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^2C 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_{IN}	2.7 to 5.5	V
Output current	I_{OUT}	1.5	A

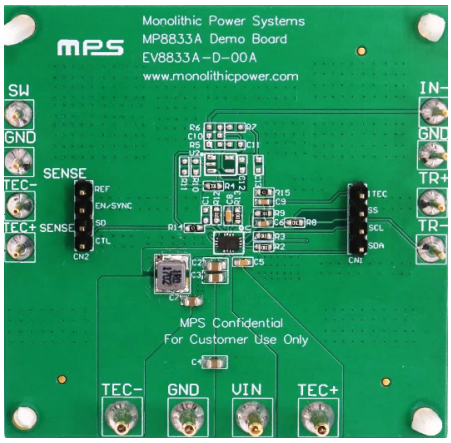
FEATURES

- 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

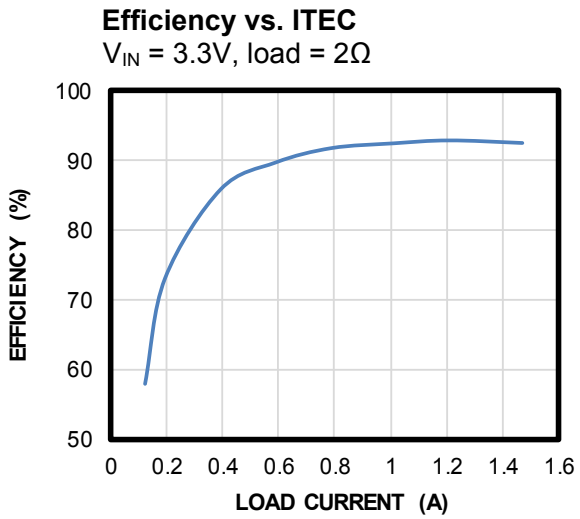
- Optical Laser Diode Modules
- Fiber Communication Networks
- Required TEC Device Applications

