

# **User Guide**

MP8869S Evaluation Kit (EVKT-8869S)



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#### **Overview**

#### Introduction

The EVKT-8869S is an evaluation kit for the MP8869S. The MP8869S is a highly integrated, highfrequency, synchronous, step-down switcher with an I2C control interface. The MP8869S is optimized to support up to 12A continuous/15A peak 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 MP8869S. By using the I2C, 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 I2C.

#### **Kit Contents**

EVKT-8869S kit contents: (items below can be ordered separately).

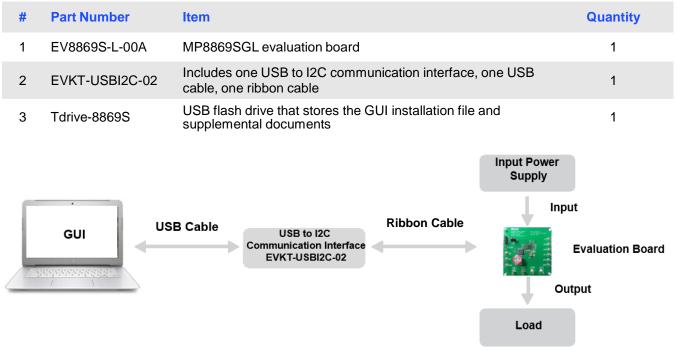


Figure 1: EVKT-8869S Evaluation Kit Set-Up



#### **Features and Benefits**

The MP8869S is highly customizable. Users can program the MP8869S 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
- 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	2.85V - 18V
Operating Input Voltage	2.85V - 18V
Output Voltage (Vout)	1V
Continuous Output Current (IOUT)	12A
Peak Output Current (Iout)	15A
Operating Systems Supported	Windows XP, 7, or later
System Requirements	Minimum 22.2MB free
GUI Software	3 Register Controls: VSEL, System1, System2
EVB Size (L x W)	8.5cm x 8.5cm



## **Section 1. Hardware Specifications**

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

The following must be minimally met to use the EVKT-8869S.

- 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 EV8869S-L-00A Specifications

The EV8869S-L-00A is an evaluation board for the MP8869SGL. For more information, please refer to the EV8869S-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 (Iour)	12A
Peak Output Current (IOUT)	15A
EVB Size (L x W)	8.5cm x 8.5cm

#### Figure 2: EV8869S-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 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.



#### Figure 3: EVKT-USBI2C-02 Communication Interface 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, dick Next. If you would like to select a different folder, di	ick 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 I<sup>2</sup>C GUI Set-Up Guide



Figure 5: MPS I<sup>2</sup>C 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.

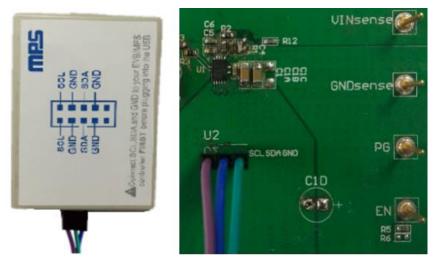


Figure 6: EVB to MPS I<sup>2</sup>C Communication Interface Wire Connection

#### 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 between 4.5V and 21V, 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 MP8869S 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).



📕 MPS	IC GUI-MP88	61 2.85V - 18V, 6A, Hi	gh-Efficiency, Wi	de-Input, Synchronous	Step-D	own C	onvert	er with	Integr	ate [	-	•
File	PartSelect	Help										
Syste	MP8843											
	MP8845				-			B				
	MP8869	11)	•		-		-					
	MP8861		•	Monolithic I	Powe	r Sys	tems	M	P88	61 II	C G	UI
	MP8869		•			-						
	MP8869	- u son sto	p 👻	SlaveAddr	65				Scan		VALI	D
	MP8868	ey 8.4A	•	olave/laal.								
	MP8867	1-14-		ReadBox								
	MP8865			System Control								
- A	MP8864			regName	D7	D6	D5	D4	D3	D2	D1	D0
	MP8846		-	VSEL	NA	NA	NA	NA	NA	NA	NA	NA
l	MP8847	Write		SysCntlreg1	NA	NA	NA	NA	NA	NA	NA	NA
		Wine		SysCntlreg2	NA	NA	NA	NA	NA	NA	NA	NA
S	ysCntireg1			Output Current	NA	NA	NA	NA	NA	NA	NA	NA
E	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 Mo	ode(1 <del>-</del>					Read	d )	E	dit Re	gs
(	OCP Mode	Hiccup Mode (1)	•									
1	Mode	Auto PFM/PWM M	ode ( 👻									
		Write										
												-
_												
Com	munication Bo	oard is Connected	EVB is Co	nnected								

Figure 7: Appearance of Address Shows Successful Connection

- If not, a warning will appear at the bottom. There are two warnings users can expect.
  - 1) "EVB is disconnected!" This means that the evaluation board is not connected (see Figure 8).
  - 2) "Communication Board is disconnected!" This means that the USB I2C communication interface is not connected.

