This application note is intended to assist designers in the transition from Semtech's SC4525A and SC4525B step-down switching regulators to the SC4525C and SC4525D devices. The SC4525C and SC4525D regulators share the identical footprint as the "A" and "B" versions, so existing customers will not need to make any PCB changes. Only minor external component value adjustments are necessary to ensure the SC4525C and SC4525D perform identically to the SC4525A and SC4525B. The components in Figure 1, marked in red boxes, are those that require adjustments.

Bootstrap Capacitor (C1) — Use 0.33µF for C1, the bootstrap capacitor from SW pin to BST pin for the SC4525C and SC4525D devices.

Oscillator Resistor (R5) — Table 1 shows the oscillator frequency setting resistors of the SC4525A and its equivalent SC4525C values. When converting from the SC4525B to SC4525D, only the oscillator resistor for 350kHz switching frequency needs to be changed from 73.2kΩ to 60.4kΩ.

Compensation Network (R7, C5 and C8) — Table 2 shows the compensation network component values for the SC4525A and SC4525C. Table 3 shows the compensation network component values of the SC4525B and SC4525D.

Table 1 — Oscillator resistor value change from SC4525A to SC4525C

Frequency (kHz)	SC4525A/B	SC4525C/D
	ROSC / R5 (kΩ)	ROSC / R5 (kΩ)
200	154.0	110.0
250	121.0	84.5
300	90.9	69.8
350	73.2	57.6
400	60.4	49.9
500	47.5	38.3
600	33.2	30.9
700	30.1	25.5
800	25.5	21.5
900	22.1	18.2
1000	18.2	15.8
1100	16.5	14.0
1200	14.7	12.4
1300	13.0	11.0
1400	11.3	9.76
1500	9.76	8.87
1600	8.87	8.06
1700	8.06	7.15
1800	6.98	6.34
1900	6.19	5.62
2000	5.36	5.23

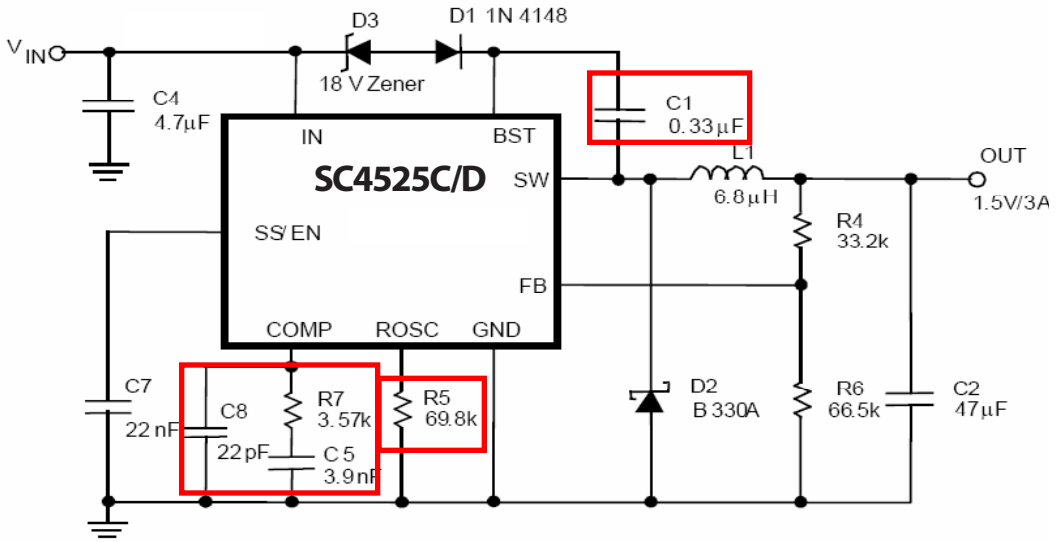

Figure 1 — SC4525C/D Application Schematic

Table 2 — Compensation component value change from SC4525A to SC4525C

Typical Applications					SC4525A Recommended Parameters				SC4525C Recommended Parameters				
V_{IN} (V)	V_O (V)	I_O (A)	F_{SW} (Hz)	C2 (µF)	L1 (µH)	R7 (kΩ)	C5 (nF)	C8 (pF)	L1 (µH)	R7 (kΩ)	C5 (nF)	C8 (pF)	Snubber
12	1.5	3	500	47	3.3	10	2.2	10	3.3	5.23	3.9	22	no
	2.5		500		4.7	16.2	2.2		4.7	8.45	3.9		
			1000		2.2	29.4	0.47		2.2	15.4	0.82		
	3.3		500		6.8	23.2	2.2		6.8	12.1	3.9		
			1000		3.3	39.2	0.47		3.3	20.5	0.82		
	5		500		6.8	29.4	2.2		6.8	15.4	3.9		
			1000		3.3	69.8	0.47		3.3	36.5	0.82		
	7.5		500		6.8	43.2	2.2		6.8	22.6	3.9		
			1000		3.3	90.9	0.47		3.3	47.5	0.82		
	10		500		3.3	69.8	2.2		3.3	36.5	3.9		
			1000		2.2	133	0.47		Not Recommended				
24	1.5	3	300		6.8	6.81	2.2		6.8	3.57	3.9		
	2.5		500		6.8	12.4	2.2		6.8	6.49	3.9		1Ω+ 220pF
			1000		2.2	29.4	0.47		Not Recommended				
	3.3		500		6.8	23.2	2.2		6.8	12.1	3.9		
			1000		3.3	43.2	0.47		3.3	22.6	0.82		
	5		500		8.2	29.4	2.2		8.2	15.4	3.9		no
			1000		4.7	59	0.47		4.7	30.9	0.82		
	7.5		500		10	49.9	2.2		10	26.1	3.9		
			1000		4.7	100	0.47		4.7	52.3	0.82		
	10		500		15	59	2.2		15	30.9	3.9		
			1000		6.8	133	0.47		6.8	69.8	0.82		