EVALUATION BOARD



(LxWxH) 6.3cmx6.3cmx2.0cm

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



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

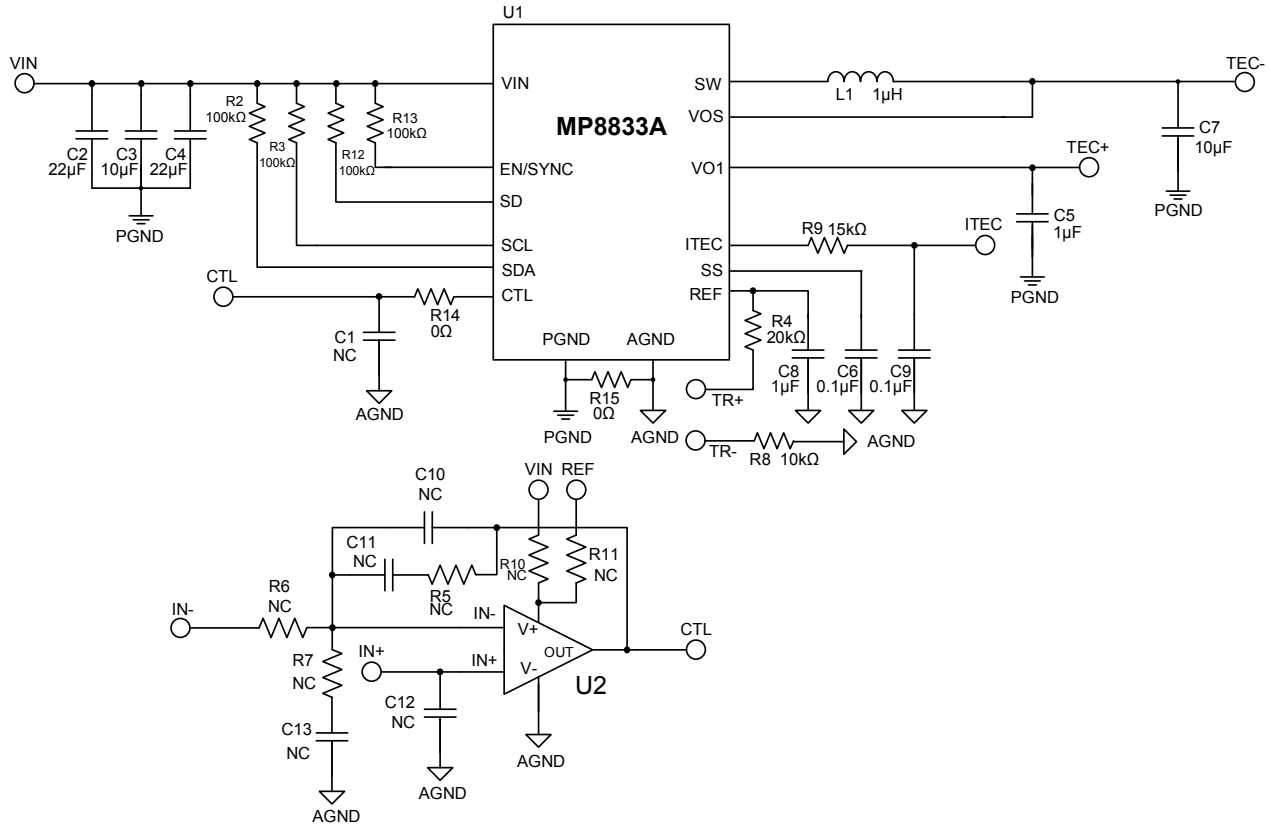


Figure 1: Typical Application Circuit for the MP8833AGD

BILL OF MATERIALS

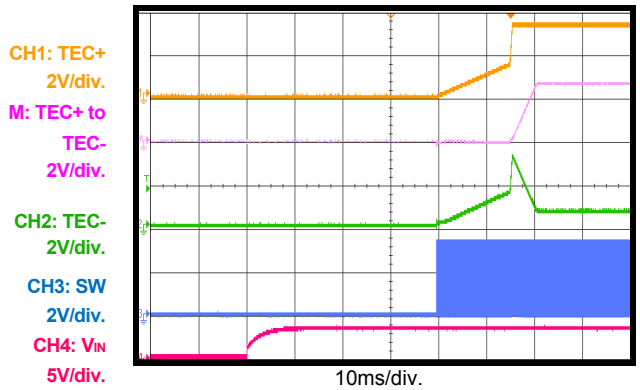
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C6, C9	100nF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E104KA01D
2	C3, C7	10µF	Ceramic capacitor, 25V, X7S	0805	Murata	GRM21BC71E106KE11L
2	C2, C4	22µF	Ceramic capacitor, 25V, X5R	0805	Murata	GRM21BR61E226ME44L
2	C5, C8	1µF	Ceramic 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_{DC} = 27mΩ, I_{SAT} = 9.0A	4020	Wurth	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 = 1μH, C_{OUT} = 10μF, T_A = 25°C, unless otherwise noted.

