



# MIC4682 Evaluation Board

## Programmable Current Limit SOP-8

### SuperSwitcher™ 4V to 34V Input / 200kHz

### General Description

The MIC4682 is an easy-to-use adjustable step-down (buck) switch-mode voltage regulator, with 10% programmable current limit. The current-limit feature makes the MIC4682 ideal for constant-voltage constant-current applications, such as simple battery chargers. The 200kHz MIC4682 achieves 2.1A peak output current in a small SOP-8 across a 4V to 34V input voltage range.

In shutdown mode, the MIC4682 draws typically 1µA standby current. The regulator performs cycle-by-cycle current limiting and thermal shutdown for protection under fault conditions.

The MIC4682 requires a minimum number of external components and can operate using a standard series of inductors.

The MIC4682 is available in the 8-lead SOP with a -40°C to +125°C junction temperature range.

### Requirements

The MIC4682 evaluation board requires a power supply capable of at least 2.5A at up to 34V. The load should be capable of delivering 2.0A peak under normal operation or 3A in current limit.

### Operation

Figure 1 shows the schematic of the evaluation board circuit. When the internal high-side switch turns on, one side of the inductor is fed from the input voltage, charging the inductor (+) and (-). During this period, current flows from the input, through the internal switch, inductor and load. When the internal switch turns off, the inductor polarity switches to (-) and (+), the SW pin voltage drops until the freewheeling diode

is forward biased. During this portion of the cycle, current flows through the diode, inductor and load. Figure 2 shows the 5V output efficiency versus input voltage and continuous output current.

### Precautions

MIC4682 has no protection from reversed polarity being applied to its input. Any momentary reversal of the dc power supply connections can cause permanent damage to the circuit. Use extreme care with these connections. The safest way to power up the MIC4682 evaluation board is to set the power supply to zero Volts, and then gradually increase the supply voltage. Monitor the input supply current while increasing the input voltage. If the circuit draws excessive current with no load applied (greater than 100mA) then there is probably a problem with the set-up. Immediately shut off the main power supply and check for proper power supply connections. This simple procedure can avoid most catastrophic failures.

**Warning: Tantalum capacitors may explode if improperly connected. Always wear safety glasses when operating the evaluation board. The maximum input voltage to the board is 34V. The tantalum output capacitor is rated at 10V. Do not exceed 10V.**

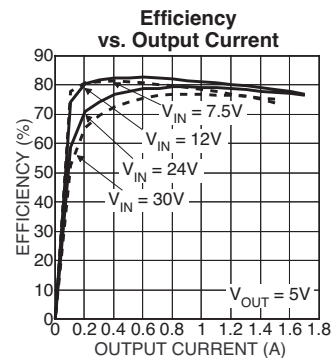


Figure 2.

