

### DESCRIPTION

The EV8867-LE-00A is used for demonstrating the performance of MPS's MP8867. MP8867 is a highly integrated and high frequency synchronous step-down switcher with I<sup>2</sup>C control interface. It is optimized to support up to 8A load current over an input supply range from 4.5V to 17V with excellent load and line regulation.

Current-Mode operation provides fast transient response and eases loop stabilization. The reference voltage level can be controlled, on-the fly through an I<sup>2</sup>C serial interface. Reference voltage range can be adjusted from 0.6V to 1.87V in 10mV steps. Voltage scaling slew rate, enable and power saving mode are also selectable through the I<sup>2</sup>C interface. Full protection features include over voltage, hiccup over-current protection and thermal shut down.

The MP8867 is available in QFN-14(3mmx4mm) package.

### ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V <sub>IN</sub>	4.5– 17	V
Output Voltage	V <sub>OUT</sub>	1	V
Output Current	I <sub>OUT</sub>	8	A

### FEATURES

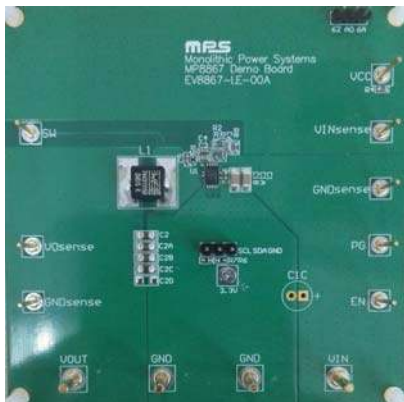
- Wide 4.5V-to-17V Operating Input Range
- 1% Internal Reference Accuracy
- I<sup>2</sup>C Programmable Reference Output Voltage
- Range from 0.6V to 1.87V in 10mV Steps with Slew Rate Control
- I<sup>2</sup>C Selectable Switching Frequency.
- 200kHz-2MHz Synchronized External Clock
- OTP, OCP Hiccup Indication Via I<sup>2</sup>C
- Selectable PSM and Fs Through I<sup>2</sup>C
- Programmable Soft Start Time
- Open-Drain Power Good Indicator
- Small 3x4mm QFN 14 Package

### APPLICATIONS

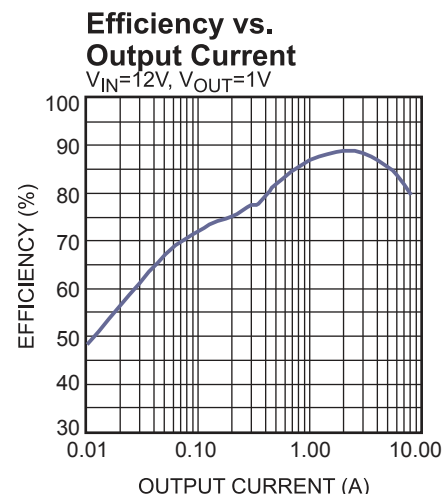
- SoC and Media Processors
- FPGA-based Systems
- ASIC Supplies
- Distributed Power Systems

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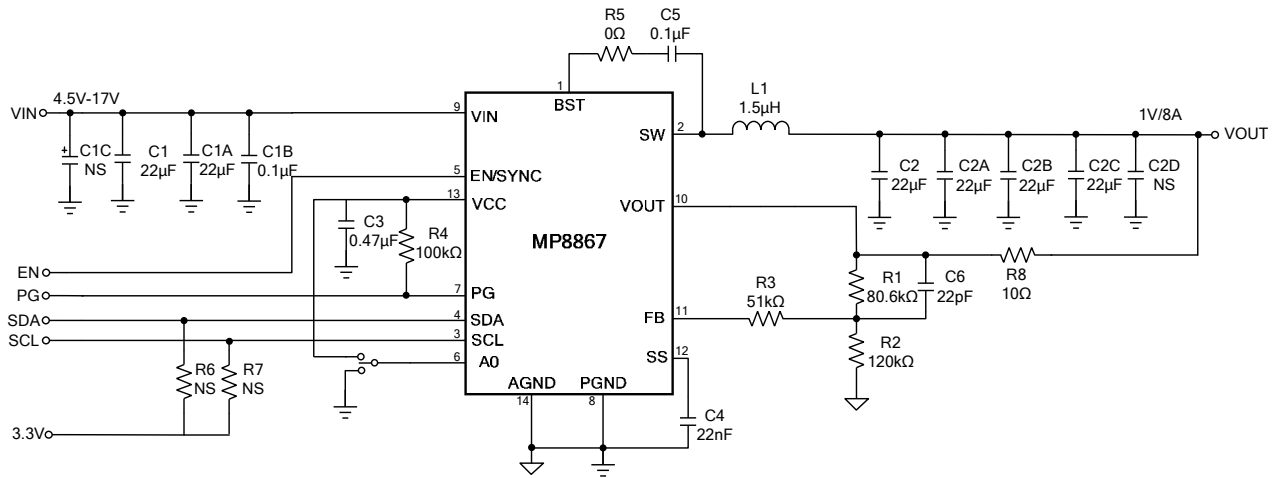
### EV8867-LE-00A EVALUATION BOARD