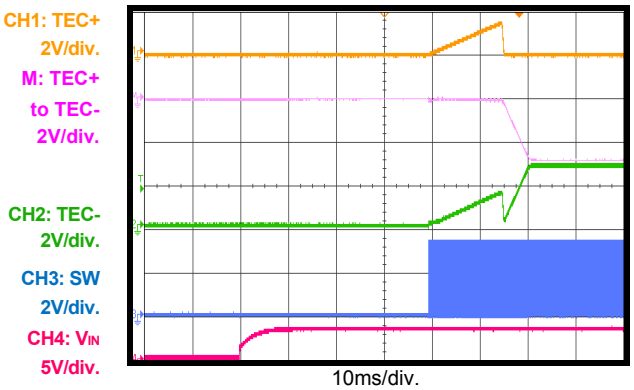
VIN Start-Up

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



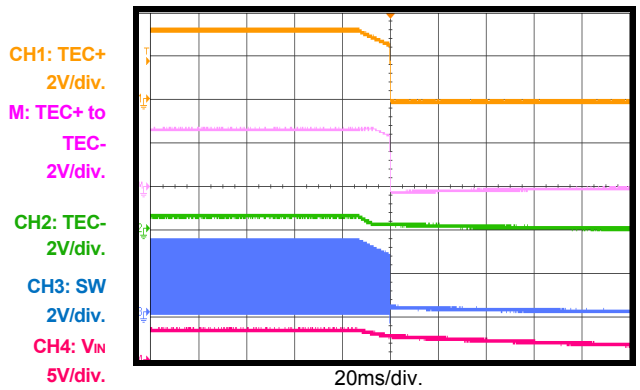
VIN Start-Up

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



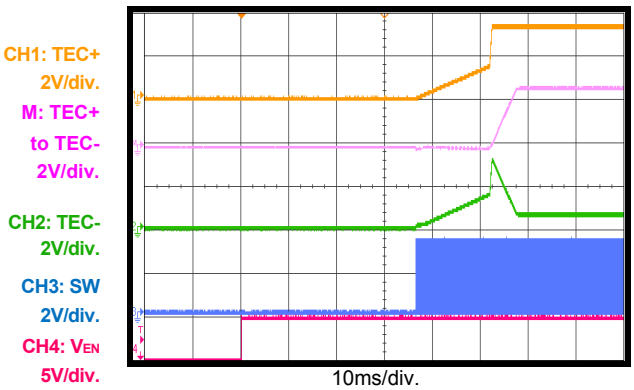
VIN Shutdown

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



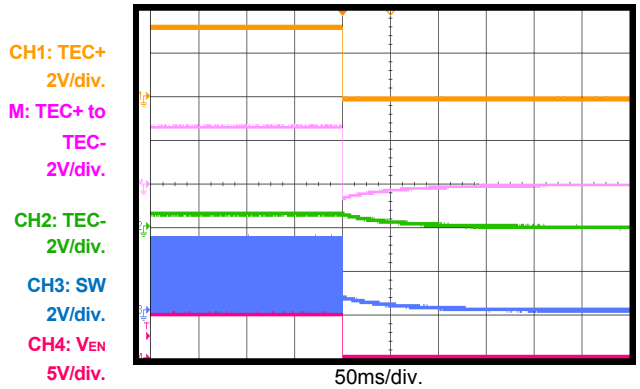
EN Start-Up

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



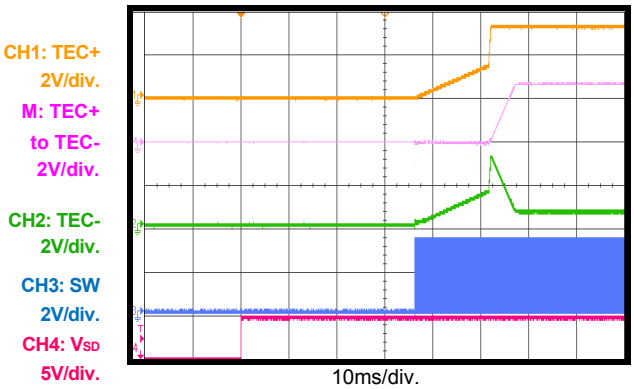
EN Shutdown

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



SD Start-Up

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

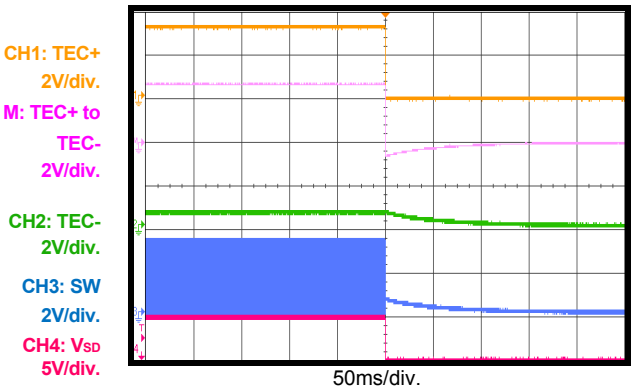


EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 3.3V, L = 1µH, C_{OUT} = 10µF, T_A = 25°C, unless otherwise noted.