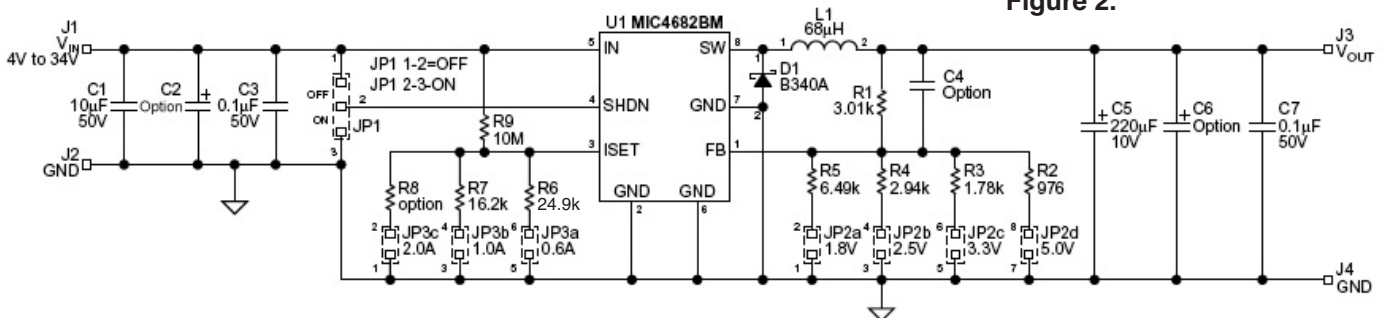


Figure 1. Evaluation Board Schematic

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### Current Limit Setting

Two options of current limit are provided on the evaluation board. To select the current limit, place the shorting jumper across the proper pins of header JP3. See "Typical Characteristics: Current Limit vs. RISET at  $T_J = 25^\circ\text{C}$ ", from the MIC4682 data sheet for more detailed information. **Do not short or float the  $I_{SET}$  pin.** Shorting the  $I_{SET}$  pin will set the peak current limit above 2A. Floating the  $I_{SET}$  pin will exhibit unstable conditions.

Jumper	Current Limit
JP3a	0.6A
JP3b	1.0A

Table 1. Typical Current Limit

### Output Voltage Setting

Four standard voltages may be selected by placing the shorting jumper across the proper pins of header JP2. If a non-standard output voltage is desired, resistor value R5 is calculated by the following equation.

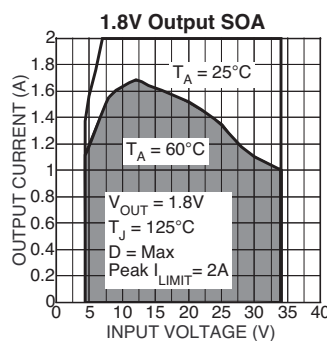
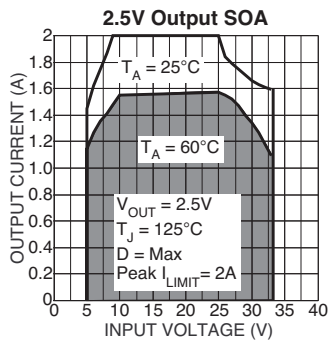
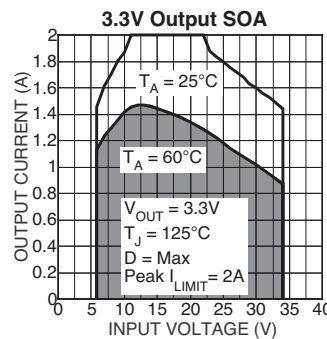
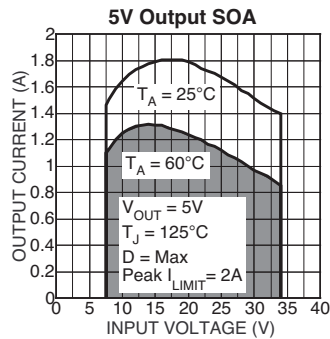
$$R5 = \frac{R1}{\left(\frac{V_{OUT}}{V_{FB}}\right) - 1}$$

$$V_{FB} = 1.23V$$

Jumper	Output Voltage
JP2a	1.8V
JP2b	2.5V
JP2c	3.3V
JP2d	5.0V

Table 2. Typical Output Voltage

### Typical Safe Operating Area (SOA)<sup>(1)</sup>



Note 1. SOA measured on the MIC4682 evaluation board.

