

# **User Guide**

MP8861 Evaluation Kit (EVKT-8861)



# **Table of Contents**

Overview	2
Introduction	2
Kit Contents	2
Features and Benefits	2
Kit Specifications	3
Section 1. Hardware Specifications	4
1.1 Personal Computer Requirements	4
1.2 EV8861-L-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	6
3.1 Hardware Setup	6
3.2 Powering up the EVB	6
3.3 Software Set-Up	6
3.4 Troubleshooting Tips	9
Section 4. Ordering Information	9



# **Overview**

### Introduction

The EVKT-8861 is an evaluation kit for the MP8861. The MP8861 is a highly integrated, highfrequency, synchronous, step-down switcher with an I<sup>2</sup>C control interface. The MP8861 is optimized to support up to 6A continuous output current over an input supply range from 2.85V to 18V with excellent load and line regulation. This kit allows for quick evaluation of the MP8861. By using the I<sup>2</sup>C, users can set the current limit, slew rate, work mode, and output voltage. This device also features telemetry, which provides output voltage and output current monitoring via I<sup>2</sup>C.

# **Kit Contents**

EVKT-8861 kit contents: (items below can be ordered separately).

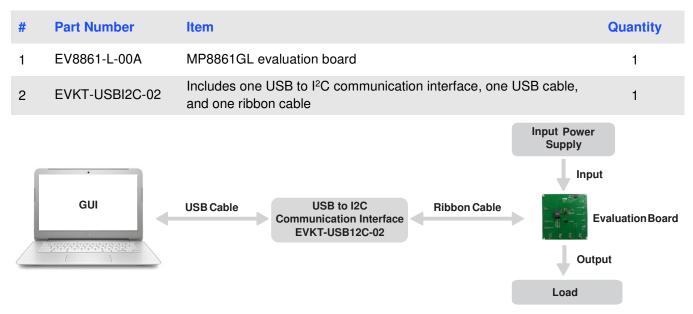


Figure 1: EVKT-8861 Evaluation Kit Set-Up

### **Features and Benefits**

The MP8861 is highly customizable. Users can program the MP8861 via the MPS I<sup>2</sup>C GUI.



 $\triangle$  All changes made in  $l^2C$  mode will NOT be retained once the EVB is powered down.

Features adjustable under each method are outlined below.

I2C

- Adjustable output voltage
- Slew rate
- Selectable OVP, OCP mode
- Selectable PFM mode
- Selectable PG deglitch time
- Selectable frequency
- Soft stop
- Adjustable current limit
- Output current/voltage monitor
- System enable (EN bit)
- Status indication: OC, OTEW, OT, PG

# **Kit Specifications**

Features	Specification
Supply for Board (V <sub>IN</sub> )	2.85V - 18V
Operating Input Voltage	2.85V - 18V
Output Voltage (Vout)	1V
Continuous Output Current (Iout)	6A
System Requirements	Minimum 22.2 MB free
GUI Software	3 Register Controls: VSEL, SysCntlreg1, SysCntlreg2
EVB Size (L x W)	8.5 cm x 8.5 cm



# **Section 1. Hardware Specifications**

### **1.1 Personal Computer Requirements**

The following must be minimally met to use the EVKT-8861:

- 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 EV8861-L-00A Specifications

The EV8861-L-00A is an evaluation board for MP8861GL. For more information, please refer to the EV8861-L-00A datasheet.



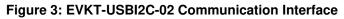
Feature	Specification
Supply for Evaluation Board	2.85V - 18V
Operating Input Voltage	2.85V - 18V
Output Voltage (Vour)	1V
Continuous Output Current (Iout)	6A
EVB Size (L x W)	8.5 cm x 8.5 cm

### Figure 2: EV8861-L-00A Evaluation Board

### 1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the communication interface, which connects the EVB, the PC, and its supporting accessories. It provides I<sup>2</sup>C 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 I<sup>2</sup>C GUI. Follow the instructions below to install the software.

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

- 1. Visit the MP88xx I<sup>2</sup>C GUI page at https://www.monolithicpower.com/en/i2c-tool.html.
- 2. Click the "Download" button in the upper right-hand corner.
- 3. Once the download has completed, 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."
- 4. Follow the prompts in the set-up guide.
- 5. Wait for the status screen to verify that installation is complete (see Figure 5).

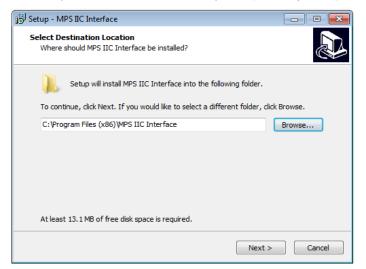


Figure 4: MPS I<sup>2</sup>C GUI Set-Up Guide







# Section 3. Evaluation Kit Test Set-Up

### 3.1 Hardware Set-Up

The hardware must be properly configured prior to use. Use the USB cable to connect the EVKT-USBI2C-02 communication interface to the PC, and 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 and PC.
- 2. Connect SCL, SDA, and GND (see Figure 6). If needed, refer to the datasheet for further clarification.

