

### POWER MANAGEMENT

This application note is intended to assist designers in the transition from Semtech's SC4524C and SC4524D step-down switching regulators to the SC4524E and SC4524F devices. The SC4524E and SC4524F regulators have identical footprint as the "C" and "D" versions so existing customers will not need to make any PCB changes. No external component change is necessary to ensure that the SC4524E and SC4524F perform identically to the SC4524C and SC4524D.

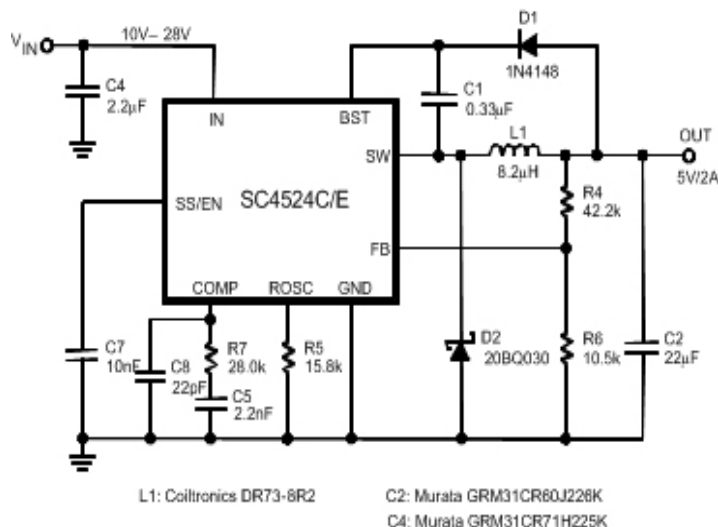


Figure 1 — SC4524C/E Typical Application  
Circuit Schematic

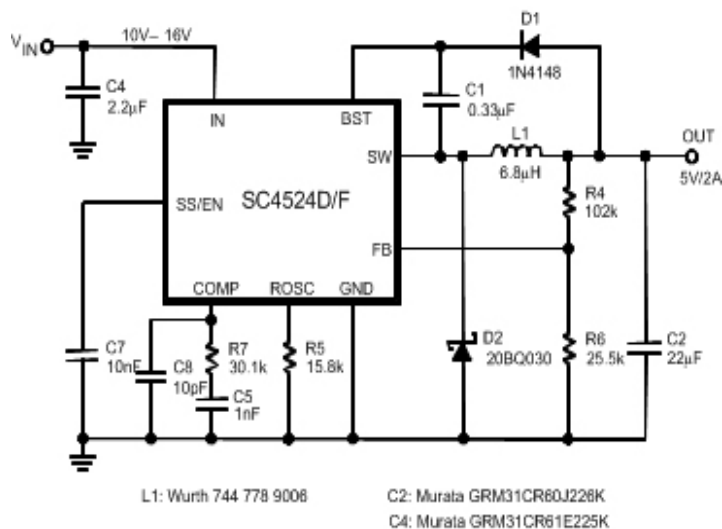


Figure 2 — SC4524D/F Typical Application  
Circuit Schematic

## Bootstrapping the power transistor

For  $V_{OUT} > 8V$  SC4524C/D applications, a Schottky diode, D4 as shown in Figure 3, is required in parallel with the bootstrap capacitor, C1. This extra schottky diode is not necessary in the SC4524E/F for  $V_{OUT} > 8V$  applications. This is shown in Figure 4. Figure 4 can be used for any output voltage including  $V_{OUT} > 8V$ . Refer to the SC4524E/F datasheets for additional information.

