

## DESCRIPTION

The MP8847 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 6A load current over an input supply range from 2.7V to 6V with excellent load and line regulation.

Constant frequency hysteretic mode provides extremely fast transient response without loop compensation and easily achieves high efficiency under light load condition.

The output voltage level can be controlled, on-the fly through a 3.4Mbps I<sup>2</sup>C serial interface. Voltage range can be adjusted from 0.6V to 1.235V in 5mV steps.

Voltage slew rate, switching frequency and power savings mode are also selectable through the I<sup>2</sup>C interface.

The MP8847 requires a minimum number of readily available standard external components and is available in the compact QFN 2mmx3mm package.

## ELECTRICAL SPECIFICATION

| Parameter      | Symbol           | Value  | Units |
|----------------|------------------|--------|-------|
| Input Voltage  | V <sub>IN</sub>  | 2.7– 6 | V     |
| Output Voltage | V <sub>OUT</sub> | 0.95   | V     |
| Output Current | I <sub>OUT</sub> | 6      | A     |

## FEATURES

- 2.7V to 6V Input Voltage Range
- Up to 6A Load Current
- Internal 35mΩ High-Side, 15mΩ Low-Side Power MOSFETs
- I<sup>2</sup>C Compatible Interface up to 3.4Mbps
- I<sup>2</sup>C Programmable Output Range from 0.6V to 1.235V in 5mV Steps
- Factory Adjustable Switching Frequency from 0.85MHz to 2.2MHz
- Power Saving Mode Selectable via I2C
- Internal 1ms Soft-Start
- Power Good Indicator
- Current Overload and Thermal Shutdown Protection
- Available in QFN 2mmx3mm package

## APPLICATIONS

- Processor Core Supply
- Micro Converter

All MPS parts are lead-free and adhere to the RoHS directive. For MPS green status, please visit MPS website under Products, Quality Assurance page.

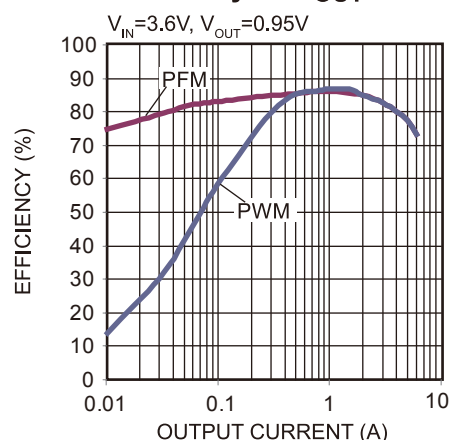
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## EV8847-D-00A EVALUATION BOARD

