



# EV8833A-D-00A

## 1.5A Thermoelectric Cooler Controller Evaluation Board

### DESCRIPTION

The EV8833A-D-00A is an evaluation board for the MP8833A, a monolithic thermoelectric cooler controller with built-in internal power MOSFETs. It achieves 1.5A of continuous output current from a 2.7V to 5.5V input voltage range, with a thermoelectric cooler (TEC) voltage range. The TEC voltage is linearly controlled by the analog voltage.

Features such as TEC voltage and current limiting are controlled by the 400kHz I<sup>2</sup>C serial interface. The MP8833A is ideal for TEC device applications, such as optical laser diodes and fiber communication networks.

Full protection features include internal soft start, over-current protection (OCP), over-voltage protection (OVP), and over-temperature protection (OTP). The MP8833A is available in a space-saving QFN-16 (2mmx3mm) package.

### ELECTRICAL SPECIFICATIONS

| Parameter      | Symbol           | Value      | Units |
|----------------|------------------|------------|-------|
| Input voltage  | V <sub>IN</sub>  | 2.7 to 5.5 | V     |
| Output current | I <sub>OUT</sub> | 1.5        | A     |

### FEATURES

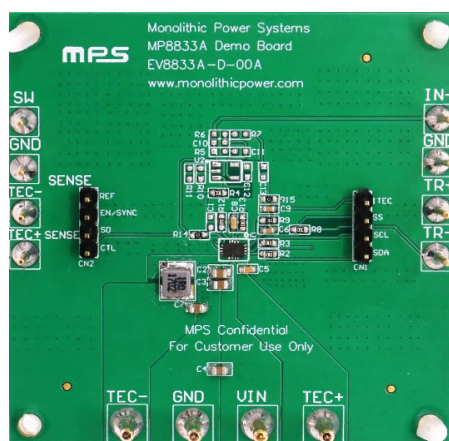
- 1% 2.5V REF Accuracy
- Wide 2.7V to 5.5V Operating Input Range
- Up to 1.5A TEC Current
- High-Accuracy TEC Current Monitor
- One-Time Programmable Frequency
- 30mΩ Internal MOSFETs for PWM Switches and Linear Switches
- Default 1MHz Switching Frequency
- External SYNC Function
- EN/SD for Power Sequencing
- Available in a QFN-16 (2mmx3mm) Package

### APPLICATIONS

- Optical Laser Diode Modules
- Fiber Communication Networks
- Required TEC Device Applications

All MPS parts are lead-free, halogen-free, and adhere to the RoHS directive. For MPS green status, please visit the MPS website under Quality Assurance. "MPS", the MPS logo, and "Simple, Easy Solutions" are registered trademarks of Monolithic Power Systems, Inc. or its subsidiaries.

### EVALUATION BOARD

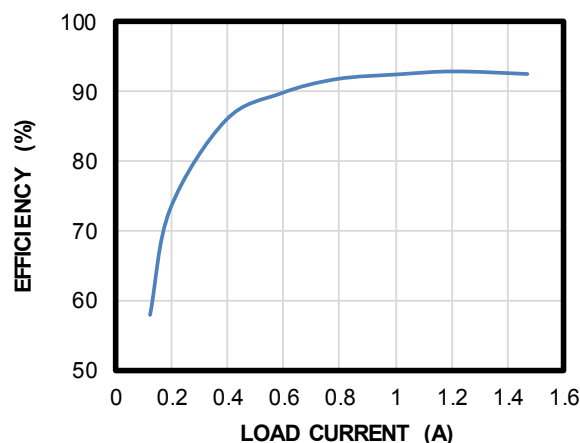


(LxWxH) 6.3cmx6.3cmx2.0cm

| Board Number  | MPS IC Number |
|---------------|---------------|
| EV8833A-D-00A | MP8833AGD     |