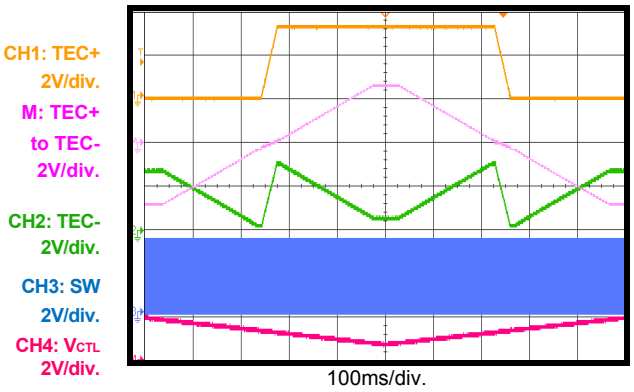
SD Shutdown

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



CTL Transient

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



PCB LAYOUT

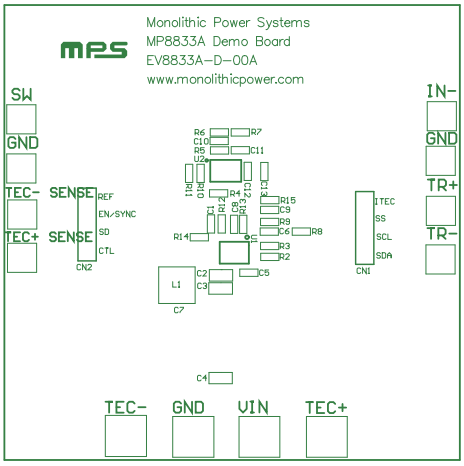


Figure 2: Top Silk Layer

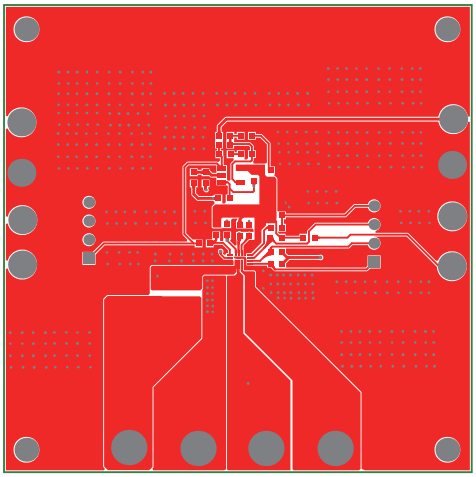


Figure 3: Top Layer

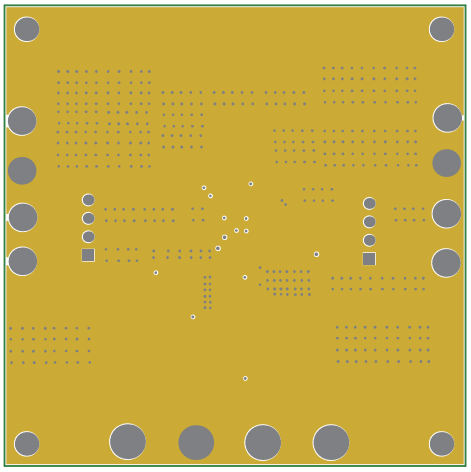


Figure 4: Mid-Layer 1

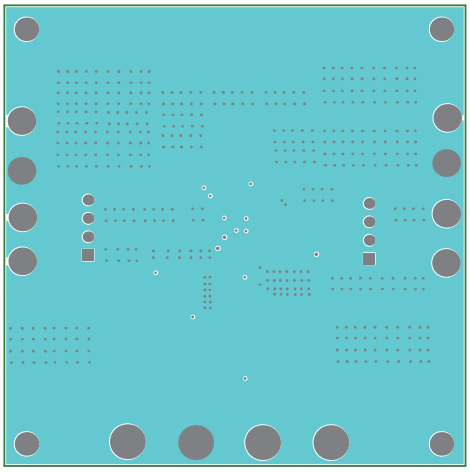


Figure 5: Mid-Layer 2

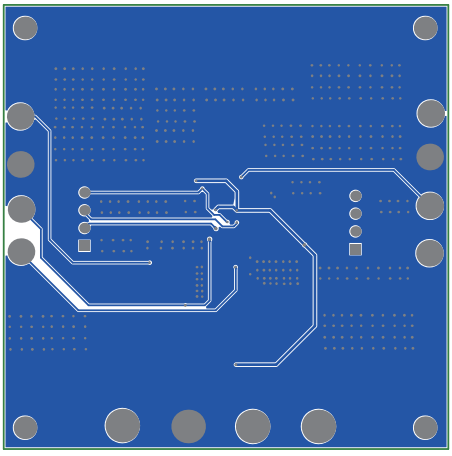


Figure 6: Bottom Layer