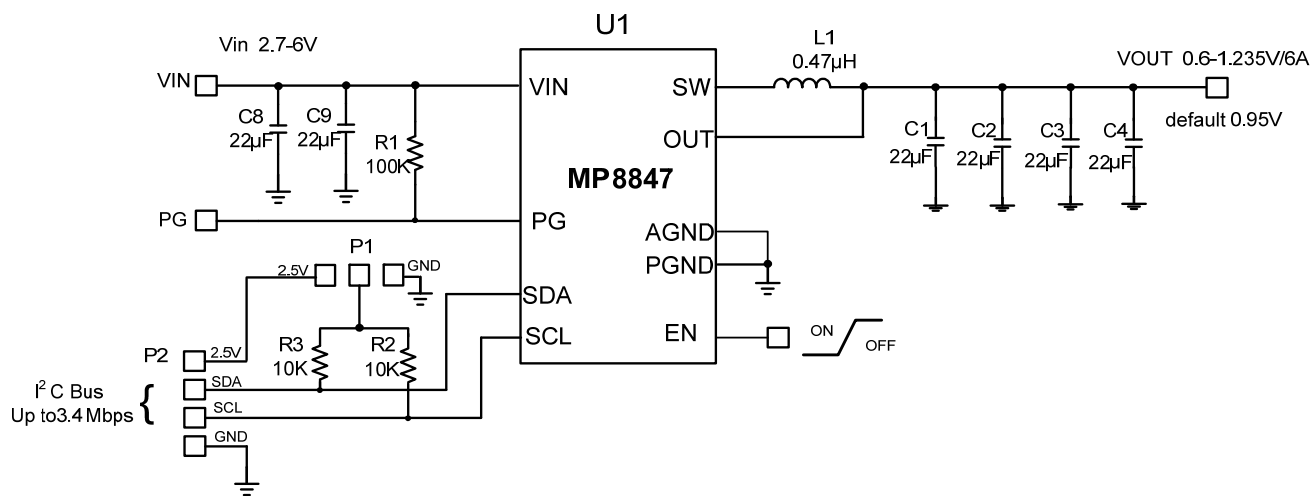


| Board Number | MPS IC Number |
|--------------|---------------|
| EV8847-D-00A | MP8847GD      |

### Efficiency Vs. I<sub>OUT</sub>



## EVALUATION BOARD SCHEMATIC



## EV8847-D-00A BILL OF MATERIALS

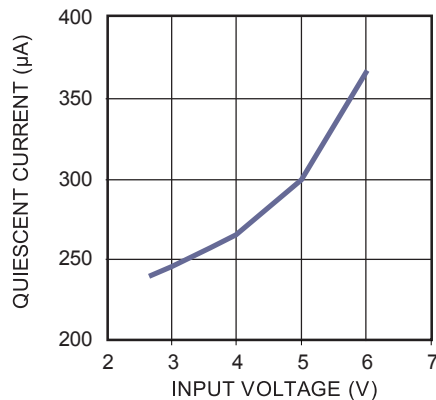
| Qty | RefDes         | Value  | Description                  | Package      | Manufacturer | Manufacturer P/N   |
|-----|----------------|--------|------------------------------|--------------|--------------|--------------------|
| 4   | C1, C2, C3, C4 | 22µF   | Ceramic Cap, 6.3V, X5R       | SM0805       | muRata       | GRM21BR60J226ME39L |
| 2   | C8, C9         | 22µF   | Ceramic Cap, 10V, X5R        | SM0603       | muRata       | GRM21BD71A226ME44L |
| 3   | C5, C6, C7     | NS     |                              |              |              |                    |
| 1   | R1             | 100k   | Film Res., 5%                | SM0603       | Any          |                    |
| 2   | R2, R3         | 10k    | Film Res., 5%                | SM0603       | Any          |                    |
| 1   | L1             | 0.47µH | Inductor IR=6.8A, Isat=14.5A | SM 4.0X4.0mm | Würth        | 744 373 240 047    |
| 1   | U1             | MP8847 | Step Down Switcher With I2C  | QFN-2mmx3mm  | MPS          | MP8847DG           |

## EVB TEST RESULTS

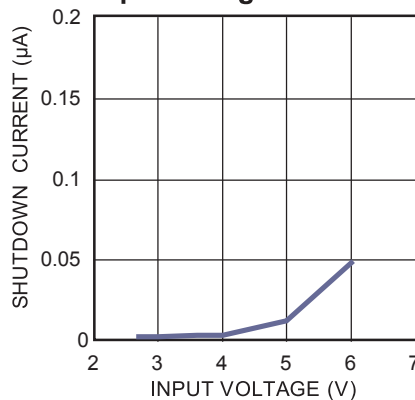
Performance waveforms are tested on the evaluation board.

$V_{IN} = 5V$ ,  $V_{OUT} = 0.95V$ ,  $L = 0.47\mu H$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

