

MIC4680—The World's Simplest 1.3Amp Surface-Mount Switcher

Micrel's new MIC4680 SuperSwitcher™ buck regulator is the industry's first surface-mount switching regulator to provide up to 1.3A of output current in an SO-8 package—with only four external components!

As electronic systems become more complex with higher power demands, the power supply must keep pace with these demands. The system often leaves little room for a power supply, requiring the power supply to be small and simple with few external components. It should have a broad enough specification to cover a wide variety of applications. For example, 5V input to 1.8V output as well as 30V input to 12V output. The MIC4680 is the ideal part to fill this need.

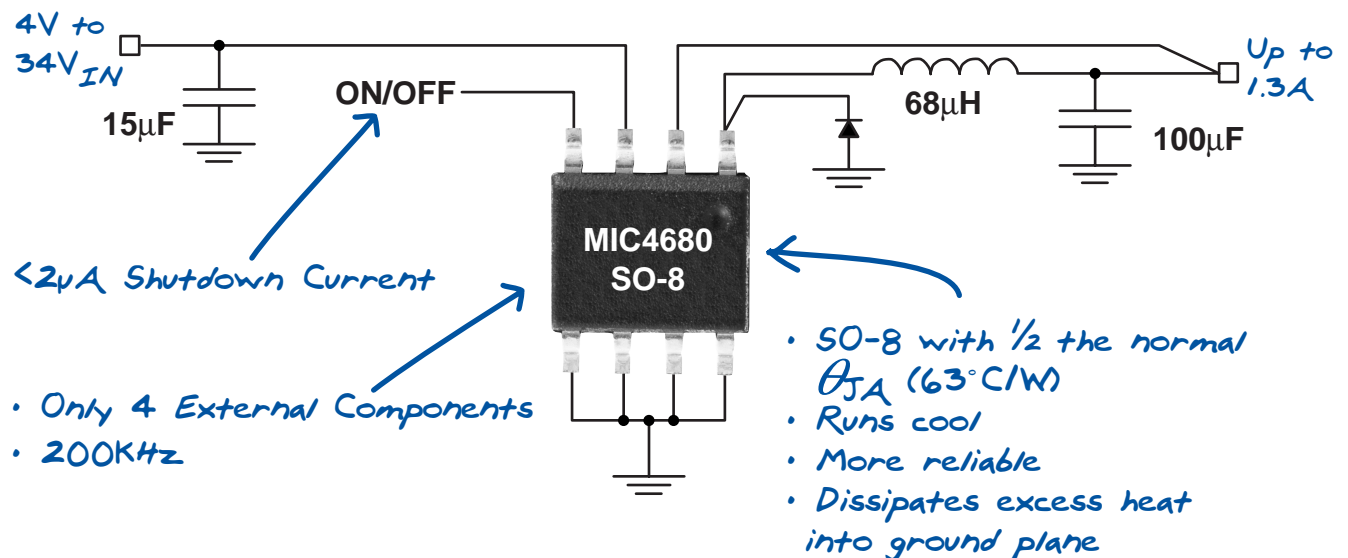
The MIC4680 is a simple step-down regulator that uses only four external components, has an input voltage range of 4V to 34V with an adjustable output voltage down to 1.25V—all in a SO-8 package. These features make the MIC4680 the new standard for simplicity and size for dc-to-dc converters.

Super Switcher™

SuperSwitcher™ Regulators — Smaller, Simpler, Better

MIC4680 SuperSwitcher Features

- ◆ Simple step-down buck regulator design
- ◆ Only four external components
- ◆ 4V to 34V input voltage operating range
- ◆ Up to 1.3A of continuous output current
- ◆ SO-8 package with twice the normal power handling capability
- ◆ 200kHz switching frequency
- ◆ Near-zero off shutdown current—typically 2μA
- ◆ Internal compensation with fast transient response
- ◆ Fixed output voltages of 3.3V and 5V as well as adjustable versions down to 1.25V
- ◆ -40°C to +125°C operating temperature range



Smaller is Better

Devices capable of the MIC4680's high current output are traditionally only available in large, high-power packages, such as the TO-220 and TO-263. These packages are more than 5 times the size of the MIC4680's surface-mount SO-8 package.



1A capability no longer requires large packages such as the TO-220 and TO-263

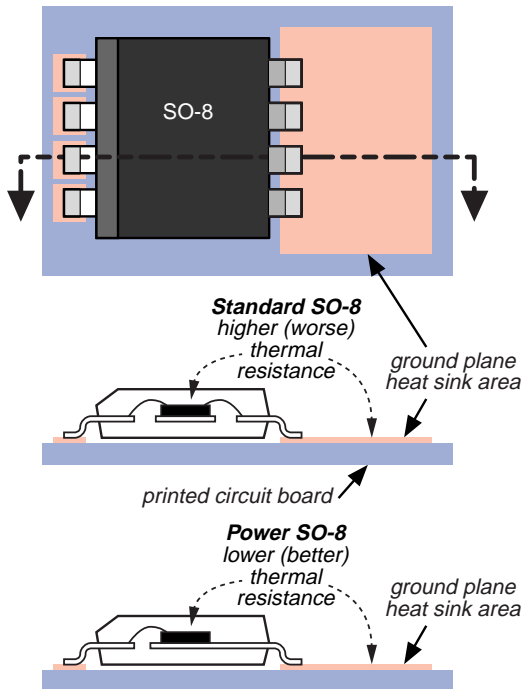


Up to 1.3A now available in an SO-8!