Board Number	MPS IC Number
EV8867-LE-00A	MP8867GLE



## EVALUATION BOARD SCHEMATIC



## EV8867-LE-00A BILL OF MATERIALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
1	R1	80.6k	Film Res,1%	0603	ROYAL	RC0603FR-0780K6L
1	R2	120k	Film Res,1%	0603	ROYAL	RL0603FR-07120KL
1	R3	51k	Film Res,1%	0603	ROYAL	RL0603FR-0751KL
1	R5	0Ω	Film Res,1%	0402	RALEC	RTT020000FTP
1	R4	100k	Film Res,1%	0603	ROYAL	RL0603FR-07100KL
2	R6, R7	NS				
1	R8	10 Ω	Film Res,1%	0603	ROYAL	RL0603FR-0710RL
2	C1B, C5	0.1µF	Ceramic Cap,25V,X7R	0603	muRata	GRM188R71E104KA01D
2	C1A, C1	22µF	Ceramic Cap,25V,X5R	1206	muRata	GRM31CR61E226KE15L
4	C2, C2A, C2B, C2C	22µF	Ceramic Cap, 25V,X5R	0805	muRata	GRM21BR61E226ME44L
2	C2D, C1C	NS				
1	C3	0.47 µF	Ceramic Cap,16V,X7R	0603	muRata	GRM188R71C474KA88D
1	C4	22nF	Ceramic Cap,16V,X7R	0603	muRata	GRM188R71C223KA01D
1	C6	22pF	Ceramic Cap,50V,C0G	0603	muRata	GRM1885C1H220JA01D
1	L1	1.5µH	IR=11A,Isat=14A, DCR=6.6m Ω	SMD	Wurth	744 311 150
1	U1	MP8867	Step-Down Converter with I2C Interface	QFN14 (3*4)	MPS	MP8867GLE

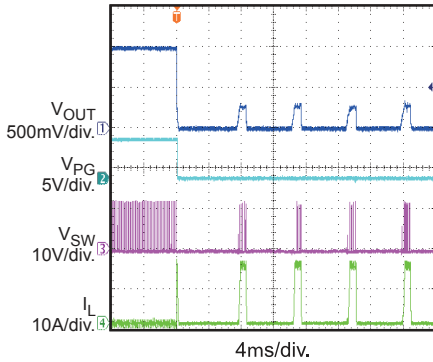
## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

V<sub>IN</sub> = 12V, V<sub>OUT</sub> = 1V, L = 1.5μH, T<sub>A</sub> = 25°C, unless otherwise noted.