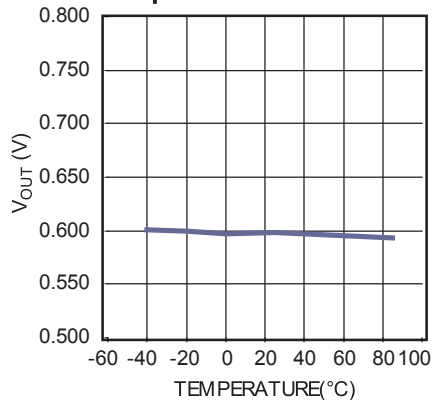
**Quiescent Current vs. Input Voltage**



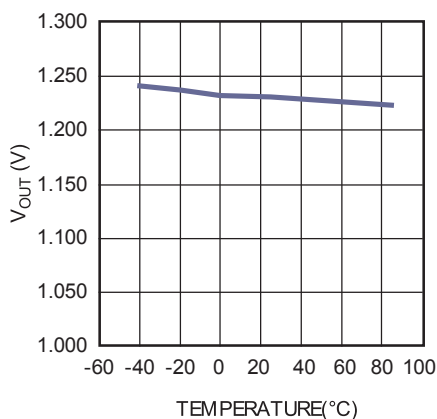
**Shutdown Current vs. Input voltage**



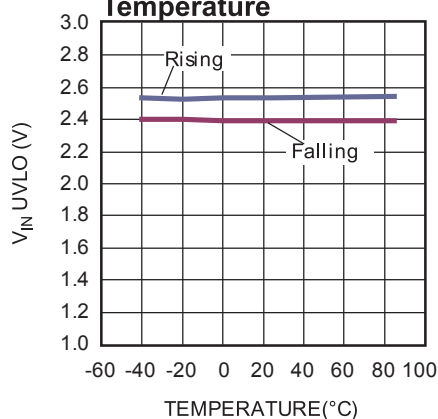
**Lowest Vout vs. Temperature**



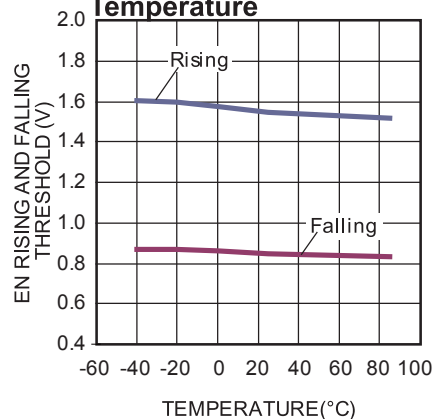
**Highest  $V_{OUT}$  vs. Temperature**



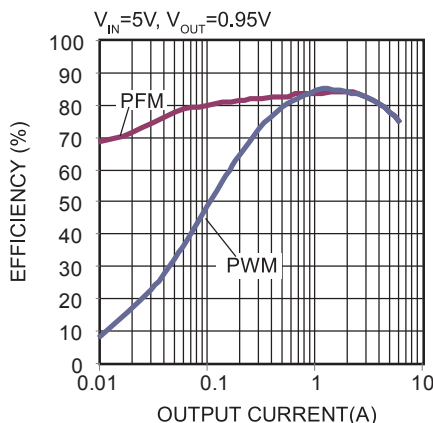
**$V_{IN}$  UVLO Rising and Falling Threshold vs. Temperature**



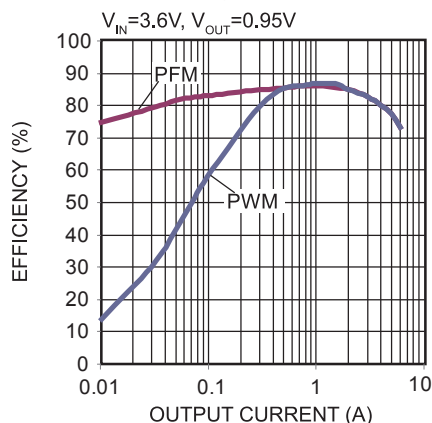
**EN Rising and Falling Threshold vs. Temperature**