MIC4680 in Depth

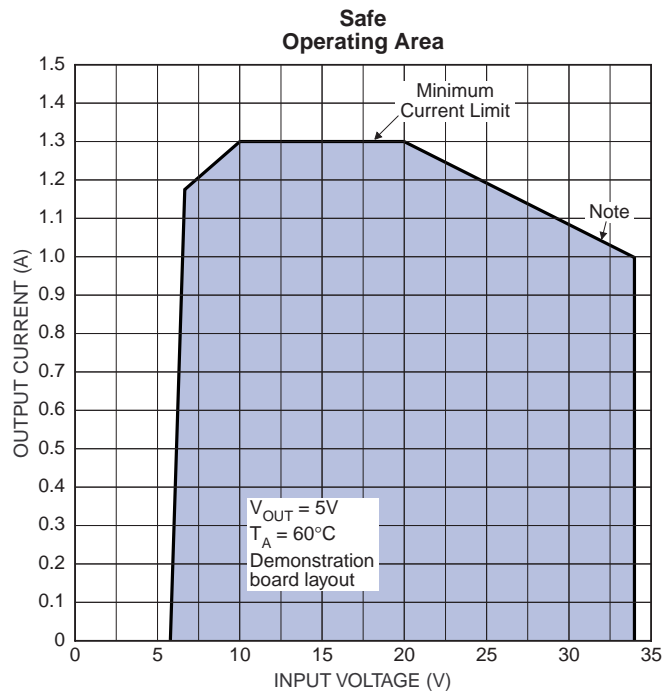
One of the secrets of the MIC4680's performance is its power SO-8 package featuring half the thermal resistance of a standard SO-8. Lower thermal resistance means more output current for a given package size.

Lower thermal resistance is achieved by joining the four ground leads with the die attach paddle to create a single-piece electrical and thermal conductor. This concept has been used by MOSFET manufacturers for years, proving very reliable and cost effective for the user.



Standard vs. Power SO-8 package cross sections

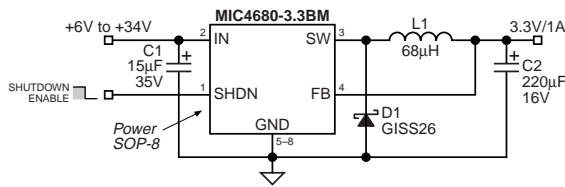
The "Safe Operating Area" figure below demonstrates how much output current can easily be achieved, even at high working ambient temperatures, with the power SO-8 package. At 60°C ambient, 1.3A output current can easily be achieved, with $V_{IN} = 10V$ to 20V and $V_{OUT} = 5V$.



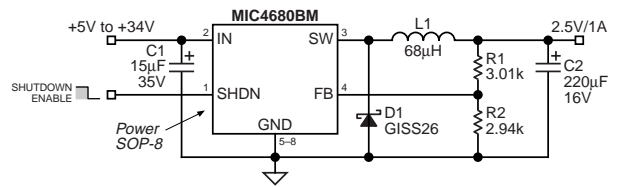
Safe operating area for MIC4680 in typical application

The Flexibility of the MIC4680

One strength of the MIC4680 is the few components and ease-of-use for straight conversion applications such as 5V to 2.5V, 12V to 1.8V or 34V to 5V.



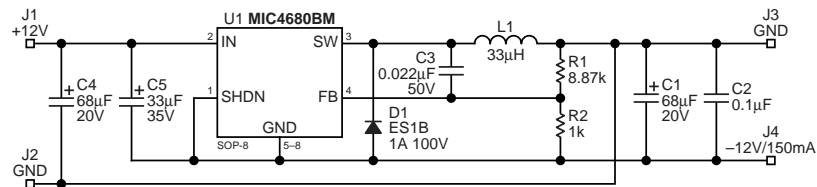
Basic Application. Fixed output voltage



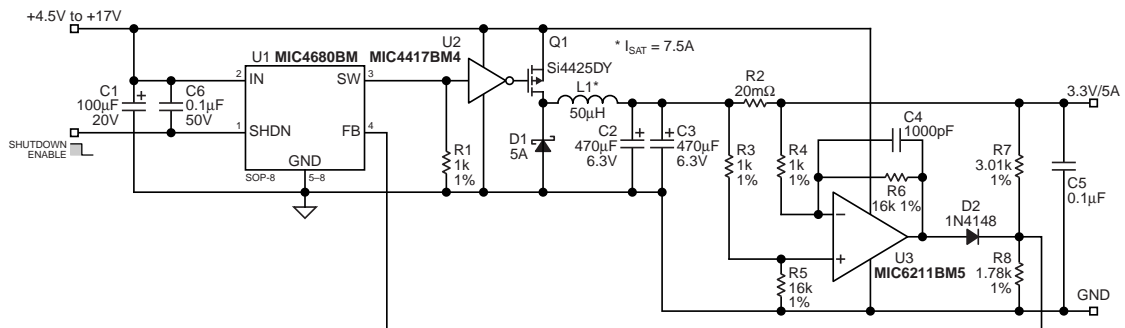
Basic Application. Adjustable voltage down to 1.25V

The MIC4680's flexibility allows it to be used for more complex circuit requirements.