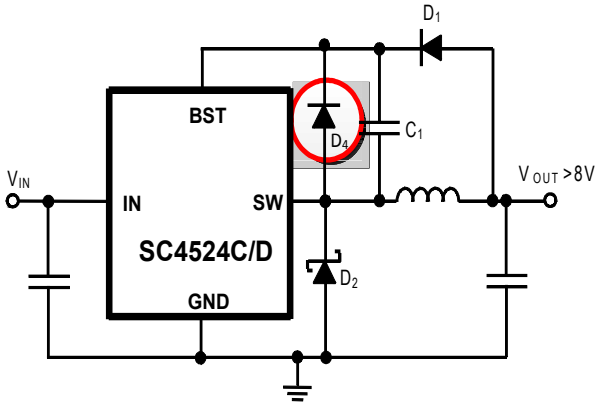


Figure 3 — SC4524C/D  $V_{OUT} > 8V$  Application Circuit

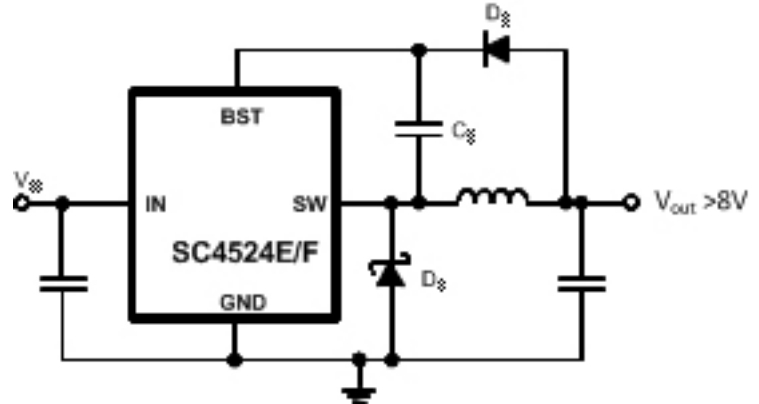


Figure 4 — SC4524E/F  $V_{OUT} > 8V$  Application Circuit

## Electrical Characteristics

Almost all the specifications of SC4524C/D have been adopted for the SC4524E/F except the two below. In order to better assist with creating designs using the SC4524E/F, the specification for maximum switch on-time has been added to the electrical characteristics table, as shown in Tables 4 and 5 below.

Table 4 — SC4524C and SC4524E Electrical Characteristic Comparison

Parameter	SC4524C			SC4524E		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
Minimum Switch On-time (ns)		135		70	120	230
Minimum Switch Off-time (ns)		100		30	75	130

Table 5 — SC4524D and SC4524F Electrical Characteristic Comparison

Parameter	SC4524D			SC4524F		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
Minimum Switch On-time (ns)		135		70	120	230
Minimum Switch Off-time (ns)		100		30	75	130

**Frequently Asked Questions**

Q1. Does my oscillator resistor value need to change?

A. No.

The switching frequency of the SC4524E/F is set with an external resistor from the ROSC pin to ground. When converting from the SC4524C/D to SC4524E/F, there is no need to change the frequency-setting resistor.

Q2. Do I need to change my compensation network component values?

A. No.

The switching regulators in the SC4524C/D and SC4524E/F require a simple Type-2 compensation network for stable operation. The correct calculation of these component values (R7, C5 and C8) is very important to maintain the stability of the circuit. It is essential to verify loop compensation by checking regulator load transient response. With the largest load step pertinent to the application applied, the regulator output voltage and the load current were observed. These transient waveforms should not show any ringing or excessive overshoot. It is required to adjust the component values until we get a stable operation. While verifying the load transient response of SC4524E/F, no excessive ringing or overshoot was noticed. So no component change is needed while converting SC4524C/D to SC4524E/F.

Q3. If I replace SC4524C/D with SC4524E/F, will it impact the efficiency?

A. Efficiency is similar with both parts.

Q4. Do I need to change feedback resistor?

A. No, same feedback resistor can be used for both the parts.

© Semtech 2013

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent or other industrial or intellectual property rights. Semtech assumes no responsibility or liability whatsoever for any failure or unexpected operation resulting from misuse, neglect improper installation, repair or improper handling or unusual physical or electrical stress including, but not limited to, exposure to parameters beyond the specified maximum ratings or operation outside the specified range.

SEMTECH PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF SEMTECH PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK. Should a customer purchase or use Semtech products for any such unauthorized application, the customer shall indemnify and hold Semtech and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs damages and attorney fees which could arise.

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## Contact Information

---

Semtech Corporation  
Power Management Products Division  
200 Flynn Road, Camarillo, CA 93012  
Phone: (805) 498-2111 Fax: (805) 498-3804

[www.semtech.com](http://www.semtech.com)