

User Guide

MP8867 Evaluation Kit (EVKT-8867)



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Overview

Introduction

The EVKT-8867 is an evaluation kit for the MP8867. The MP8867 is a high-frequency, synchronous, rectified, step-down, switch-mode converter with an I2C control interface. The MP8867 achieves 8A of output current with excellent load and line regulation over a wide input supply range. This kit allows for quick evaluation of the MP8867. By using the I2C, users can set the output voltage, slew rate, switching frequency, and work mode.

Kit Contents

EVKT-8864 kit contents: (items below can be ordered separately).

#	Part Number	Item	Quantity
1	EV8867-LE-00A	MP8867GLE evaluation board	1
2	EVKT-USBI2C-02	Includes one USB to I2C communication interface, one USB cable, one ribbon cable	1
3	Tdrive-8867	USB flash drive that stores the GUI installation file and supplemental documents	1
	GUI	B Cable USB to I2C Communication Interface EVKT-USBI2C-02 USB to I2C Communication Interface EVKT-USBI2C-02 USB to I2C Communication Interface EVKT-USBI2C-02 USB to I2C	Evaluation Board

Figure 1: EVKT-8867 Evaluation Kit Set-Up



Features and Benefits

The MP8867 is highly customizable. Users can program the MP8867 via the MPS I2C GUI.

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

Features adjustable under each method are outlined below.

I2C

- Adjustable output voltage
- Selectable slew rate
- Selectable switching frequency
- Selectable PFM mode
- System enable (EN bit)
- Status indication: OC, OTEW, OT, PG

Kit Specifications

Features	Specification
Supply for Board	4.5V - 17V
Operating Input Voltage	4.5V - 17V
Output Voltage (V _{OUT})	1V
Output Current (IOUT)	8A
Operating Systems Supported	Windows XP, 7, or later
System Requirements	Minimum 22.2MB free
GUI Software	2 Register Controls: VSEL, System1
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-8867.

- 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 EV8867-LE-00A Specifications

The EV8867-LE-00A is an evaluation board for the MP8867GLE. For more information, please refer to the EV8867-LE-00A datasheet.



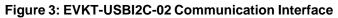
Feature	Specification
Supply for Board	4.5V - 17V
Operating Input Voltage	4.5V - 17V
Output Voltage (V _{OUT})	1V
Output Current (Iout)	8A
EVB Size (L x W)	8.5cm x 8.5cm

Figure 2: EV8867-LE-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 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 thumb drive into the computer using any available USB port.
- 2. Locate 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 the status screen to verify that installation is complete (see Figure 5).

📴 Setup - MPS IIC Interface	- • •
Select Destination Location Where should MPS IIC Interface be installed?	
Setup will install MPS IIC Interface into the following folder.	
To continue, click Next. If you would like to select a different folder, click	Browse.
C:\Program Files (x86)\MPS IIC Interface	Browse
At least 13.1 MB of free disk space is required.	
Next >	Cancel

Figure 4: MPS I²C GUI Set-Up Guide



Figure 5: MPS I²C GUI Set-Up Success

Section 3. Evaluation Kit Test Set-Up

3.1 Hardware Set-Up

The hardware must be configured properly 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.
- 2. Connect SCL, SDA, and GND (see Figure 6). If needed, refer to the datasheet for further clarification.



Figure 6: EVB to MPS I²C 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 between 4.5V to 17V, 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 MP8867 will enter the power-on sequence automatically.

3.3 Software Set-Up

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

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



IS MP	S IIC GUI-	MP886	51 2.85V ·	- 18V, 6A, High-E	fficiency, Wi	de-Input, Synchronou	s Step-D	own C	Convert	er with	Integr	ate	-	•
File	PartSele	ect	Help	-										
Syst	, M	P8843												
_	M	P8845								8				
	м	P8869		1)					_					
	M	P8861		<u> </u>	•	Monolithic	Powe	r Sys	tems	M	P88(61 II	C G	UI
	M	P8869\	W	(00)	•									
	M	P88699	5	ed Soft Stop	-	SlaveAddr	62			-	Scan		VALI	0
		P8868		ey 8.4A	-	olavenaal								
		P8867		/rite		ReadBox								
		P8865		line		System Control]							
- c1		P8864				regName	D7	D6	D5	D4	D3	D2	D1	D0
		P8846			-	VSEL	NA	NA	NA	NA	NA	NA	NA	NA
	M	P8847		Vrite		SysCntlreg1	NA	NA	NA	NA	NA	NA	NA	NA
				VIIIe		SysCntlreg2	NA	NA	NA	NA	NA	NA	NA	NA
	SysCntire	g1 —				Output Current	NA	NA	NA	NA	NA	NA	NA	NA
	Enable		Enable	ed	•	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 Rat	•	_	s (100)	•	Status	NA	NA	NA	NA	NA	NA	NA	NA
		-			_				_					
	OVP Mod	e	Auto R	ecovery Mode(1	•					Read	d	E	dit Re	gs
	OCP Mod	e	Hiccup	o Mode (1)	-									*
	Mode		Auto P	FM/PWM Mode (•									
				Vrite										
				VIILE										
														Ŧ
Com	municati	on Bo	ard is C	Connected	EVB is Co	onnected								

Figure 7: Appearance of Address Shows Successful Connection

- If not, a warning will appear at the bottom. There are two warnings a user can expect (see Figure8). Each of warning means 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 I2C communication interface is not connected.