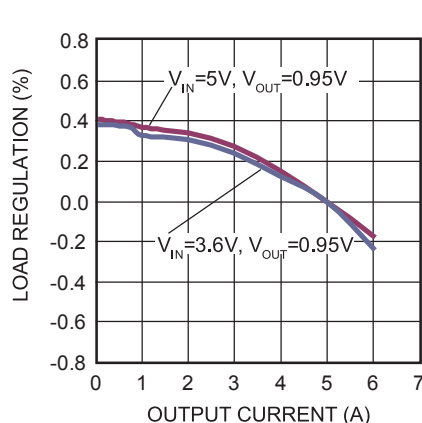
**Efficiency Vs.  $I_{OUT}$**



**Efficiency Vs.  $I_{OUT}$**



**Load Regulation Vs.  $I_{OUT}$**



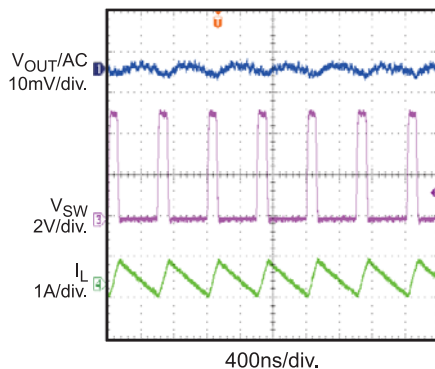
## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

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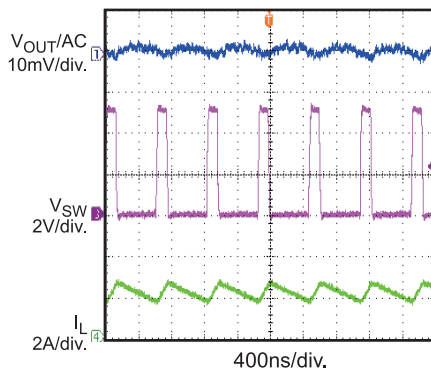
**Output Ripple**