### Efficiency vs. ITEC

V<sub>IN</sub> = 3.3V, load = 2Ω



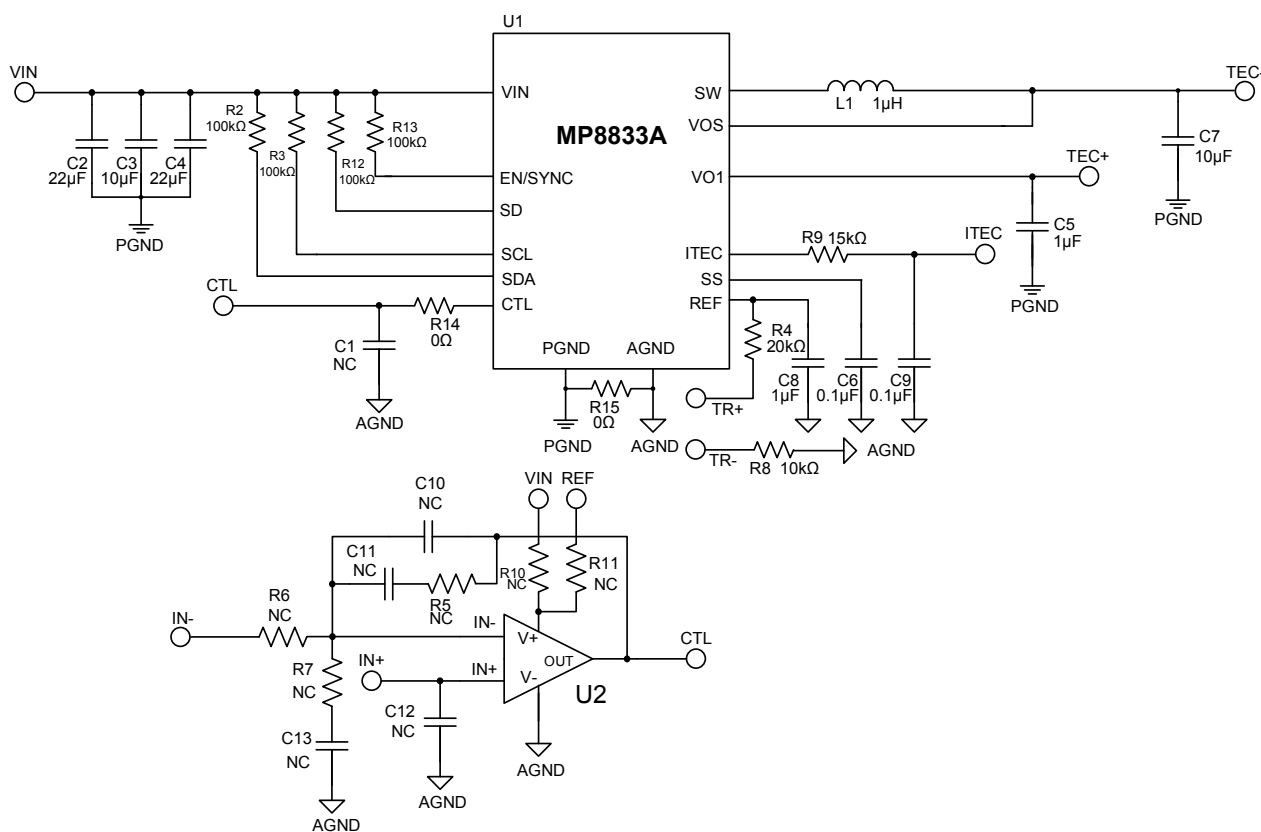
## QUICK START GUIDE

The EV8833A-D-00A can work with the EV8833-Base-00A to get a closed-loop system. Refer to the MP8833A and EV8833-Base-Board datasheets for more details.

To operate the EV8833A-D-00A in open loop operation, follow the steps below:

1. Preset the power supply ( $V_{IN}$ ) between 2.7V and 5.5V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
  - a. Positive (+): VIN
  - b. Negative (-): GND
4. Connect the load to:
  - a. Positive (+): TEC+
  - b. Negative (-): TEC-
5. Turn the power supply on after making the connections. The board should start up automatically.
6. To adjust the TEC voltage and direction, connect the CTL pin to a voltage between 0V and 5V.