File PartSelect System Contro		ous step bown switchers i			ucc						
VSEL V_BOOT Output	I2C Control Loop Mode ↓ 0.60 V ↓	Monolithic P	ower	Syst		M	P88	67 II	C G	UI	
	Write	SlaveAddr:	00		•		Scan		INVAL		Invalid Slave Add
SysCntireg		ReadBox									
Enable Go_Bit	Enabled - Go Bit = 0 -	System Control									
Slew Rate	4mV/us (100) ▼	regName	D7	D6	D5	D4	D3	D2	D1	D0	
Switch	500kHz -		NA NA	NA NA	NA NA	NA NA	NA NA	NA	NA NA	NA	
Mode	PWM Mode 🗸	ID1	NA	NA	NA	NA	NA	NA	NA	NA	
	Write	Status	NA	NA	NA	NA	NA	NA	NA	NA	
						Read	ł	E	dit Re	qs	
										*	
										-	
Communication	Board is Disconnected EVB is	Disconnected	EV/F	lis r	lisco	nne		4			

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



- 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 MP8867 (see Figure 7) (The default GUI window is for the MP8861). The Register Control menu will appear on the left side. I2C register values will be read and displayed on the right side after clicking **Read** button (see Figure 9).

File PartSelect	98867 17V,10A High Efficient Help	Synchronous	Step-Down Switchers	with 12	C Inter	face			t		
System Control VSEL V_BOOT Output	FB Control Loop Mode 0.60 V Write	3 ▼ ▼	Monolithic SlaveAddr	_	r Sys	tems		P88	67 II	C G	_
SysCntireg1 Enable	Enabled	•	ReadBox System Control	1					-		
Go_Bit	Go_Bit = 0	•	regName	D7	D6	D5	D4	D3	D2	D1	D0
Slew Rate	4mV/us (100)	•	VSEL	1	0	0	0	0	0	0	0
Switch	500kHz	•	SysCntlreg1	1	0	1	0	0	0	0	1
Mode	PWM Mode	-	ID1	1	0	0	0	0	0	1	1
	Write		Status	0	0	0	0	0	0	0	1
	whe						Read	ł	E	dit Re	gs
									_		*
											Ŧ
	Board is Connected	EVB is Co	and a second sec								

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 All** button to update values. The changed information of the item will appear on the right side (see Figure 10).

MPS IIC	GUI-MP8	867 17V,10A High Efficient	Synchronous S	Step-Down Switchers	with I2	C Inter	face				-	
File Pa	rtSelect	Help										
System	Control											
VSEI V_B Out	OOT	FB Control Loop Mode 0.60 V Write	•	Monolithic SlaveAddr	_	r Sys	D tems		P88	67 II	C G	_
Sys0 Ena	Cntireg1 ble	Disabled	•	ReadBox System Control								
Go_	Bit	Go_Bit = 0	•	regName	D7	D6	D5	D4	D3	D2	D1	D0
Slev	v Rate	4mV/us (100)	•	VSEL	1	0	0	0	0	0	0	0
Swi	tch	500kHz	-	SysCntlreg1	0	0	1	0	0	0	0	1
Mod	le	PWM Mode	•	ID1	1	0	0	0	0	0	1	1
		Write		Status	0	0	0	0	0	0	0	0
		Wite						Read	±	E	dit Re	gs
				The Part is Disab	led							*
												-
Commur	nication B	oard is Connected	EVB is Con	nected								

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

▲ All changes made via I2C 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 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", 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. 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

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

No Supply

The MP8867's input pin has an under-voltage lockout

(UVLO) detection circuit. If the input voltage (AVIN) is lower than the UVLO rising threshold, the MP8867's functions are disabled.

Shutdown Event

If the MP8867 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 MP8867 switches to no supply state or power-off state, regardless of the current state.

Thermal Recovery

If the MP8867 is in a power-off state due to the die temperature exceeding the thermal protection threshold, the MP8867 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 MP8867 enters the shutdown sequence directly.



Figure 11: Updating the Driver Software

USBXpress Device Properties							Х
General	Driver	Details	Events				_
T	USBXp	ress Dev	ice				
	Driver F	Provider:	Silico	n Laborato	ries Inc.		
	Driver [Date:	11/6/	/2015	_		
	Driver \	/ersion:	6.7.2	.0			
Digital Signer: Microsoft Windows Hardware Compatibility Publisher							
Drive	er Detail	S	View det	tails about f	the installed drive	er files.	
Upda	ate Drive	er	Update f	the driver fo	or this device.		
Roll B	ack Driv	/er			fter updating the Isly installed drive		
Disable Device Disable the device.							
Uninst	all Devi:	се	Uninstal	the device	e from the system	(Advanced)	
					ОК	Cancel	

Figure 12: Correct Driver Version



Section 4. Ordering Information

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

Part Number	Description
EVKT-8867	Complete evaluation kit
Contents of EVKT-8867	
EV8867-LE-00A	MP8867GLE evaluation board
EVKT-USBI2C-02	Includes one USB to I2C communication interface, one USB cable, one ribbon cable
Tdrive-8867	USB flash drive that stores the GUI installation file and supplemental documents

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