# Printed Circuit Layout

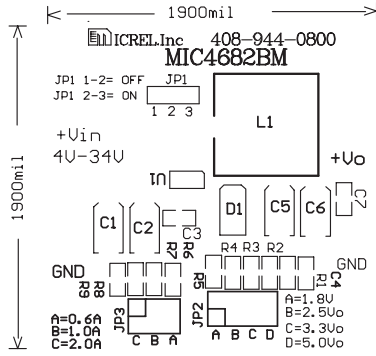


Figure 3a. Top Silkscreen

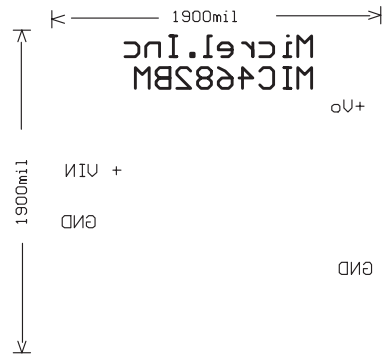


Figure 3c. Bottom Silkscreen

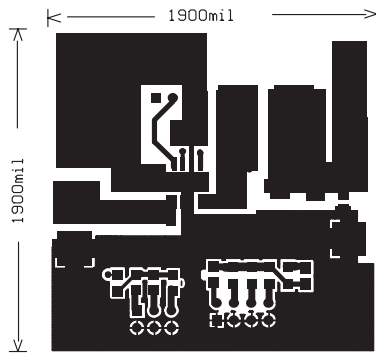


Figure 3b. Top Layer

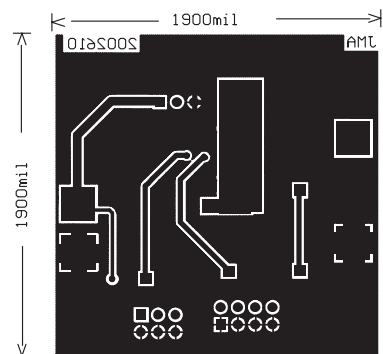


Figure 3d. Bottom Layer

**Bill of Materials**

Item	Part Number	Manufacturer	Description	Qty.
U1	MIC4682BM	Micrel Semiconductor <sup>1</sup>	Programmable Current Limit Buck Regulator	1
C1	GRM55DR61H106KA88L	Murata <sup>7</sup>	10 $\mu$ F/50V, Ceramic, X5R	1
C3, C7	VJ0805Y104KXAMT	Vishay Vitramon <sup>3</sup>	0.1 $\mu$ F/50V	2
C2, C4, C6			Optional	
C5	593D227X0010D2T	Vishay Sprague <sup>2</sup>	220 $\mu$ F/10V	1
D1	B340A SS34A	Diode, Inc. <sup>4</sup>	Schottky 3A, 40V	1
L1	CDRH127-680MC	Sumida <sup>5</sup>	68 $\mu$ H	1
R1	CRCW08053011FRT1	Vishay-Dale <sup>6</sup>	3.01k, 1%	1
R2	CRCW08059760FRT1	Vishay-Dale <sup>6</sup>	976 $\Omega$ , 1%	1
R3	CRCW08051781FRT1	Vishay-Dale <sup>6</sup>	1.78k, 1%	1
R4	CRCW08052941FRT1	Vishay-Dale <sup>6</sup>	2.94k, 1%	1
R5	CRCW08056491FRT1	Vishay-Dale <sup>6</sup>	6.49k, 1%	1
R6	CRCW08052492FRT1	Vishay-Dale <sup>6</sup>	24.9k, 1%	1
R7	CRCW08051622FRT1	Vishay-Dale <sup>6</sup>	16.2k, 1%	1
R8	—	—	Optional	—
R9	CRCW08051005FRT1	Vishay-Dale <sup>6</sup>	10M, 1%	1
J1-J4	2551-2-00-01-00-00-07-0	Millmax	Turrets pins	4
JP1, JP2, JP3			Jumpers	

1. **Micrel Semiconductor**, tel: 408-944-0800, <http://www.micrel.com>
2. **Vishay Sprague Inc.**, tel: 207-490-7256, <http://www.vishay.com>
3. **Vishay Vitramon Inc.**, tel: 203-452-5615, <http://www.vishay.com>
4. **Diode, Inc.**, tel: 805-446-4800, <http://www.diodes.com>
5. **Sumida**, tel: 510-668-0600, <http://www.sumida.com>
6. **Vishay-Dale**, tel: 402-644-4218, <http://www.vishay.com>
7. **Murata**, tel: 770-436-1300, <http://www.murata.com>

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