

# **User Guide**

mEZDPD3603A Evaluation Kit (PKT-mEZDPD3603A)



# **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 EVmEZDPD3603A-00A Specifications	4
1.3 EVKT-USBI2C-02 Specifications	4
Section 2. Software Requirements	5
2.1 Software Installation Procedure	5
Section 3. Evaluation Kit Test Set-Up	3
3.1 Hardware Set-Up	3
3.2 Powering up the EVB	3
3.3 Software Set-Up	3
3.4 Device Programming Instructions1	1
3.5 Troubleshooting Tips13	3
Section 4. Ordering Information14	4



### **Overview**

#### Introduction

The PKT-mEZDPD3603A is an evaluation kit for mEZDPD3603A. The mEZDPD3603A is a programmable DC/DC power supply up to 3A and 0.6 - 12V output voltage. This part has a multiple-time programmable memory and a simple programmable GUI.

The GUI includes a modeling software for verification of the part performance. During bench evaluations, different configurations can be obtained easily through the I2C interface. This allows users to optimize each output for their requirements. All non-programmed parts (mEZDPD3603A-XXXX) parts require only current and output voltage values to begin the evaluation. The other parameters, as defined in the GUI, have default settings that can be modified by the user, if needed.

#### **Kit Contents**

PKT- mEZDPD3603A Kit contents: (Items below can be ordered separately).

#	Part Number	ltem (				
1	EVmEZDPD3603A-00A	mEZDPD3603A evaluation board				
2	mEZDPD3603A-0001	mEZDPD3603A modules with default configuration	1			
3	EVKT-USBI2C-02	USB to I2C communication interface device kit, includes one USB to I2C communication interface device, USB cable, and ribbon cable				
4	Tdrive-mEZDPD3603A	USB thumb drive that stores the GUI installation file and supplemental documents	1			
		Input Power Supply				
		Input				
	GUI	Cable USB to I2C communication interface device EVKT-USB12C-02 10-Pin Ribbon Cable EV Outp	aluationBoard ut			
		Load				

Figure 1: PKT-MEZDPD3603A Evaluation Kit Set-Up



#### **Features and Benefits**

The mEZDPD3603A is highly customizable. Users can program the module via the MPS I2C GUI and one-time programming (OTP).

 $\triangle$  All changes made in I2C mode will NOT be retained once the EVB is powered down.  $\triangle$  Information written in OTP mode CANNOT be changed.

Features adjustable under each method are outlined below.

12C	OTP
<ul> <li>Output voltage</li> <li>Output current limit</li> <li>Switching frequency</li> <li>Multiple protection modes</li> <li>Compensation</li> </ul>	<ul> <li>Output voltage</li> <li>Output current limit</li> <li>Switching frequency</li> <li>Multiple protection modes</li> <li>Compensation</li> </ul>

#### **Kit Specifications**

Features	Specification
Supply for board (VIN)	4.5V - 36V
Operating input voltage	4.5V - 36V
Operating systems supported	Windows XP, 7 or later
System requirements	Minimum 17.6 MB free
GUI software	8 register controls: output voltage, mode, compensation, switching, VIN/EN threshold, power good, SS time, protection
EVB size (L x W)	6.4cm x 6.4cm



## **Section 1. Hardware Specifications**

#### **1.1 Personal Computer Requirements**

The following must be minimally met to use the PKT-mEZDPD3603A.

- Operating system of Windows XP, 7 or later
- Net Framework 4.0
- PC with a minimum of one available USB port
- At least 17.6 MB of free space

#### 1.2 EVmEZDPD3603A-00A Specifications

The EVmEZDPD3603A-00A is an evaluation board for the mEZDPD3603A. For more information, please refer to the EVmEZDPD3603A-00A datasheet.



Feature	Specification
Supply for Evaluation Board	4.5V - 36V
Operating Input Voltage	4.5V - 36V
EVB Size (L x W)	6.4cm x 6.4cm

Figure 2: EVmEZDPD3603A-00A Evaluation Board

#### 1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the communication interface device, which connects the EVB, the PC, and its supporting accessories. It provides I2C and PMBus capabilities. Together with MPS 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.







## **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: 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. Browse to 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 status screen to verify that installation is complete.

Fetup - mEZDPD3603A -	_		$\times$
Select Destination Location Where should mEZDPD3603A be installed?		Ģ	Ð
Setup will install mEZDPD3603A into the following folder.			
To continue, click Next. If you would like to select a different folder, clic	k Brow	/se.	
C:\Program Files\mEZDPD3603A	Br	owse	
At least 17.6 MB of free disk space is required.			
Next >		Can	cel

Figure 4: MPS I<sup>2</sup>C 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. Locate the proper wires to connect the EVB to the EVKT-USBI2C-02 communication interface device.
- 2. Connect SCL, SDA, and GND (see Figure 5). If needed, refer to the datasheet for further clarification.
- 3. Use the USB cable to connect the EVKT-USBI2C-02 communication interface device to the PC, and follow the instructions below to set up the EVB.