## EVALUATION BOARD SCHEMATIC



**Figure 1: Typical Application Circuit for the MP8833AGD**

**BILL OF MATERIALS**

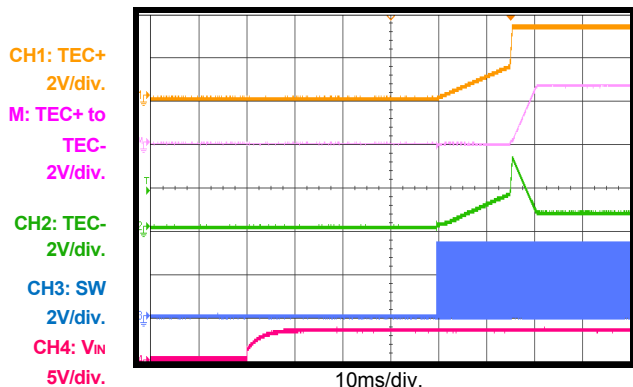
| Qty | Ref                    | Value   | Description                                               | Package          | Manufacturer | Manufacturer P/N   |
|-----|------------------------|---------|-----------------------------------------------------------|------------------|--------------|--------------------|
| 2   | C6, C9                 | 100nF   | Ceramic capacitor, 25V, X7R                               | 0603             | Murata       | GRM188R71E104KA01D |
| 2   | C3, C7                 | 10μF    | Ceramic capacitor, 25V, X7S                               | 0805             | Murata       | GRM21BC71E106KE11L |
| 2   | C2, C4                 | 22μF    | Ceramic capacitor, 25V, X5R                               | 0805             | Murata       | GRM21BR61E226ME44L |
| 2   | C5, C8                 | 1μF     | Ceramic capacitor, 25V, X7R                               | 0603             | Murata       | GRM188R71E105KA12D |
| 4   | R2, R3, R12, R13       | 100kΩ   | Film resistor, 1%, 0603, 100kΩ                            | 0603             | Yageo        | RC0603FR-07100KL   |
| 1   | R9                     | 15kΩ    | Film resistor, 1%, 0603, 15kΩ                             | 0603             | Yageo        | RC0603FR-0715KL    |
| 2   | R14, R15               | 0Ω      | Film resistor, 1%, 0603, 0R                               | 0603             | Yageo        | RC0603FR-070RL     |
| 1   | L1                     | 1μH     | Inductor, R <sub>DC</sub> = 27mΩ, I <sub>SAT</sub> = 9.0A | 4020             | Würth        | 74437324010        |
| 1   | R4                     | 20kΩ    | Film resistor, 1%, 0603, 20kΩ                             | 0603             | Yageo        | RC0603FR-0720KL    |
| 1   | R8                     | 10kΩ    | Film resistor, 1%, 0603, 10kΩ                             | 0603             | Yageo        | RC0603FR-0710KL    |
| 1   | U1                     | MP8833A | 1.5A thermoelectric cooler controller                     | QFN-16 (2mmx3mm) | MPS          | MP8833AGD          |
| 0   | C1, C10, C11, C12, C13 | NC      |                                                           |                  |              |                    |
| 0   | R5, R6, R7, R10, R11   | NC      |                                                           |                  |              |                    |
| 0   | U2                     | NC      |                                                           |                  |              |                    |

## EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board.  $V_{IN} = 3.3V$ ,  $L = 1\mu H$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