$I_{OUT} = 0A$



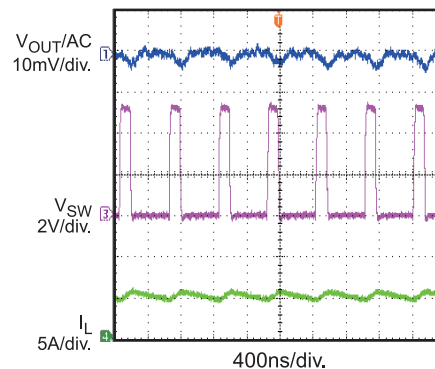
**Output Ripple**

$I_{OUT} = 2A$



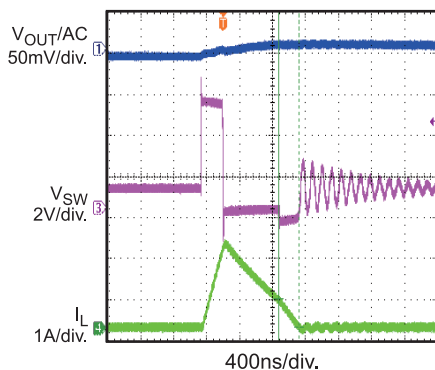
**Output Ripple**

$I_{OUT} = 5A$



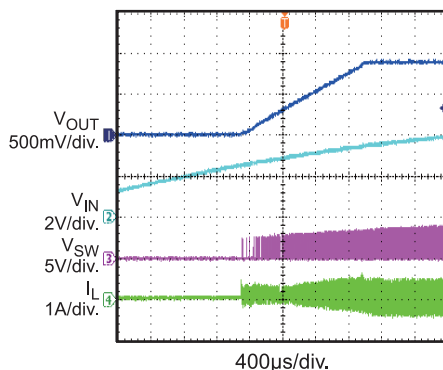
**Output Ripple**

PFM Mode



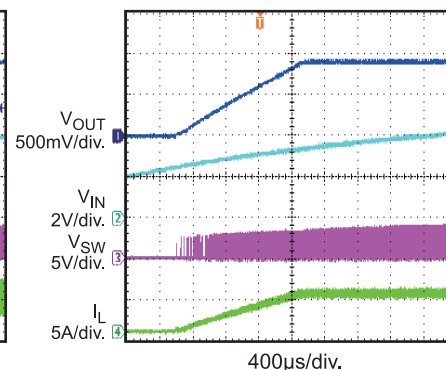
**V<sub>IN</sub> Power Up**

$I_{OUT} = 0A$



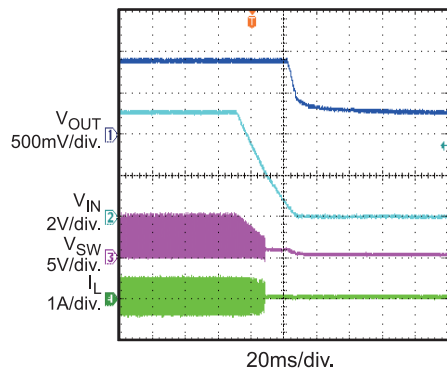
**V<sub>IN</sub> Power Up**

$I_{OUT} = 5A$



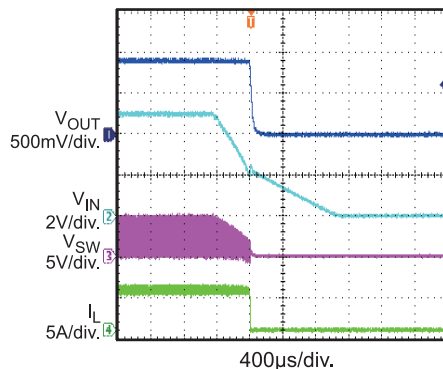
**V<sub>IN</sub> Power Down**

$I_{OUT} = 0A$



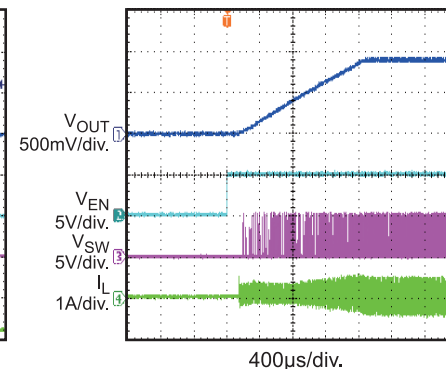
**V<sub>IN</sub> Power Down**

$I_{OUT} = 5A$



**EN On**

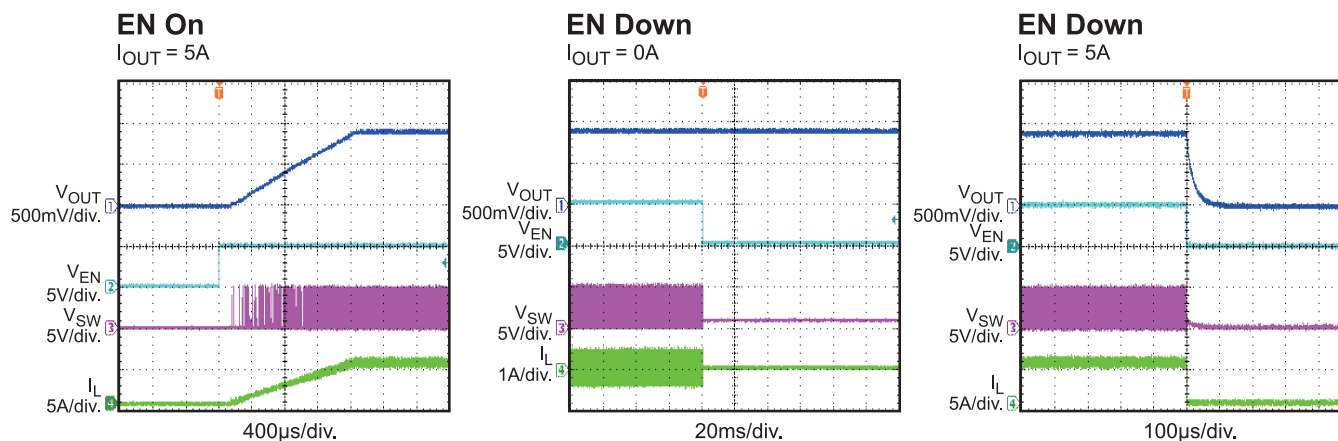
$I_{OUT} = 0A$



## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

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## PRINTED CIRCUIT BOARD LAYER

