

## DESCRIPTION

The MP8833 is a monolithic thermoelectric cooler controller with built-in internal power MOSFETs. It achieves 1.5A continuous output current from a 2.7V-to-5.5V input voltage with TEC voltage range. The TEC voltage is linear controlled by an analog voltage.

The features such as TEC voltage/current limit, can be controlled on-the fly through a 3.4Mbps I<sup>2</sup>C serial interface. This brings minimum external components. Combined with a QFN package, the minimum solution size is obtained. Fully protection features includes internal soft start, over current/voltage protection and over temperature protection.

The MP8833 is ideal for TEC device application such as an optical laser diode, fiber communication network.

## ELECTRICAL SPECIFICATION

| Parameter      | Symbol           | Value    | Units |
|----------------|------------------|----------|-------|
| Input Voltage  | V <sub>IN</sub>  | 2.7– 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
- TEC Current Monitor
- 30mΩ and 30mΩ Internal PWM MOSFET Switches
- 30mΩ and 30mΩ Internal Linear MOSFET Switches
- Default 1MHz Switching Frequency
- External SYNC Function
- EN/SD for Power Sequencing
- Available in QFN (2mmx 3mm)Package

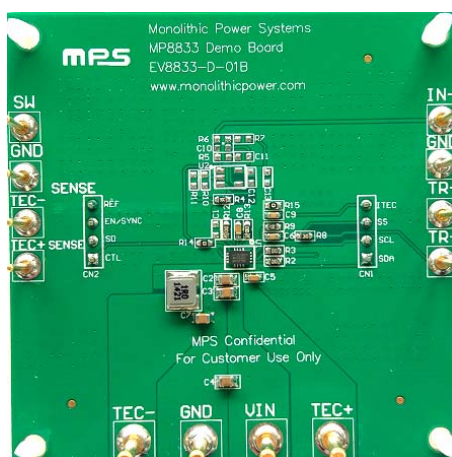
## APPLICATIONS

- Optical laser diode module
- Fiber Communication network
- Require TEC device application

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.

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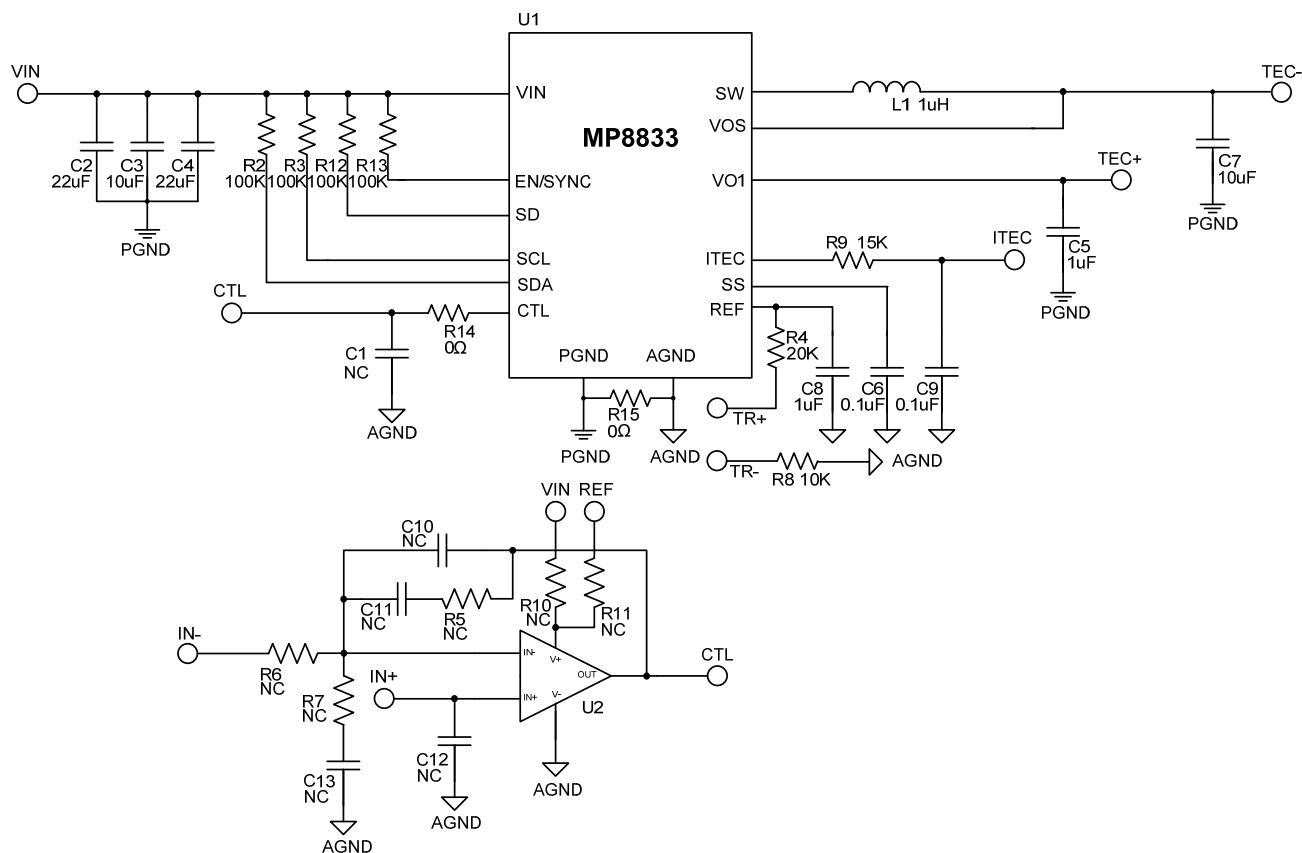
## TYPICAL APPLICATION