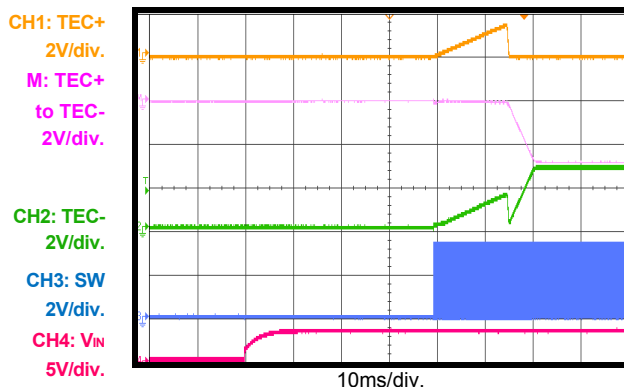
### VIN Start-Up

$V_{IN} = 3.3V$ , cooling,  $I_{OUT} = 0A$



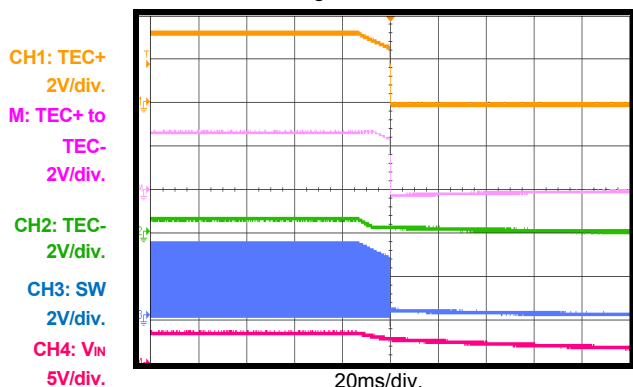
### VIN Start-Up

$V_{IN} = 3.3V$ , heating,  $I_{OUT} = 0A$



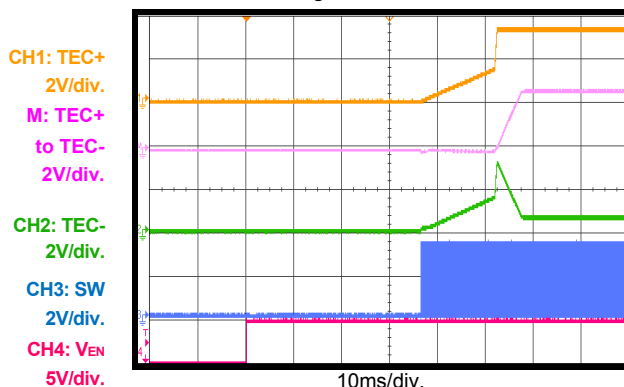
### VIN Shutdown

$V_{IN} = 3.3V$ , cooling,  $I_{OUT} = 0A$



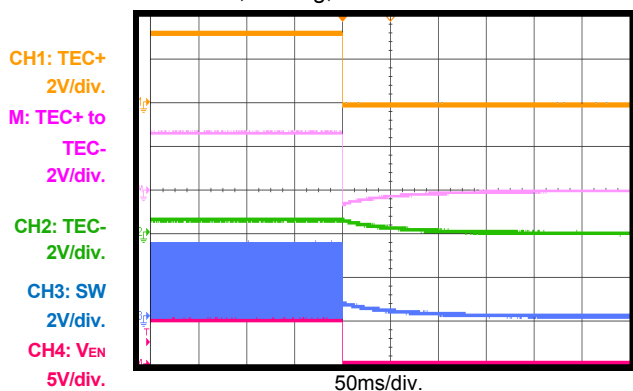
### EN Start-Up

$V_{IN} = 3.3V$ , cooling,  $I_{OUT} = 0A$



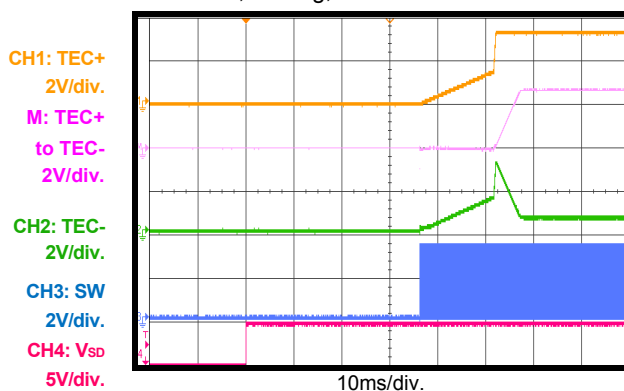
### EN Shutdown

$V_{IN} = 3.3V$ , cooling,  $I_{OUT} = 0A$



### SD Start-Up

$V_{IN} = 3.3V$ , cooling,  $I_{OUT} = 0A$

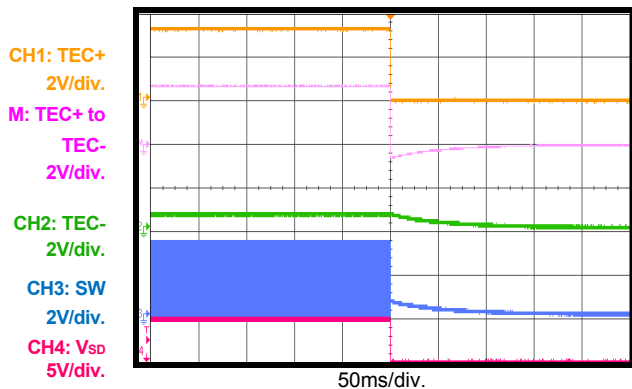


## EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board.  $V_{IN} = 3.3V$ ,  $L = 1\mu H$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