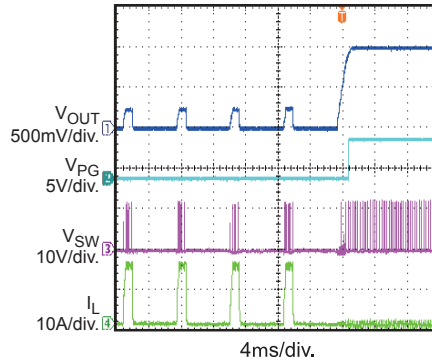
**Short Entry**

I<sub>OUT</sub> = 0A



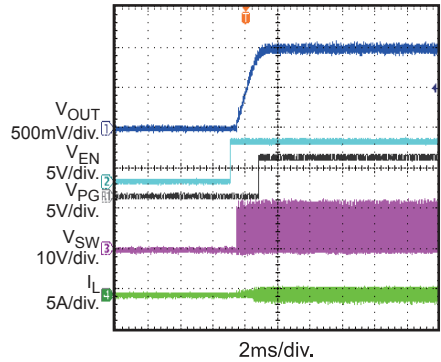
**Short Recovery**

I<sub>OUT</sub> = 0A



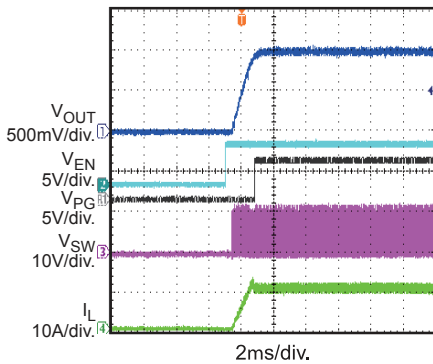
**Start-Up through Enable**

I<sub>OUT</sub> = 0A



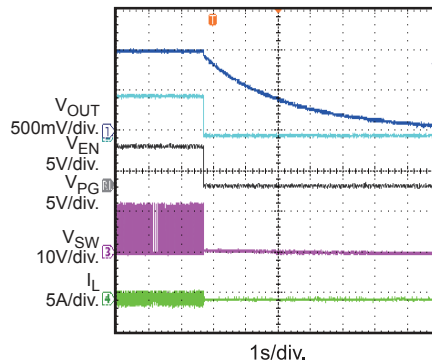
**Start-Up through Enable**

I<sub>OUT</sub> = 8A



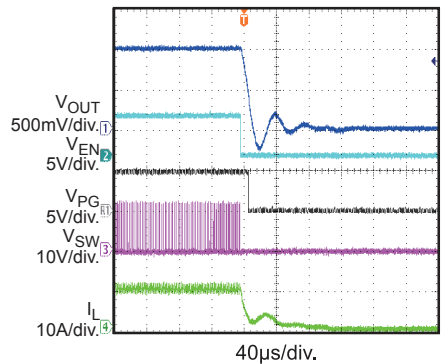
**Shutdown through Enable**

I<sub>OUT</sub> = 0A



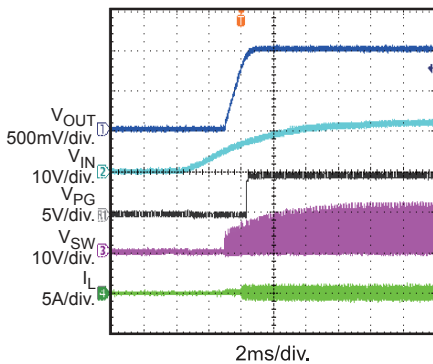
**Shutdown through Enable**

I<sub>OUT</sub> = 8A



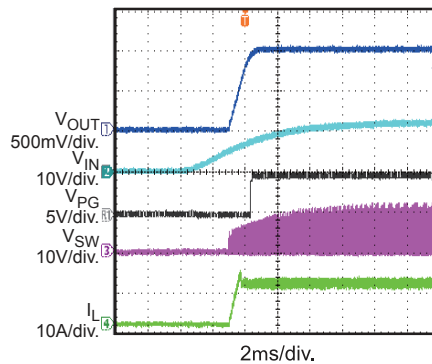
**Start-Up through Input Voltage**

I<sub>OUT</sub> = 0A



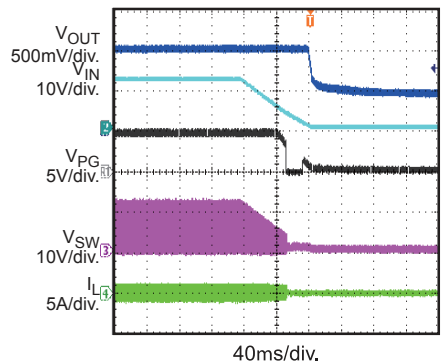
**Start-Up through Input Voltage**

I<sub>OUT</sub> = 8A



**Shutdown through Input Voltage**

I<sub>OUT</sub> = 0A



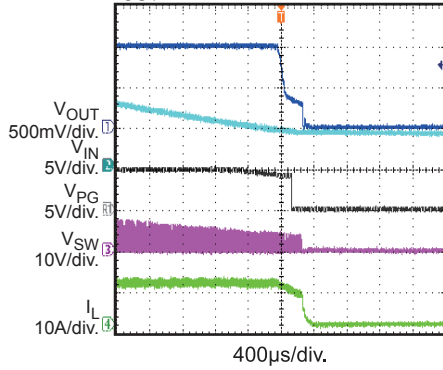
**EVB TEST RESULTS** (continued)

Performance waveforms are tested on the evaluation board.