Figure 5: EVB to MPS I<sup>2</sup>C 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. Preset the power supply output between 4.5V and 36V and turn off the power supply.
- 3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
- 4. Turn the power supply on.

#### 3.3 Software Set-Up

After connecting the hardware according to steps above, follow the steps below to use the GUI software.

1. Start the software. It will display the version (see Figure 6).





Figure 6: Appearance after Starting the Software

2. Click the "Direct Programming Mode" button. The register control menu will appear on the version (see Figure 7 and Figure 8).



Figure 7: Program Button



Basic Config	Advanced Config	Write Memory	
			MPS Monstilled power system
Output Voltage	e Vo (V)	3.3	VIN
L(uH)		10	
Switching Free	quency Fsw (kHz)	500 🔻	
Operation Mo	de Peak Current Mo	de 🔹	
			Note: Cick The congonent to change the value 1

Figure 8: Values from I2C Shown in Table

3. Find the item you want to change and write or select the desired value from the drop-down menu (see Figure 9).

				-			_	
Basic Config	Config	Write Memory No	e: Click	? for m	nore information.	Protection		
AAM/Forced CCM	M 💌	Min UVLO Rising Threshold (V)	3.3	•	Valley Current Limit Th	reshold (A) 🕐	4	12
AAM Peak Current Threshold (mA)	530 💌	Vin UVLO Hysteresis (%)	4	•	Peak Current Limit Thr	eshold (A)	5	12
Compensation®		EN Rising Threshold (V)	1.2	•	SCP Mode @	Hiccup		12
Compensation, Rcomp (kohm)	700 •	EN Rising Hysteresis (mV)	200	-	SCP Triggered FB Vol	tage (VFB) (%)	50	1
Compensation, Rt (kohm)	60 💌	Bower Good @		_	SCP Triggered Curren	t Limit Duration (Tsw)	(12	8
Compensation, Ccomp1 (pF)	40 💌	PG Upper Rising Threshold (%	110	•	Hiccup Duty Cycle (%)		.11.1	1
Slope Compensation, Vpp (V)	0.75 💌	PG Lower Rising Threshold (%	90	-	Output OVP Mode 💮	Stop 1	Switchin	19
Switching @		PG Upper Hysteresis (%)	5	-	Output OVP Rising Th	reshold (%)	120	
Switching Slew Rate (rising) (V/ns)	4 .	PG Lower Hysteresis (%)	5	-	Output OVP Hysteresi	s (%)	5	3
Switching Slew Rate (failing) (Vins)	4 *		<u> </u>		OTP Rising Threshold	0 07	175	
Frequency dithering Enable	Disable 🔻	Soft-atart Time (ms)	<u> </u>	-	OTP Hysteresis (*C) @		25	1
Frequency dithering Cycle (us)	150 👻	Concession interference	<u> </u>	-	Input OVP Rising Thre	shold (V)	No	3
Frequency dithering Amplitude (Fsw	3/28 -				Input OVP Hysteresis	(%) @	5	
	the second s				ET Setting @	Auto	Reset	- 6

Figure 9: Values from I2C Shown in Table

4. Click the "RAM Mode" button and then click the "write" button to update values (see Figure 10). A successful writing is shown in Figure 11. If the writing is wrong, check your connection and restart your writing.



onfig	Advanced Config	Write Memory	
Address	Parameter Value	Read Back	
DOH	0x42	0x42	
D1H	0x71	0x71	ROM Mode RAM Mode
D2H	0x0A	0x0A	
D3H	0x1B	0x1B	Note: Unlimit times can be written with keeping power up it's strongly suggested primary design verified under this mode
D4H	0x40	0x40	
D5H	0x21	0x21	
D6H	0x04	0x04	
D7H	0x8A	0x8A	
D8H	0x04	0x04	
D9H	0xDE	0xDE	Write Read
DAH	0x50	0x50	Export Txt
DBH	0x8C	0x8C	Exportixe

Figure 10: RAM Mode Write Version



Figure 11: RAM Mode Write Successfully

5. Click the "Read" button to read back the values (see Figure 12 and Figure 13).



onfig	Advanced Config	Write Memory	
-			
Address	Parameter Value	Read Back	
DOH	0x42	0x42	
D1H	0x71	0x71	ROM Mode RAM Mode
D2H	0x0A	0x0A	
D3H	0x1B	0x1B	Note: Unlimit times can be written with keeping power up it's strongly suggested primary design verified under this model
D4H	0x40	0x40	
D5H	0x21	0x21	
D6H	0x04	0x04	
D7H	0x8A	0x8A	
D8H	0x04	0x04	
D9H	0xDE	0xDE	Write Read
DAH	0x50	0x50	Export Txt
DBH	0x8C	0x8C	Exportixe

