3A 、32V Synchronous Rectified Step-Down Converter

Description

SC88DY44A is a monolithic synchronous step-down converter. It provides 3A continuous load current over a wide input supply range. Current mode control provides fast transient response and cycle-by-cycle current limit, it also provides soft-start, low-voltage protection, over-temperature protection and over-current protection. In shutdown mode, the supply current is only 0.3μA.

Features

- **3A Output Current**
- **Wide 4.75V to 32V Operating Input Range**
- **Internal Integrated Power MOSFET witches**
- **Output Adjustable from 0.925V to 20V**
- **Up to 95% Efficiency**
- **Programmable Soft-Start Time Low Quiescent**

Applications

- **Distributed Power Systems**
- **Networking Systems**
- **Notebook Computer**

Typical Application Circuit

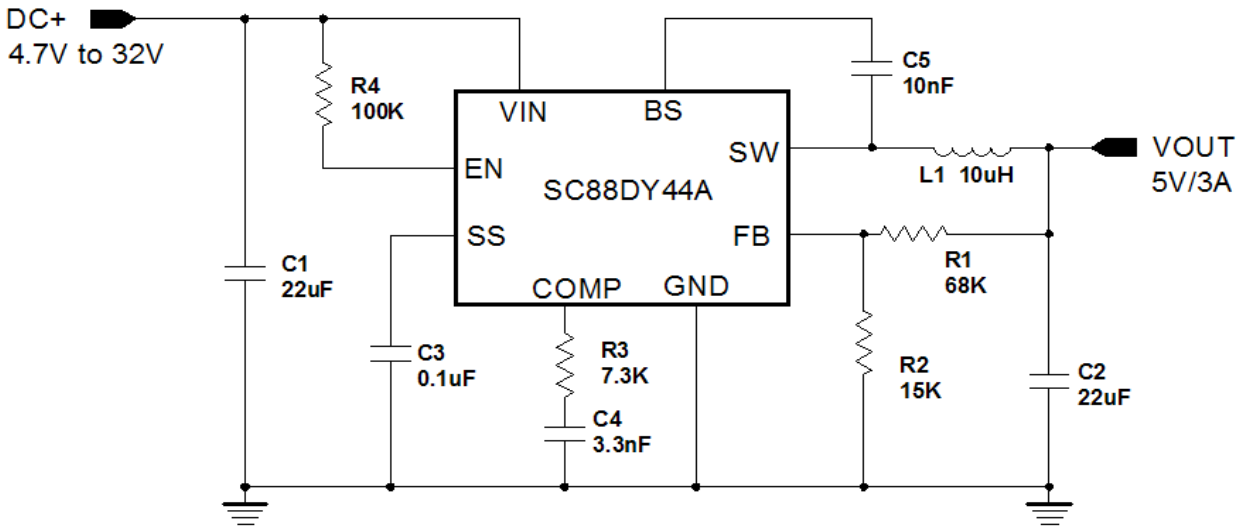
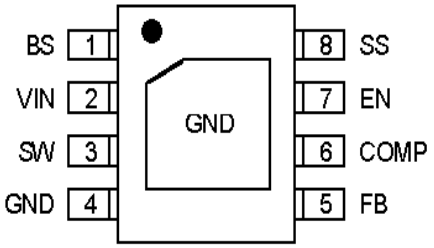


Figure 1：Typical Application Circuit

Pin Configurations

Package Type	Pin Configurations
SC88DY44A SOP-8PP	

Pin Description

PIN	NAME	DESCRIPTION
1.	BS	High-Side Gate Drive Boost Input. BS supplies the drive for the high-side N-channel MOSFET switch. Connect a 0.01uF or greater capacitor from SW to BS to power the switch.
2.	VIN	Power Input. Drive In with a 4.75 to 32V power source. Bypass IN to GND with a suitably capacitor to eliminate noise on the input to the IC.
3.	SW	Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.
4.	GND	Ground.
5.	FB	Feedback Input. FB senses the output voltage. Drive FB with a resistive voltage divider from the output voltage. The feedback threshold is 0.925V.
6.	COMP	Compensation Node. Connect a series RC network from COMP to GND to compensate the regulation control loop. In some cases, an additional capacitor from COMP to GND is required.
7.	EN	Enable Input. EN is a digital input that turns the regulator on or off. Drive EN high to turn on the regulator, low to turn it off. Attach to IN with a 100KÙ pull up resistor for automatic startup.
8.	SS	Soft-start Control Input. Connect a capacitor from SS to GND to set the soft-start period. A 0.1Uf Capacitor sets the soft-start time to 15 ms. To disable the soft-start feature, leave SS unconnected.