V<sub>IN</sub> = 12V, V<sub>OUT</sub> = 1V, L = 1.5μH, T<sub>A</sub> = 25°C, unless otherwise

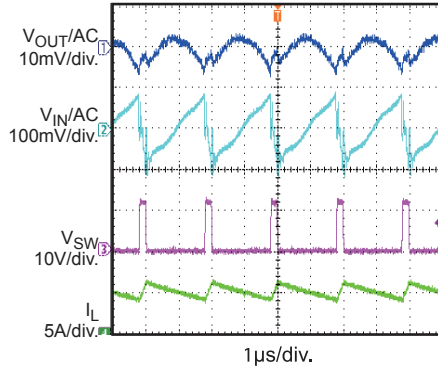
**Shutdown through Input Voltage**

I<sub>OUT</sub> = 8A



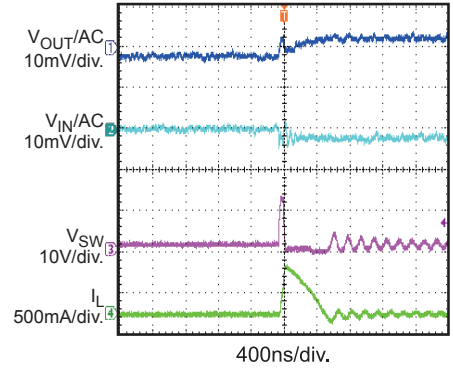
**Input/Output Ripple**

I<sub>OUT</sub> = 8A



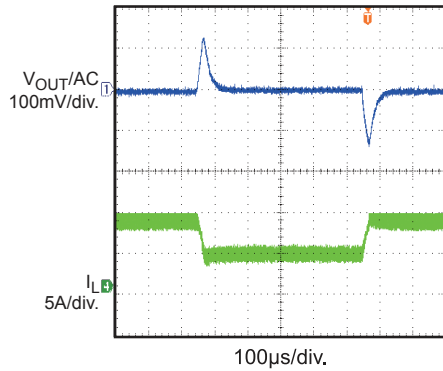
**Input/Output Ripple**

I<sub>OUT</sub> = 0A, PFM



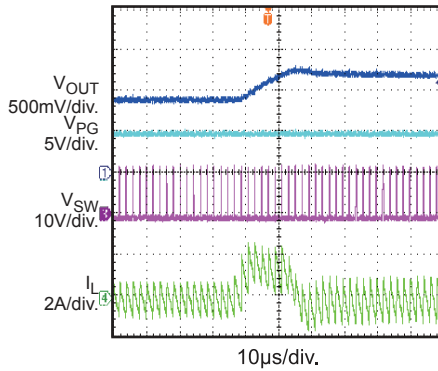
**Load Transient Response**

I<sub>OUT</sub> = 4A to 8A



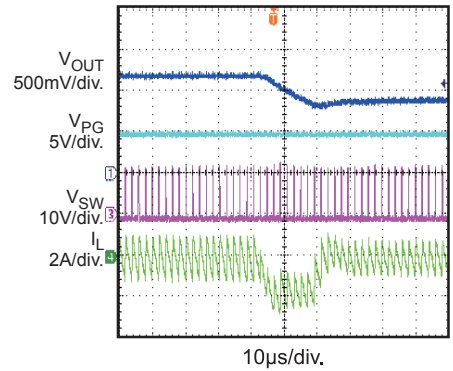
**I<sup>2</sup>C Control Slew Rate**

Slew Rate=16mV/μs, I<sub>OUT</sub> = 0A, from 0.9V to 1.2V



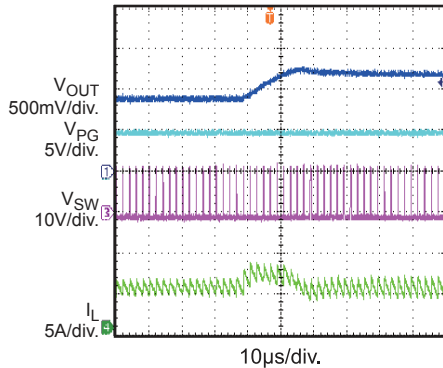
**I<sup>2</sup>C Control Slew Rate**

Slew Rate=16mV/μs, I<sub>OUT</sub> = 0A, from 1.2V to 0.9V



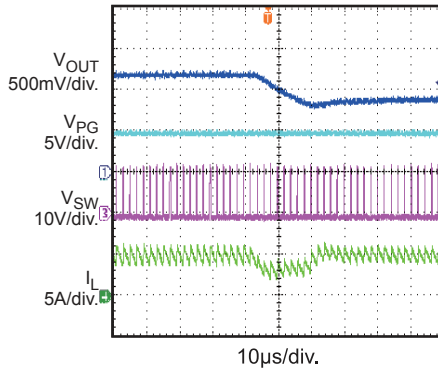
**I<sup>2</sup>C Control Slew Rate**

Slew Rate=16mV/μs, I<sub>OUT</sub> = 5A, from 0.9V to 1.2V

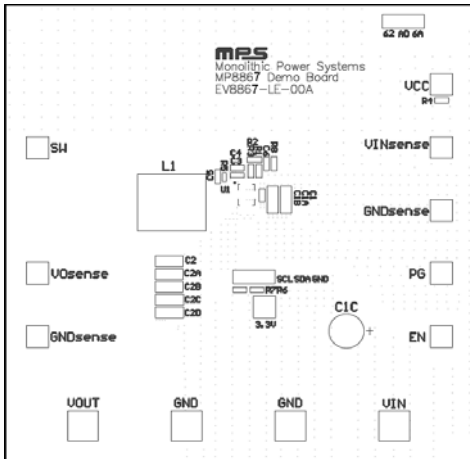