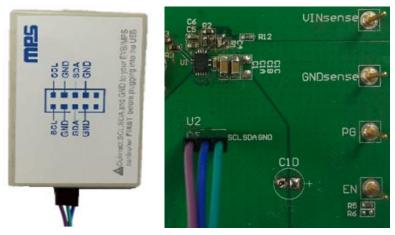


Figure 6: EVB to MPS I<sup>2</sup>C Communication Interface Wire Connection

### 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 2.85V to 18V, and then 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. The MP8861 will enter the power-on sequence automatically.

### 3.3 Software Set-Up

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

- 1. Start the software. It will automatically check the EVB connection.
  - If connection is successful, the address will be listed in the "Slave Address" (see Figure 7).



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ste	MP8843	3										
	MP8845	5						8				
٦.	MP8869	)	-		-		_					
	MP8861	L 1)	•	Monolithic	Powe	r Svs	tems	M	P88	61 II	C G	UI
MP8869 MP8869	MP8869	9W (00)	•		0.00	. 0,0	teme					
	os ed Soft Sto	p 👻	SlaveAddr	65				Scan		VAUI		
-	MP8868	3 ey 8.4A	•	SlaveAdur	05				Jour			
	MP8867			ReadBox								
	MP8865			System Control								
1	MP8864						0.5				D.4	
	MP8846	5		regName	D7	D6	D5	D4	D3	D2	D1	DO
	MP8847			VSEL	NA	NA	NA	NA	NA	NA	NA	NA
		Write		SysCntlreg1	NA	NA	NA	NA	NA	NA	NA	NA
SV	sCntireg1			SysCntlreg2	NA	NA	NA	NA	NA	NA	NA	NA
100	nable	Enabled		Output Current	NA	NA	NA	NA	NA	NA	NA	NA
			•	Output Voltage	NA	NA	NA	NA	NA	NA	NA	NA
Go	o_Bit	Go_Bit = 0	•	ID1	NA	NA	NA	NA	NA	NA	NA	NA
SI	ew Rate	5mV/us (100)	+	Status	NA	NA	NA	NA	NA	NA	NA	NA
0	VP Mode	Auto Recovery Me	ode(1 👻					Read	H )	E	dit Re	qs
0	CP Mode	Hiccup Mode (1)										
M	ode	Auto PFM/PWM M	lode ( 🔻									
		Write										
		J										

Figure 7: Appearance of Address Shows Successful Connection

- If connection is not successful, a warning will appear at the bottom. There are two warnings a user can expect (see Figure8). Each of the warnings mean an invalid connection.
  - 1) "EVB is disconnected!" This means that the evaluation board is not connected.
  - 2) "Communication Board is disconnected!" This means that the USB I<sup>2</sup>C communication interface is not connected.

	stem Control				رنصر			B					
	SysCntlreg2 PG Deglitch	30us (11)	-		Ē		-						
				Monolithic P	owe	r Sys	tems	M	-88	61 II	CG	UI	
	Switch	500kHz (00)	<b>•</b>										
	Soft Stop	Disabled Soft Stop	•	SlaveAddr:	00				Scan		INVAL	ID 🗖	→ Invalid SlaveAddre
	Current Limit	LS Valley 8.4A	•	l olaveriaal.									
		Write		ReadBox									
				System Control									
	VSEL			regName	D7	D6	D5	D4	D3	D2	D1	DO	
	Reference	0.72 V		VSEL	NA	NA	NA	NA	NA	NA	NA	NA	
		Write		SysCntlreg1	NA	NA	NA	NA	NA	NA	NA	NA	1
				SysCntlreg2	NA	NA	NA	NA	NA	NA	NA	NA	-
	SysCntireg1			Output Current	NA	NA	NA	NA	NA	NA	NA	NA	
	Enable	Enabled	•	Output Voltage	NA	NA	NA	NA	NA	NA	NA	NA	
	Go_Bit	Go_Bit = 0	•	ID1	NA	NA	NA	NA	NA	NA	NA	NA	
	Slew Rate	5mV/us (100)	*	Status	NA	NA	NA	NA	NA	NA	NA	NA	
	OVP Mode	Auto Recovery Mode(	1 -		_		1					_	<b>-</b>
	OCP Mode							Read		E	dit Re	qs	
		Hiccup Mode (1)	•									*	
	Mode	Auto PFM/PWM Mode	( -										
mmunication		Write											
oard is												-	

Figure 8: Warning Indicates Unsuccessful Connection



- 2. If the connection is successful, proceed to Step 3. Otherwise, check connections between the EVB, communication interface, and PC. Re-plug the USB into the computer and restart the GUI.
- Click the "PartSelect" button to select the MP8861 (see Figure 7). The Register Control menu will appear on the left side. The I<sup>2</sup>C register values will be read and displayed on the right side after clicking the "Read" button (see Figure 9).

