit 27 A © MRR_CTRL_COMP RAMP 447mV00110]							1.794-			
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MER_CERL_COMP Lise International International <td></td> <td>OC_amit</td> <td>27</td> <td>A</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		OC_amit	27	A						
RAMP 44.7mV[0b110] • 90 100 110 120 130 140 150		MFR_CTRL_COMP					1.760			
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29.4 29.2 29.3 28.8 28.8 28.8 50 100 110 120 130 140 150							90 100 11	0 120 130	140 150	
202- 202- 202- 202- 202- 202- 202- 202-							29.4-			
204 288 288 288 90 100 110 120 130 140 150							202		Temperature	
288- 288- 288- 90 100 110 120 130 140 150										
28.8 1 28.6 1 90 100 110 120 130 140 150							29			
28.6-1 90 100 110 120 130 140 150							28.8			
90 100 110 120 130 140 130							28.6			
							90 100 11	120 130	140 150	

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

Order directly from MonolithicPower.com or our distributors.