**I<sup>2</sup>C Control Slew Rate**

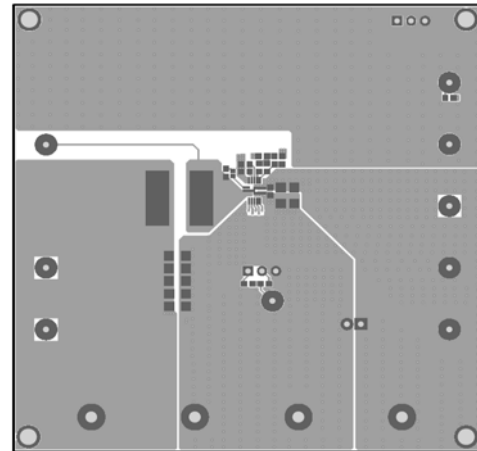
Slew Rate=16mV/μs, I<sub>OUT</sub> = 5A, from 1.2V to 0.9V



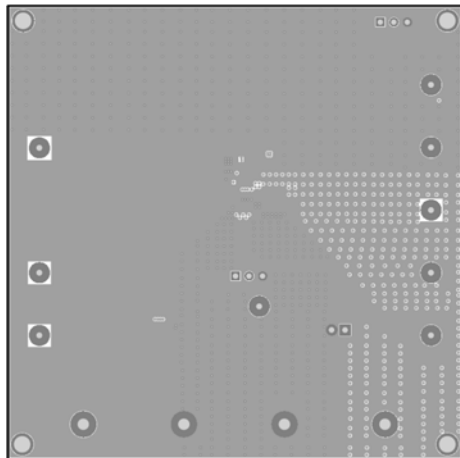
**PRINTED CIRCUIT BOARD LAYER**



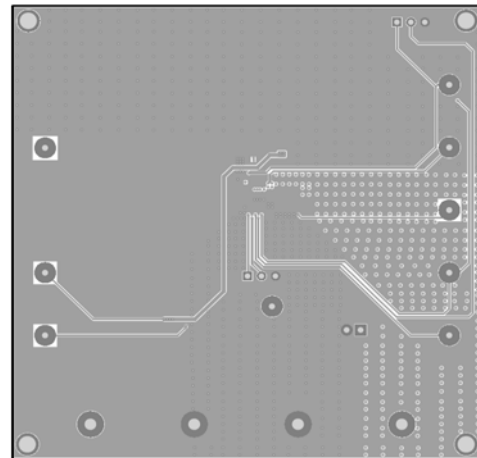
**Figure 1: Top Silk Layer**



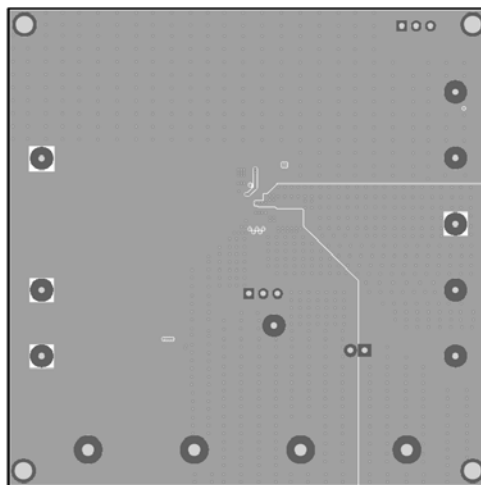
**Figure 2: Top Layer**



**Figure 3: Inner 1 Layer**



**Figure 4: Inner 2 Layer**



**Figure 5: Bottom Layer**

## QUICK START GUIDE

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 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 board will automatically start up.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.52V to turn on the regulator, or less than 1.02V to turn it off.
6. To program I<sup>2</sup>C function, connect SCL, SDA and GND to I<sup>2</sup>C start kit board. Connect I<sup>2</sup>C start kit board to computer and run MP8867 GUI software to program MP8867 I<sup>2</sup>C register.

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