File PartSelect System Control	Help										
SysCntlreg2			=		F	8					
PG Deglitch	24us (11) -	Monolithic	Power	r Sys	tems	MF	<b>2886</b>	69 <b>S</b>	IIC (	Gι	
Switch	500kHz (00) 👻									_	
Soft Stop	Disabled Soft Stop -	SlaveAddr	00		•	-	Scan		NVAL	ID 🗖	Invalid Slave Addr
Current Limit	LS Valley 14A 🗸										
	Write	ReadBox									
VSEL		System Control									
Reference	0.72 V 👻	regName	D7	D6	D5	D4	D3	D2	D1		
Kelerence		VSEL	NA	NA	NA	NA	NA	NA		N/	
	Write	SysCntlreg1 SysCntlreg2	NA	NA NA	NA NA	NA	NA NA	NA	NA NA	N/	
SysCntireg1		Output Current	NA	NA	NA	NA	NA	NA	NA	N/	
Enable	Enabled -	Output Voltage	NA	NA	NA	NA	NA	NA	NA	N/	
Go_Bit	Go_Bit = 0	ID1	NA	NA	NA	NA	NA	NA	NA	N/	
Slew Rate	5mV/us (100) -	Status	NA	NA	NA	NA	NA	NA	NA	N/	
OVP Mode	Auto Recovery Mode(1 -		_	_				<b>_</b>		_	
OCP Mode						Read		Ec	dit Re	qs	
Mode	Auto PFM/PWM Mode ( -										
ation	Write										
						_					
	ard is Disconnected EVB is	Disconnected	FV	'B is	Dis	conn	ect	ed			

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

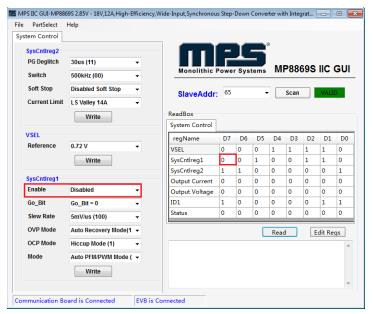


- 2. If the connection is successful, proceed to Step 3. Otherwise, check connections between the EVB, communication interface, and PC. Re-plug the USB into the computer and restart the GUI.
- 3. Click the **PartSelect** button to select the MP8869S (see Figure 7) (The default GUI window is for the MP8861). The Register Control menu will appear on the left side. I2C register values will be read and displayed on the right side after clicking the **Read** button (see Figure 9).

	Help										
ystem Control											
SysCntireg2				-	Τ,	=	v				
PG Deglitch	30us (11)	-				-					~
Switch	500kHz (00)	•	Monolithic F	Powe	r Syst	tems	IVI	P88(	95	IIC	GUI
Soft Stop	Disabled Soft Stop	•	SlaveAddr:	65		•		Scan		VALI	D
Current Limit	LS Valley 14A	•									
	Write		ReadBox								
			System Control								
VSEL			regName	D7	D6	D5	D4	D3	D2	D1	D0
Reference	0.72 V	•	VSEL	0	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	0	1	1
Slew Rate	5mV/us (100)	•	Status	0	0	0	0	0	0	0	1
OVP Mode	Auto Recovery Mode(1	•					Read	ł	E	dit Re	gs
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 All** button to update values. The changed information of the item will appear on the right side (see Figure 10).



#### 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 MP8869S's input pin has an under-voltage lockout

(UVLO) detection circuit. If the input voltage (AVIN) is lower than the UVLO rising threshold, the MP8869S's functions are disabled.

#### Shutdown Event

If the MP8869S 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 MP8869S switches to no supply state or power-off state, regardless of the current state.

#### Thermal Recovery

If the MP8869S is in a power-off state due to the die temperature exceeding the thermal protection threshold, the MP8869S 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 MP8869S enters the shutdown sequence directly.



#### Figure 11: Updating the Driver Software

USBXpress Device Prop	perties	×						
General Driver Deta	ils Events							
USBXpress [	Device							
Driver Provid	er: Silicon Laboratories Inc.							
Driver Date:	11/6/2015							
Driver Versio	n: 6.7.2.0							
Digital Signer	r: Microsoft Windows Hardware Compatibili Publisher	ty						
Driver Details	View details about the installed driver files.							
Update Driver	Update Driver Update the driver for this device.							
Roll Back Driver	If the device fails after updating the driver, r back to the previously installed driver.	oll						
Disable Device Disable the device.								
Uninstall Device	Uninstall the device from the system (Advar	iced).						
	OK Ca	ncel						

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-8869S	Complete evaluation kit
Contents of EVKT-8869S	
EV8869S-L-00A	MP8869SGL evaluation board
EVKT-USBI2C-02	Includes one USB to I2C communication interface, one USB cable, one ribbon cable
Tdrive-8869S	USB thumb drive that stores the GUI installation file and supplemental documents

Order directly from MonolithicPower.com.

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