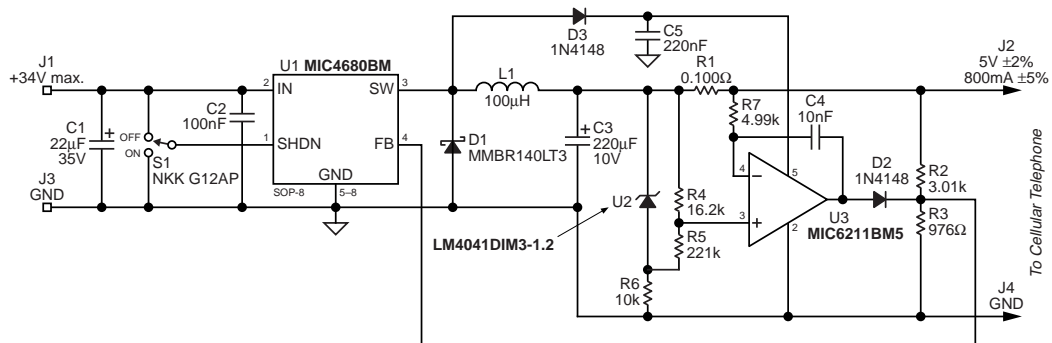
Below are sample circuits from Micrel's Application Hint 37. Many more circuits are available to help the customer design more complex circuits using the MIC4680.



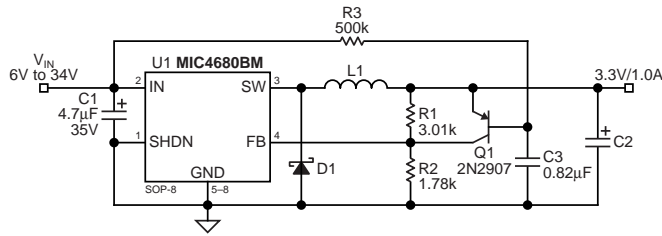
Application Hint 37b. +12V to -12V/150mA buck-boost converter



Application Hint 37m. 5V to 3.3V at 5A, with full current limit using an external FET



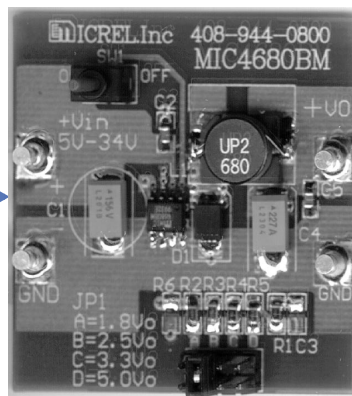
Application Hint 37a. Cellular phone charging circuit with constant voltage, constant current characteristics



Application Hint 37n. Soft-start circuit—IEEE 1394-compliant

For more MIC4680 circuits, visit our website: <http://www.micrel.com>

Place 4V to 34V here



And get an output voltage
5V, 3.3V, 2.5V, 1.8V etc.

*MIC4680 demonstration board with programmable output voltage
5V, 3.3V, 2.5V, or 1.8V at 1.3A*

Ordering Information

MIC4680BM	Adjustable output voltage
MIC4680BM T&R	Adjustable output voltage, tape & reel
MIC4680-3.0BM	Fixed 3V output
MIC4680-3.0BM T&R	Fixed 3V output, tape & reel
MIC4680-3.3BM	Fixed 3.3V output
MIC4680-3.3BM T&R	Fixed 3.3V output, tape & reel
MIC4680-5.0BM	Fixed 5V output
MIC4680-5.0BM T&R	Fixed 5V output, tape & reel

Contact Micrel Semiconductor

Corporate HQ, USA

1849 Fortune Drive
San Jose,
CA 95131 USA
Tel: +1 (408) 944-0800
Fax: +1 (408) 944-0970

Micrel, Europe

Clere House
21 Old Newtown Road
Newbury RG14 7DP UK
Tel: +44 (1635) 524455
Fax: +44 (1635) 524466

Micrel, Asia

4F, Jinsol Building
826-14, Yeoksam-dong
Kangnam-ku
Seoul 135-080 Korea
Tel: +82 (2) 3466-3000
Fax: +82 (2) 3466-2999

Worldwide Web

<http://www.micrel.com>

Literature Requests

USA only: 1 (800) 401-9572