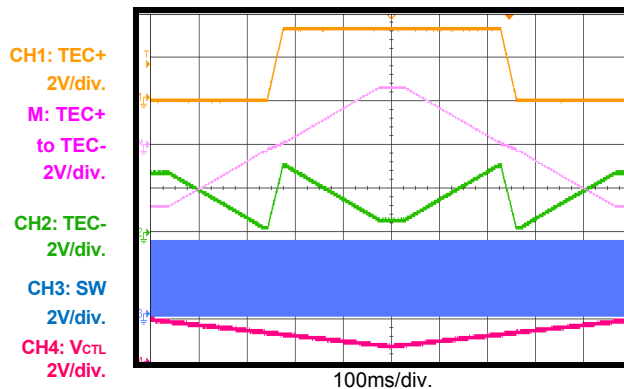
### SD Shutdown

$V_{IN} = 3.3V$ , cooling,  $I_{OUT} = 0A$

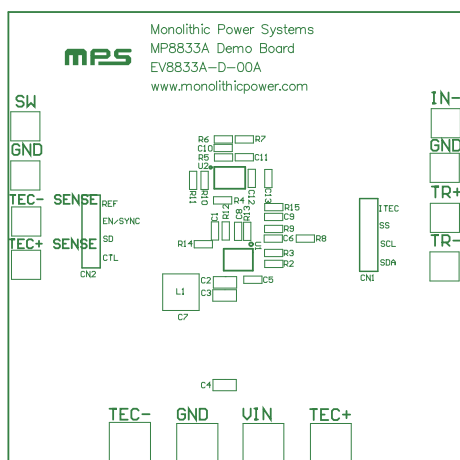


### CTL Transient

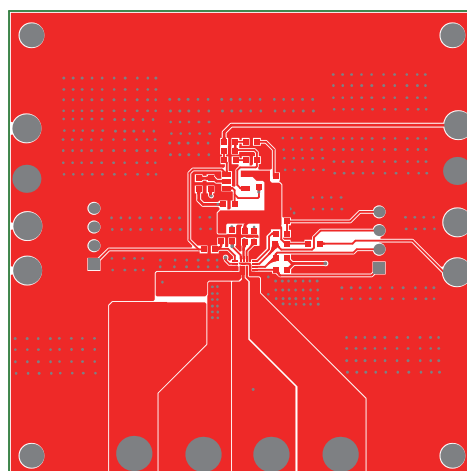
$V_{IN} = 3.3V$ ,  $I_{OUT} = 0A$



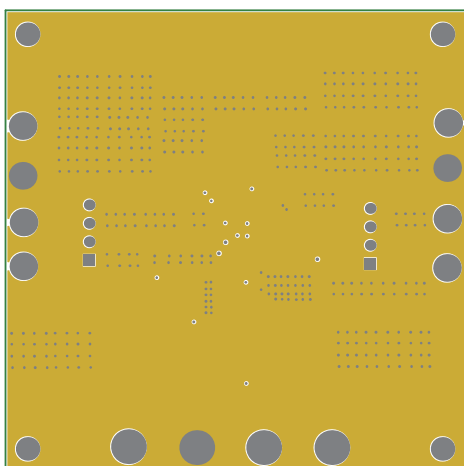
## PCB LAYOUT



### Figure 2: Top Silk Layer



### Figure 3: Top Layer



### Figure 4: Mid-Layer 1

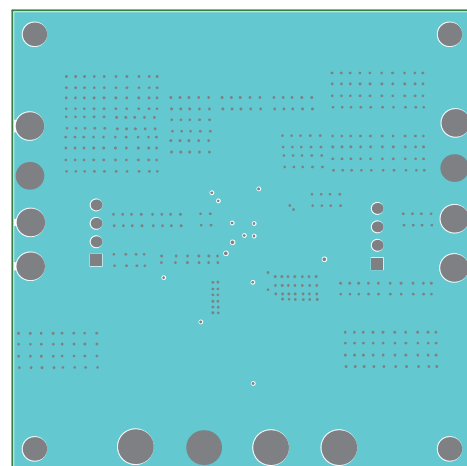
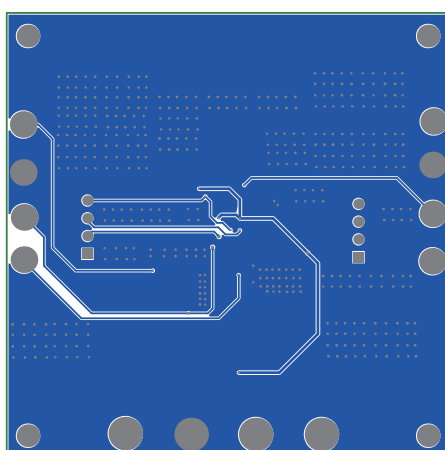


Figure 5: Mid-Layer 2



### Figure 6: Bottom Layer

**Notice:** The information in this document is subject to change without notice. Please contact MPS for current specifications. Users should warrant and guarantee that third-party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS will not assume any legal responsibility for any said applications.