Figure 12: Read Version

Advanced Config Write M	lemory		
Name	Value		
<basic config=""></basic>		*	
Output Voltage Vo (V)	4		
Switching Frequency Fsw (kHz)	500		
Operation Mode	Peak Current Mode		
<advanced config=""></advanced>	and the second second		
Light Load Mode			
AAM/Forced CCM	AAM		
AAM Peak Current Threshold (mA)	530		
Compensation			
Compensation, Rcomp (kohm)	700		and the second se
	60		OK

#### Figure 13: Read Back Data

6. Click the "Export" button to export the data of your setting (see Figure 14).



onfig	dvanced Config	Write Memory	
Address	Parameter Value	Read Back	
DOH	0x42	0x42	
D1H	0x71	0x71	ROM Mode RAM Mode
D2H	0x0A	0x0A	
D3H	0x1B	0x1B	Note: Unlimit times can be written with keeping power up it's strongly suggested primary design verified under this mode!
D4H	0x40	0x40	
D5H	0x21	0x21	
D6H	0x04	0x04	
D7H	0x8A	0x8A	
D8H	0x04	0x04	
D9H	OxDE	0xDE	Write Read
DAH	0x50	0x50	Export Txt
DBH	0x8C	0x8C	CAPOILIA

Figure 14: Export Version

▲ All changes made via I2C will be restored to default values once the EVB is powered down.

#### 3.4 Device Programming Instructions

The mEZDPD3603A can be custom-programmed. Follow the instructions below to create and export customized configurations.

- 1. Using a computer, open the MPS GUI software. Make sure you have powered on the EVB.
- 2. Ensure connection between the EVB and computer.
- 3. Set the OTP values the same as the I2C setting.

After setting your optional values, click "Rom Mode" and click the "write" button. The writing is finished (see Figure 15 and Figure 16).

onfig Advanced Config Write Memory						
Address	Parameter Value	Read Back				
DOH	0x42	0x42	ROM Mode     RAM Mode     Note: 5 times can be written under this model it's strongly suggested new design verified under RAM mode first     times left     Write     Export Txt			
D1H	0x71	0x71				
D2H	0x0A	0x0A				
D3H	0x1B	0x1B				
D4H	0x40	0x40				
D5H	0x21	0x21				
D6H	0x04	0x04				
D7H	0x8A	0x8A				
D8H	0x04	0x04				
D9H	OxDE	0xDE				
DAH	0x50	0x50				
DBH	0x8C	0x8C				





Note: you must set 8V < VIN < 36V.

onfig Advanced Config Write Memory					
Address	Parameter Value	Read Back			
D0H	0x42	0x42			
D1H	0x71	0x71	ROM Mode ORAM Mode		
D2H	0x0A	0x0A A	and the second se		
D3H	0x1B	0x1B	To be used by written under this model its attenues.		
D4H	0x40	0x40	ted new design verified under RAM mode first		
D5H	0x21	0x21 0x			
D6H	0x04	0x04	C Thes left		
D7H	0x8A	0x8A			
DBH	0x04	0x04			
D9H	0xDE	OXDE	Write Read		
DAH	0x50	0x50	Export Txt		
OBH	0x8C	0x8C	CAPOILLA		

Figure 16: OTP Successful Write

4. Turn off power and restart.

The remaining steps are optional and instruct how to check that new configurations have been programmed.

Notes:

- Unlike in I2C, not all of the configurations you set in OTP mode will be displayed until you write to mZEDPD3603A and cycle the power.
- After OTP, users are still able to change values using the I2C.
- If you try to perform OTP on a previously programmed device, the GUI software will allow you to proceed normally. However, your configurations will NOT be saved.

#### 3.5 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 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 17).
- 2. Click "Browse my computer for driver software", 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 18)



Figure 18

- 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.

#### • No Supply

The module input pin has an under-voltage lockout (UVLO) detection circuit. If the input voltage (VIN) is lower than the UVLO rising threshold, the module's functions are disabled.

#### Shutdown Event

If the module detects that the input voltage is lower than the UVLO falling threshold (enter no supply state) or over- temperature protection is triggered (enter power off state), the module switches to no supply state or power-off state, regardless of the current state.

#### • Thermal Recovery

If the mEZDPD3603A is in a power-off state due to the die temperature exceeding the thermal protection threshold, the part enters a power-on sequence when the die's temperature decreases.

#### • Shutdown Sequence

When the input voltage is lower than the UVLO falling threshold or the IC is over-temperature, the part enters the shutdown sequence directly.