Table 3 — Compensation component value change from SC4525B to SC4525D

Typical Applications				SC4525B Recommended Parameters				SC4525D Recommended Parameters			
V_{IN} (V)	V_O (V)	I_O (A)	C2 (µF)	L1 (µH)	R7 (kΩ)	C5 (nF)	C8 (pF)	L1 (µH)	R7 (kΩ)	C5 (nF)	C8 (pF)
3.3	1.0	3	47	3.3	7.15	3.2	22	3.3	3.74	6.8	47
	2.0			2.2	12.4	1.5		2.2	6.49	3.3	
5	1.5			3.3	7.15	3.3		3.3	3.74	6.8	
	2.5			4.7	12.4	2.2		4.7	6.49	4.7	
	3.3			4.7	14.32	1.5	33	4.7	7.5	3.3	68
12	1.5			4.7	7.15	3.2	47	4.7	3.74	6.8	82
	2.5			6.8	13.3	2.2		6.8	6.98	4.7	
	3.3			8.2	16.5	1.5	33	8.2	8.66	3.3	68
	5			10	22.1	1.0	22	10	11.5	2.2	47
	7.5			10	34.8	1.0		10	18.2	2.2	

V_{OUT} > 8V Applications

If V_{OUT} > 8V then use a small Schottky diode D1 (BAT54 or similar) for bootstrapping.

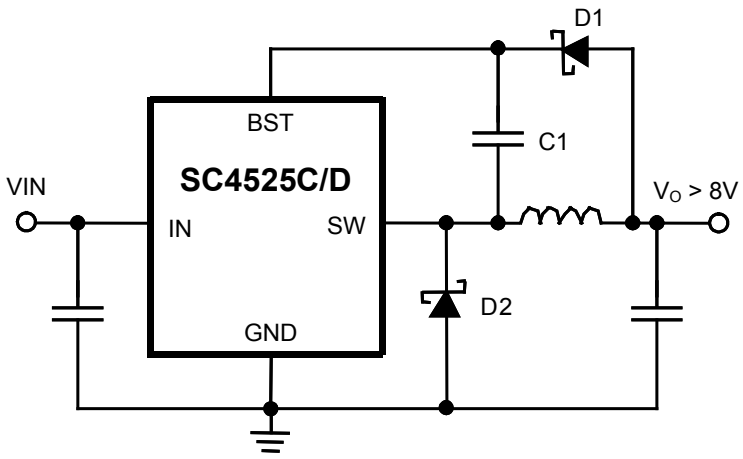

Figure 2 — Bootstrapping the SC4525C/D when V_{OUT} > 8V

Electrical Characteristics Changes

Some electrical specifications have changed on the SC4525C and SC4525D. The differences between the SC4525A/B and SC4525C/D are minor and have minimal impact on the circuit performance. The comparison results are shown in Tables 4 and 5.

Table 4 — SC4525A and SC4525C Electrical Characteristic Comparison

Parameter	SC4525A			SC4525C		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
V_{IN} Quiescent Current in Shutdown (µA)			50			52
Error Amplifier Transconductance (µΩ-1)		280			300	
COMP Pin to Switch Current Gain (A/V)		12			15.2	
Foldback Frequency (kHz) — ROSC = 93.1kΩ(1)	240	300	360	230	300	370
Foldback Frequency (kHz) — ROSC = 12.1kΩ, VFB = 0	110	230	350	100		250
Foldback Frequency (kHz) — ROSC = 93.1kΩ(1), VFB = 0	50	110	170	35	60	90
SS/EN Switching Threshold (V)	1	1.13	1.3	0.95	1.2	1.4
Soft-start Charging Current (µA) — VSS/EN = 0V		1.7			1.9	
Soft-start Charging Current (µA) — VSS/EN = 1.5V	1.2	2	2.8	1.6	2.4	3.2
Integrated Current Sense Resistor (mΩ)		4.1			3.53	
Internal Current Limit Voltage Threshold (mV)		20			18	

NOTE: (1) 73.2kΩ for the SC4525C

Table 5 — SC4525B and SC4525D Electrical Characteristic Comparison

Parameter	SC4525B			SC4525D		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
V_{IN} Quiescent Current in Shutdown (µA)			50			52
Error Amplifier Transconductance (µΩ-1)		280			300	
COMP Pin to Switch Current Gain (A/V)		12			15.2	
Foldback Frequency (kHz) — ROSC = 73.2kΩ(1), VFB = 0	35	100	185	35	65	100
SS/EN Switching Threshold (V)	0.95	1.13	1.35	0.95	1.2	1.4
Soft-start Charging Current (µA) — VSS/EN = 0V		1.7			1.9	
Soft-start Charging Current (µA) — VSS/EN = 1.5V	1.2	2	2.8	1.6	2.4	3.2

NOTE: (1) 60.4kΩ for the SC4525D

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