(L x W x H) 6.3cm x 6.3cm x 2.0cm

| Board Number | MPS IC Number |
|--------------|---------------|
| EV8833-D-01B | MP8833GD      |

## EVALUATION BOARD SCHEMATIC



**Figure1—Typical Application Circuit for MP8833GD**

## EV8833-D-01B BILL OF MATERIALS

| Qty | RefDes                       | Value  | Description                              | Package | Manufacturer | Manufacturer P/N   |
|-----|------------------------------|--------|------------------------------------------|---------|--------------|--------------------|
| 2   | C6, C9                       | 100nF  | Ceramic Cap.,25V,X7R                     | 0603    | Murata       | GRM188R71E104KA01D |
| 2   | C3, C7                       | 10uF   | Ceramic Cap.,25V,X7S                     | 0805    | Murata       | GRM21BC71E106KE11L |
| 2   | C2, C4                       | 22uF   | Ceramic Cap.,25V,X5R                     | 0805    | Murata       | GRM21BR61E226ME44L |
| 2   | C5, C8                       | 1uF    | Ceramic Cap.,25V,X7R                     | 0603    | Murata       | GRM188R71E105KA12D |
| 4   | R2, R3,<br>R12, R13          | 100k   | Film Res,1%,0603,100K                    | 0603    | YAGEO        | RC0603FR-07100KL   |
| 1   | R9                           | 15k    | Film Res,1%,0603,15K                     | 0603    | YAGEO        | RC0603FR-0715KL    |
| 2   | R14, R15                     | 0R     | Film Res,1%,0603,0R                      | 0603    | YAGEO        | RC0603FR-070RL     |
| 1   | L1                           | 1uH    | Inductor,RDC=27mOhm,Isat=9<br>.0A        | 4020    | WE           | 74437324010        |
| 1   | R4                           | 20k    | Film Res,1%,0603,20K                     | 0603    | YAGEO        | RC0603FR-0720KL    |
| 1   | R8                           | 10k    | Film Res,1%,0603,10K                     | 0603    | YAGEO        | RC0603FR-0710KL    |
| 1   | U1                           | MP8833 | 1.5A Thermoelectric Cooler<br>Controller | QFN-16  | MPS          | MP8833GD           |
| 0   | C1, C10,<br>C11, C12,<br>C13 | NC     |                                          |         |              |                    |
| 0   | R5, R6,<br>R7, R10,<br>R11   | NC     |                                          |         |              |                    |
| 0   | U2                           | NC     |                                          |         |              |                    |