ystem Control											
SysCntireg2				-			Ð				
PG Deglitch	30us (11)	-		-		-					
Switch	500kHz (00)		Monolithic P	owe	r Sys	tems	M	P88	61 II	CG	UI
								S 10.817			
Soft Stop	Disabled Soft Stop	•	SlaveAddr:	65				Scan		VALI	5
Current Limit	LS Valley 8.4A	•									
	Write		ReadBox								
			System Control								
VSEL			regName	D7	D6	D5	D4	D3	D2	D1	D0
Reference	0.72 V	•	VSEL	1	0	0	1	1	1	1	0
	Write		SysCntlreg1	1	0	1	0	0	1	1	0
			SysCntlreg2	1	1	0	0	0	0	0	1
SysCntireg1			Output Current	0	0	0	0	0	0	0	0
Enable	Enabled	•	Output Voltage	0	0	0	0	0	0	0	0
Go_Bit	Go_Bit = 0	-	ID1	1	0	0	0	0	1	1	1
Slew Rate	5mV/us (100)	•	Status	0	0	0	0	0	0	0	1
OVP Mode	Auto Recovery Mode	(1 -		_			-		<b>F</b> -		1
			-				Read	1	E	dit Reg	qs
OCP Mode	Hiccup Mode (1)	•									^
Mode	Auto PFM/PWM Mode	• ( -									
	Write										
											-

Figure 9: Values from I2C Shown in Table

- 4. Find the item you want to change and select the desired value from the drop-down menu.
- 5. Click the "**Read**" button to update values. The changed information of the item will appear on the right side (see Figure 10).

ystem Control										
SysCntlreg2			-	T		B				
PG Deglitch	30us (11) 👻			<u> </u>	-				_	
Switch	500kHz (00) -	Monolithic F	owe	r Sys	tems	M	P88	61 II	C G	UI
Soft Stop	Disabled Soft Stop 👻	SlaveAddr:	65			-	Scan		VALI	)
Current Limit	LS Valley 8.4A +	ReadBox								
	wille	System Control								
VSEL		regName	D7	D6	D5	D4	D3	D2	D1	D0
Reference	0.72 V 🔹	VSEL	1	0	0	1	1	1	1	0
	Write	SysCntlreg1	0	0	1	0	0	1	1	0
		SysCntlreg2	1	1	0	0	0	0	0	1
SysCntireg1		Output Current	0	0	0	0	0	0	0	0
Enable	Disabled -	Output Voltage	0	0	0	0	0	0	0	0
Go_Bit	Go_Bit = 0 👻	ID1	1	0	0	0	0	1	1	1
Slew Rate	5mV/us (100) -	Status	0	0	0	0	0	0	0	0
OVP Mode	Auto Recovery Mode(1 👻					Read	1	E	dit Re	gs
OCP Mode	Hiccup Mode (1) 🔹									
Mode	Auto PFM/PWM Mode ( 👻									
	Write									
										+

#### Figure 10: Refer to Datasheet to Translate 0's and 1's

 $\triangle$  All changes made via  $l^2C$  will be restored to default values once the EVB is powered down.



### 3.4 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 the MPS PMBus and I<sup>2</sup>C.

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### EVKT-USBI2C-01

In case 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).
- Click "Browse my computer for driver software." find the downloaded driver, and install.

#### EVKT-USBI2C-02

In case 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).

 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.

#### No Supply

The MP8861's input pin has an under-voltage lockout

(UVLO) detection circuit. If the input voltage (AVIN) is lower than the UVLO rising threshold, the MP8861's functions are disabled.

#### Shutdown Event

If the MP8861 detects that the input voltage is lower than the UVLO falling threshold (it enters a no supply state) or over-temperature protection is triggered (it enters a power-off state), the MP8861 switches to no supply state or power-off state, regardless of the current state.

#### Thermal Recovery

If the MP8861 is in a power-off state due to the die temperature exceeding the thermal protection threshold, the MP8861 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 MP8861 enters the shutdown sequence directly.

MPS *	Undate Driver Software
SMS	Update Driver Software
Print qu	Disable
Process	Uninstall
Sensors	
Software	Scan for hardware changes
Sound,	Properties

ISBXpre	ss Device	Propert	ies	×
General	Driver	Details	Events	
T	USBXp	oress Dev	ice	
	Driver I	Provider:	Silicon Laboratories Inc.	
	Driver I	Date:	11/6/2015	
	Driver	Version:	6.7.2.0	
	Digital	Signer:	Microsoft Windows Hardware Compatibility Publisher	
Dri	ver Detail	s	View details about the installed driver files.	
Up	date Drive	er	Update the driver for this device.	
Roll Back Driver		ver	If the device fails after updating the driver, roll back to the previously installed driver.	
Disa	able Devid	ce	Disable the device.	
Unin	istall Devi	ice	Uninstall the device from the system (Advanced	).
	Figu	re 12	Correct DriverVersion	



# **Section 4. Ordering Information**

The components of the evaluation kit can be purchased separately depending on user needs.

Part Number	Description
EVKT-8861	Complete evaluation kit
Contents of EVKT-8861	
EV8861-L-00A	MP8861GL-CCCC evaluation board
EVKT-USBI2C-02	Includes one USB to I <sup>2</sup> C communication interface, one USB cable, and one ribbon cable

Order directly from MonolithicPower.com or our distributors.