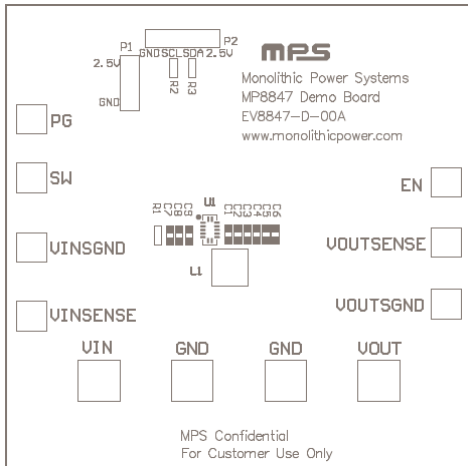


Figure 1: Top Silk Layer

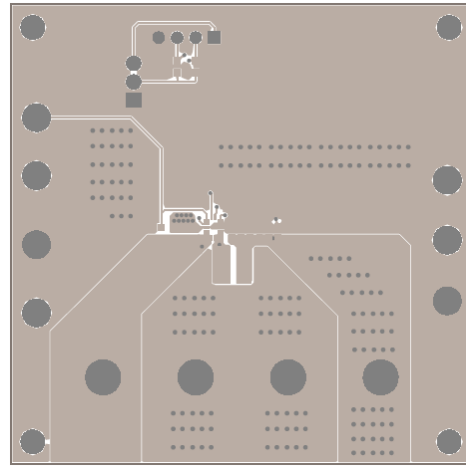


Figure 2: Top Layer

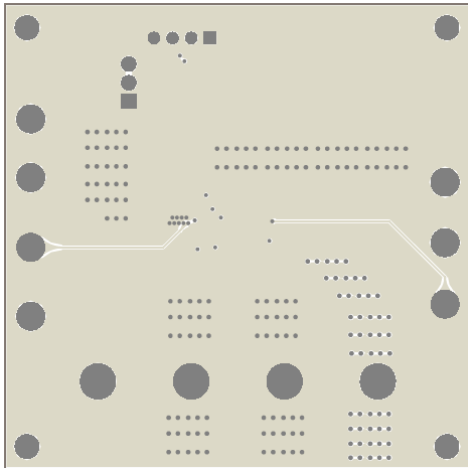


Figure 3: Internal Layer1

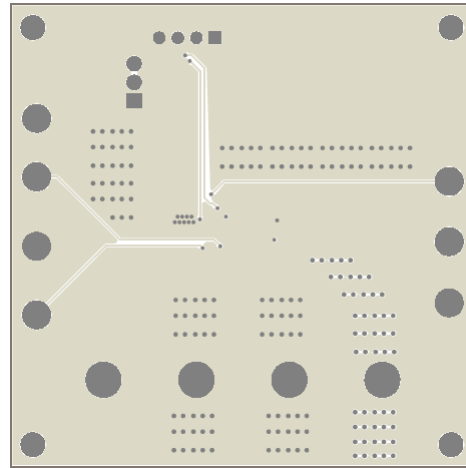


Figure 4: Internal Layer2

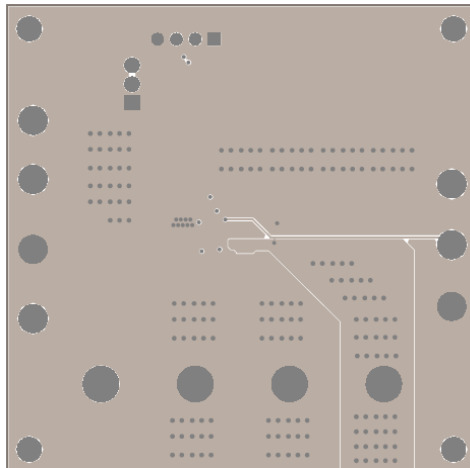


Figure 5: Bottom Layer

## 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 2.7V and 6V, 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 and make EN voltage more than threshold. The board will automatically start up.
5. Refer to MPS IIC Interface System user manual for I<sup>2</sup>C application.

## LAYOUT RECOMMENDATION OF MP8847

Proper layout of the switching power supplies is very important, and sometimes critical to make it work properly. Especially, for the high switching frequency converter, if the layout is not carefully done, the regulator could show poor line or load regulation, stability issues.

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