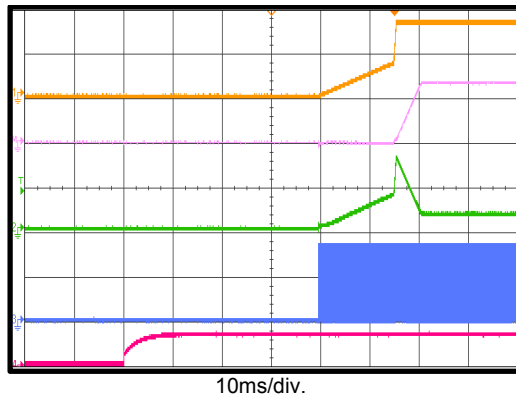
## TYPICAL PERFORMANCE CHARACTERISTICS(continued)

$V_{IN} = 3.3V$ ,  $L = 1\mu H$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = +25^\circ C$ , unless otherwise noted.

### VIN Start-Up

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

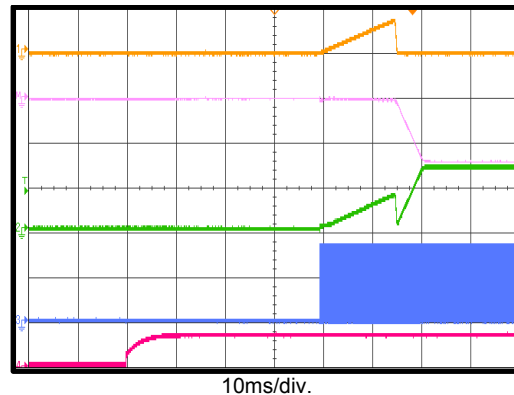
CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{IN}$   
5V/div.



### VIN Start-Up

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

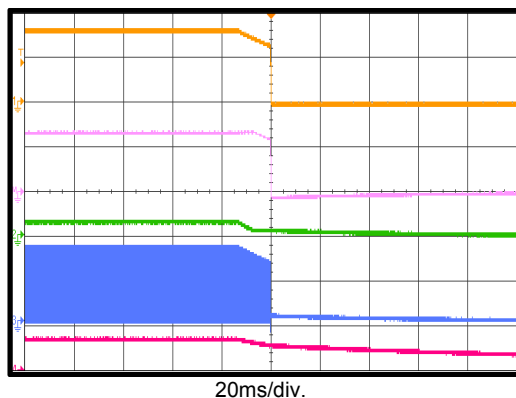
CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{IN}$   
5V/div.



### VIN Shutdown

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

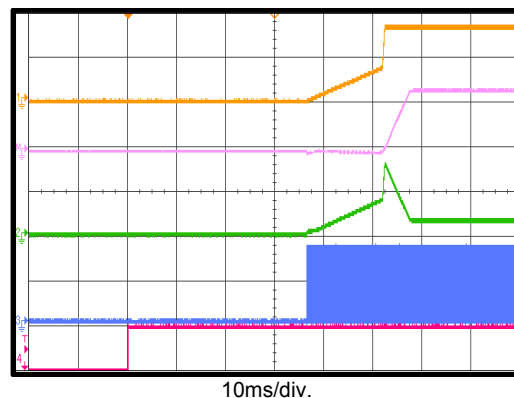
CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{IN}$   
5V/div.



### EN Start-Up

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

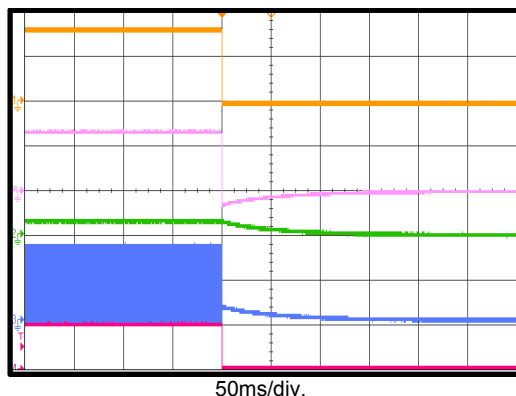
CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{EN}$   
5V/div.



