

User Guide

MP8860 Evaluation Kit (EVKT-MP8860)



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Overview

Introduction

The EVKT-MP8860 is an evaluation kit for the MP8860, a synchronous, 4-switch, integrated, buckboost converter capable of regulating the output voltage from a wide 2.8V to 22V input voltage range with high efficiency. The MP8860 provides flexible system configurations via the I²C. This kit allows for quick evaluation of the MP8860, supporting a wide range of designs.

Kit Contents

EVKT-MP8860 kit contents: (Items listed below can be ordered separately, GUI installation file and supplemental documents can be downloaded from the MPS website)

#	Part Number	Item	Quantity
1	EV8860-Q-00A	MP8860GQ-0000 evaluation board	1
2	EVKT-USBI2C-02	Includes one USB to I2C communication interface device, one USB male A to B cable, one 3-pin ribbon cable	1

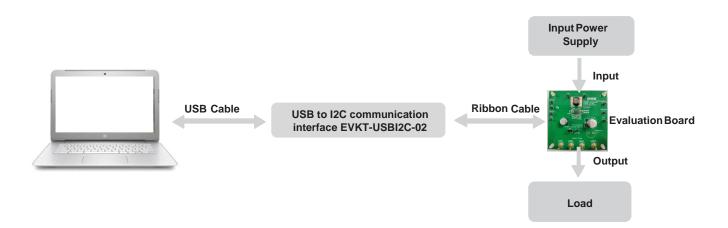


Figure 1: EVKT-MP8860 Evaluation Kit Set-Up



Features and Benefits

The MP8860 is highly customizable. Users can configure the MP8860 via the MPS I2C GUI.

 \triangle All changes made in I2C mode will NOT be retained once the EVB is powered down.

Adjustable features are outlined below.

I2C

- Output voltage setting
- PG delay enable
- Output current limit
- Part enable
- OCP and OVP mode
- Discharge enable
- Mode
- Frequency
- Line drop compensation
- Soft-start time
- Read status and ID
- Interrupt
- Mask

Kit Specifications

Features	Specification
Operating input voltage	2.8V - 22V
Operating systems supported	Windows 7 or later
System requirements	Minimum 22.2 MB free
GUI software	5 register controls: Interrupt, Vout, current, control, mask
EVB size (L x W)	6.35cm x 6.35cm



Section 1. Hardware Specifications

1.1 Personal Computer Requirements

The following must be minimally met to use the EVKT-MP8860.

- Operating system of Windows 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 EV8860-Q-00A Specifications

The EV8860-Q-00A is an evaluation board for the MP8860GQ-0000. For more information, please refer to the EV8860-Q-00A datasheet.



Feature	Specification
Operating input voltage	2.8V - 22V
EVB size (L x W)	6.35cm x 6.35cm

Figure 2: EV8860-Q-00A Evaluation Board

1.3 EVKT-USBI2C-02 Specifications

The EVKT-USBI2C-02 refers to the USB to I2C 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.

- 1. Double click the .exe file to open the set-up guide (see Figure 4).
- 2. Follow the prompts in the set-up guide.
- 3. Wait for status screen to verify that installation is complete (see Figure 5).

13 Setup - MP8860	- • •
Select Destination Location Where should MP8860 be installed?	
Setup will install MP8860 into the following folder.	
To continue, click Next. If you would like to select a different folder, c	lick Browse.
C:\Program Files\MP8860	Browse
At least 21.5 MB of free disk space is required.	
Next	> Cancel

Figure 4: MPS I²C GUI Set-Up Guide

Device Driver Installation Wizar	rd	
	Completing the De Installation Wizard	
	The drivers were successfully in	stalled on this computer.
	You can now connect your devi came with instructions, please re	ice to this computer. If your device ead them first.
	Driver Name	Status
	✓ Silicon Laboratories Inc	Ready to use
	< Back	Finish Cancel





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 6). 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 6: 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. Preset the power supply output between 2.8V and 22V, 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 board will start up automatically with the default settings.

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



											D	etect 🗕		×
Part Numbers	Debug Tool	Utility	Help											
ADDRESS:				REGISTER	HEX	D7	D6	D5	D4	D3	D2	D1	D0	
6B														
REGISTER CONTRO)L:													
				1										

Figure 7: Appearance of Address Showing Successful Connection

- If not, one of two warnings will appear at the bottom:
 - 1) "No Slave Found. Please Check the Connection!" This means that the evaluation board is not connected (see Figure 8).
 - 2) "Device is not available. Please check the Connection!" This means that the USB I2C communication interface device is not connected (see Figure 9).

Part Numbers	Debug Tool	Utility	Help										
ADDRESS:				REGISTER	HEX	D7	D6	D5	D4	D3	D2	D1	D0
REGISTER CONTR	OL:												
				No	Slave	Found.	Please	check	the co	nnectic	on!		
			/	T									
No Slave Found, F	Please check the	connnecti	on!	1									

Figure 8: Warning Indicates Unsuccessful Connection – Evaluation Board Not Connected



				· ·								Detect 🗕		×
Part Numbers	Debug Tool	Utility	Help											
ADDRESS:				REGISTER	HEX	D7	D6	D5	D4	D3	D2	D1	D0	
REGISTER CONTRO	OL:													
					Device i	o not o	voiloble	Diago		li tha a		otion		
					Jevice	s not a	valiable	. Pieas	e chec	k ine c	onne	ction!		
				ſ										
Device is not avail	able, Please cheo	ck the con	nnection!											

Figure 9: Warning Indicates Unsuccessful Connection – USBI2C Communication Interface Device is Not Connected

- 2. If the connection is successful, proceed to Step 3. Otherwise, check the connections between the EVB, communication interface device, and PC. Re-plug the USB into the computer and restart the GUI.
- 3. Select MP8860 from under Part Numbers. The Register Control menu will appear on the left side. The I2C register values will be read automatically and displayed on the right (see Figure 10).

EV8860-Q-00A 2.8-22V VIN,1A IOUT,4-SWIT	CH,INTEGRATED	BUCK-B	DOST CO	ONVERTE	R WITH I	I2C INTE	RFACE			
Part Numbers Debug Tool Utility Help										
ADDRESS:	REGISTER	HEX	D7	D6	D5	D4	D3	D2	D1	D0
6B	VOUT_L(0x0)	4	0	0	0	0	0	1	0	0
	VOUT_H(0x1)	3E	0	0	1	1	1	1	1	0
REGISTER CONTROL:	VOUT_GO(0x2)	0	0	0	0	0	0	0	0	0
	IOUT_LIM(0x3)	3C	0	0	1	1	1	1	0	0
	CTL1(0x4)	FO	1	1	1	1	0	0	0	0
O VOUT	CTL2(0x5)	30	0	0	1	1	0	0	0	0
	Status(0x9)	80	1	0	0	0	0	0	0	0
	Interrupt(0xa)	1	0	0	0	0	0	0	0	1
	Mask(0xb) ID1(0xc)	0	0	0	0	0	0	0	0	0
	MFR_ID(0x27)	0 9	0 0	0 0	0 0	0 0	0 1	0 0	0 0	0 1
	DEV_ID(0x28)	58	0	1	0	1	1	0	0	0
	IC_REV(0x29)	1	0	0	0	0	0	0	0	1
	,									
									read	all





- 4. Find the item you want to change and select the desired value from the drop-down menu.
- 5. Click the "Read All" button to update values. The changed information of the item will appear on the right side (see Figure 11).