### EN Shutdown

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

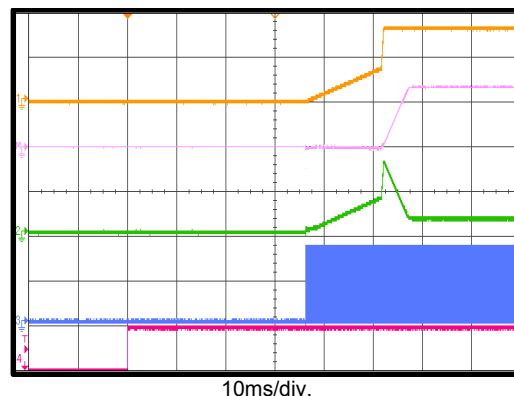
CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{EN}$   
5V/div.



### SD Start-Up

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

CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{SD}$   
5V/div.



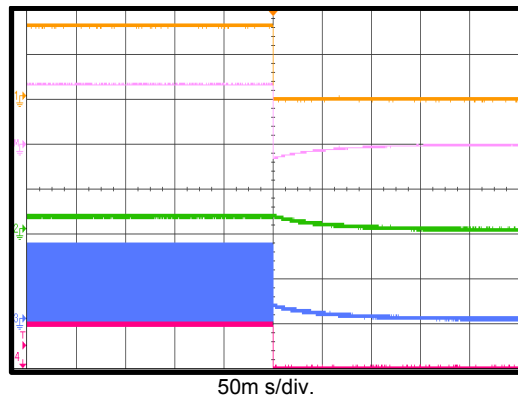
## TYPICAL PERFORMANCE CHARACTERISTICS(continued)

$V_{IN} = 3.3V$ ,  $L = 1\mu H$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = +25^\circ C$ , unless otherwise noted.

### SD Shutdown

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

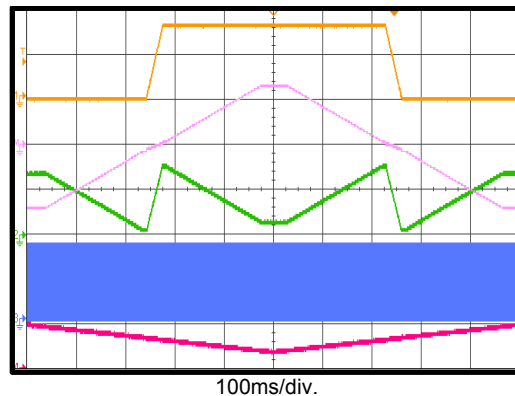
CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{SD}$   
5V/div.



### CTL Transient

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

CH1: TEC+  
2V/div.  
M: TEC+ - TEC-  
2V/div.  
CH2: TEC-  
2V/div.  
CH3: SW  
2V/div.  
CH4:  $V_{CTL}$   
2V/div.