art Numbers Debug Tool Utility H	Help									
DDRESS:	REGISTER	HEX	D7	D6	D5	D4	D3	D2	D1	D0
58	VOUT_L(0x0)	4	0	0	0	0	0	1	0	0
	VOUT_H(0x1)	ЗE	0	0	1	1	1	1	1	0
	VOUT_GO(0x2)	0	0	0	0	0	0	0	0	0
EGISTER CONTROL:	IOUT_LIM(0x3)	3C	0	0	1	1	1	1	0	0
	CTL1(0x4)	70	0	1	1	1	0	0	0	0
✓ VOUT	CTL2(0x5)	30	0	0	1	1	0	0	0	0
	Status(0x9)	0	0	0	0	0	0	0	0	0
	Interrupt(0xa)	1	0	0	0	0	0	0	0	1
CTL1(0x4)	Mask(0xb)	0	0	0	0	0	0	0	0	0
EN(D7)	ID1(0xc)	0	0	0	0	0	0	0	0	0
Disable(0) 🔻	MFR_ID(0x27)	9	0	0	0	0	1	0	0	1
HICCUP OCP_OVP(D6)	DEV_ID(0x28)	58	0	1	0	1	1	0	0	0
Hiccup mode(1) •	IC_REV(0x29)	1	0	0	0	0	0	0	0	1
DISCHG_EN(D5)										
Enable(1) 🔻										
MODE(D4)										
Force PWM mode(1)										
CTL2(0x5)										
LINE DROP COMP(D6) No compensation(00)	-							Г	read	

Figure 11: Refer to Datasheet to Translate 0's and 1's

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

3.4 Troubleshooting Tips

• EVKT-USBI2C-02 Driver Problem

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 the 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 12).
- 2. Click "Browse my computer for driver software".
- 3. Find the driver and install.

✓ ▲ Other device	es
AutoGra	abService
MPS SMS	Update Driver Software
> 🖻 Print qu	Disable
> D Process	Uninstall
> 🖭 Sensors > 📔 Software	Scan for hardware changes
> 🗐 Sound,	Properties
S Storage	

Figure 12: 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 the 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 13).

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 communication interface device to the PC with the USB cable.

USBXpress Device Properties					
General	Driver	Details	Events		
ø	USBXp	oress Devi	ice		
Driver Provider:		Provider:	Silicon Laboratories Inc.		
	Driver Date:		11/6/2015		
	Driver Version:		6.7.2.0		
Digital Signer:		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		ce	Disable the device.		
Unin	Uninstall Device		Uninstall the device from the system (Advanced	i) .	
			OK Cance	4	

Figure 13: Updating the Driver Software

• No Supply

The MP8860's input pin has an under-voltage lockout (UVLO) detection circuit. If the input voltage (VIN) is lower than the UVLO falling threshold, the MP8860's functions are disabled.

• Shutdown Event

Three events can shut down the chip: EN low, V_{IN} low, and thermal shutdown. During shutdown, the signaling path is blocked to avoid any fault triggering. Then V_{COMP} and the internal supply rail are pulled down. The floating driver is not subject to this shutdown command.

Thermal Recovery

When the silicon die temperature exceeds 150°C, the entire chip shuts down. When the temperature falls below its lower threshold (typically 130°C), the chip is enabled.

• OCP and OVP Mode

When OCP or OVP are triggered, the MP8860 enters hiccup mode or latch-off mode. In hiccup mode, the MP8860 stops switching and recovers automatically with 12.5% duty cycles. In latch-off mode, the MP8860 stops switching until the IC restarts (V_{IN} , EN, or EN bit toggle). For MP8860GQ-0000, the default mode is hiccup mode.



Section 4. Ordering Information

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

Part Number	Description			
EVKT-MP8860	Complete evaluation kit			
Contents of EVKT-MP8860				
EV8860-Q-00A	MP8860GQ-0000 evaluation board			
EVKT-USBI2C-02	Includes one USB to I2C communication interface device, one USB male A to B cable, one 3-in ribbon cable			

Order directly from MonolithicPower.com or our distributors.

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Monolithic Power Systems (MPS):

EVKT-MP8860