## PRINTED CIRCUIT BOARD LAYOUT

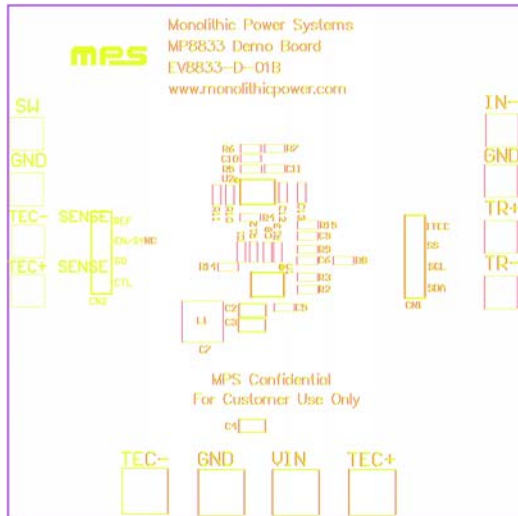


Figure 2—Top Silk Layer

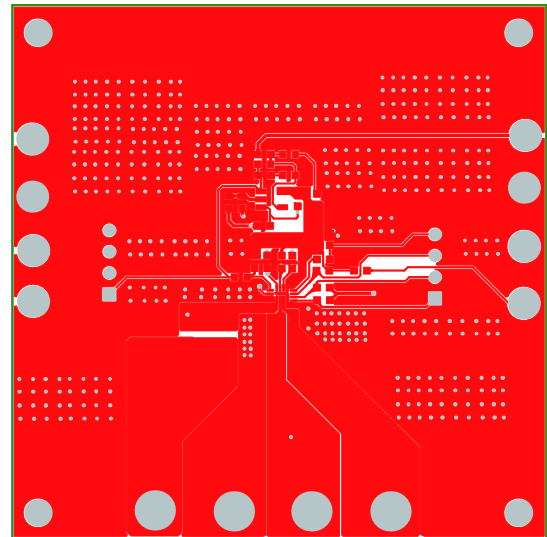


Figure 3—Top Layer

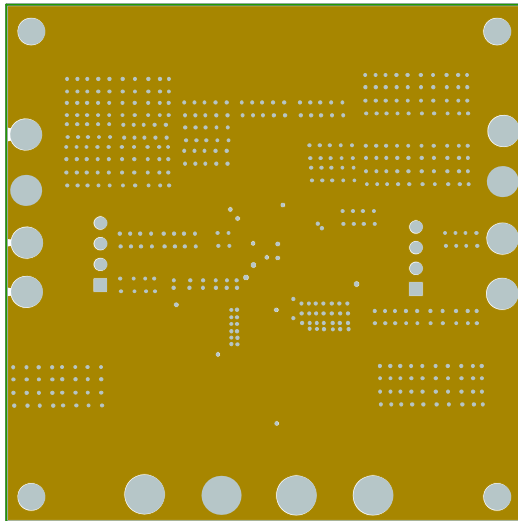


Figure 4—Middle Layer1

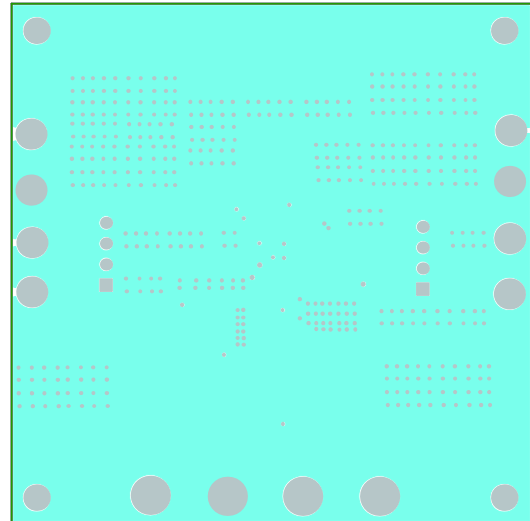


Figure 5—Middle Layer2

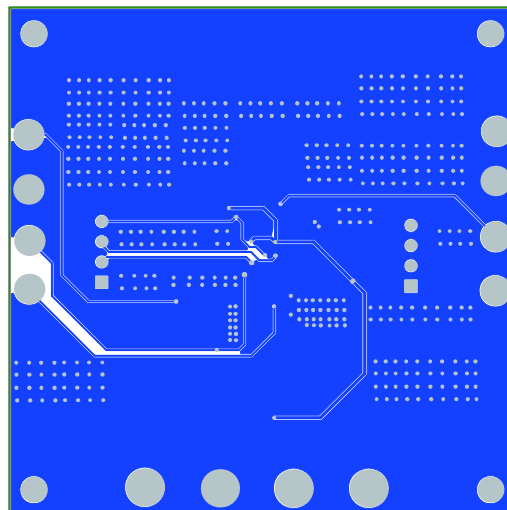


Figure 6—Bottom Layer

## QUICK START GUIDE

EV8833-D-01B can combine with EV8833-Base-00A to get a close loop system, please refer EV8833-Base-Board datasheet and MP8833 datasheet for more details.

EV8833-D-01B can also work in open loop, please follow below steps to setup:

1. Connect a TEC or an R-load to the TEC+ and TEC- pins, respectively.
2. Preset the power supply output between 2.7V and 5.5V, 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. Connect the CTL pin to a voltage within 0V to 5V to adjust the TEC voltage and direction.

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