Absolute Maximum Ratings

- **Input Supply Voltage (V_{IN}) ---------- –0.3V to 32V**
- **Switch Voltage(V_{SW}) ---------- 32V**
- **Boost Voltage ---------- Vsw - 0.3～Vsw +6V**
- **All Other Pins ---------- –0.3V to 6V**
- **Maximum Junction Temperature ---------- 125℃**
- **Operating Ambient Temperature Range ---------- –40℃ to 85℃**
- **Storage Temperature Range ---------- –65℃ to 150℃**
- **Lead Temperature (Soldering, 10 sec) ---------- 260℃**

Block Diagram

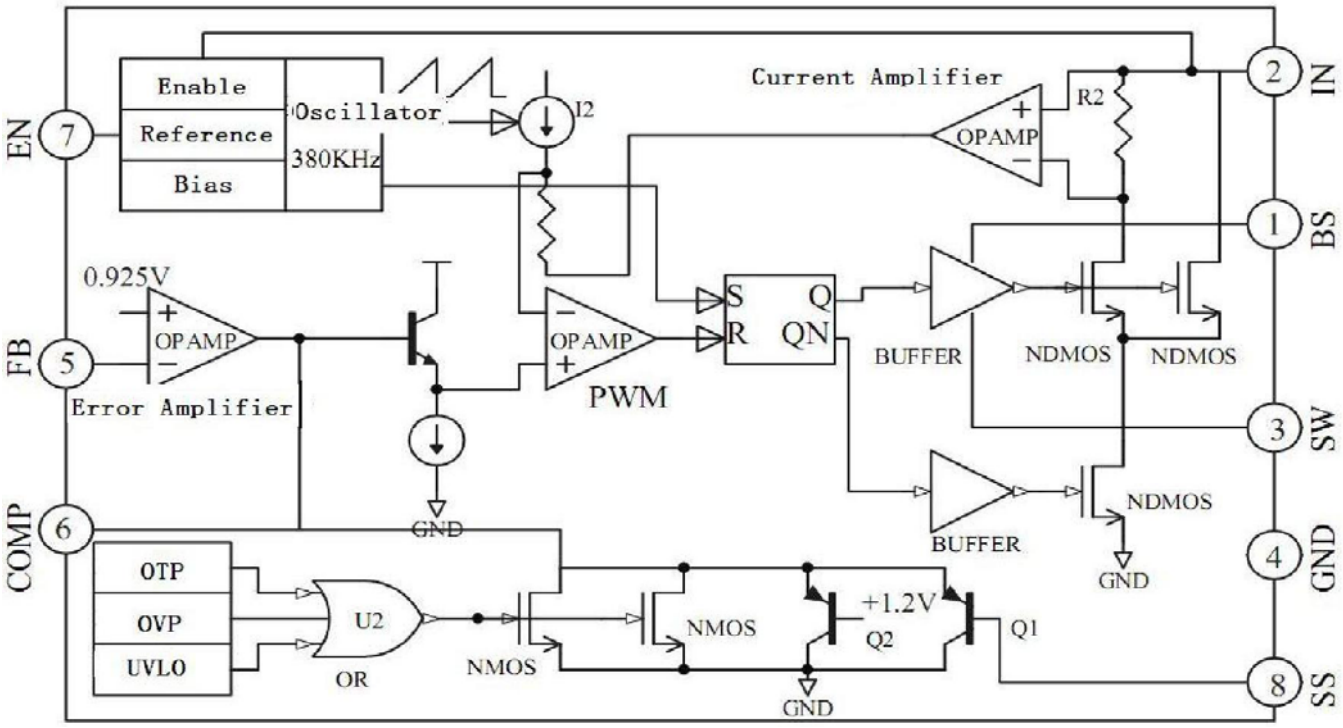


Figure 2：Block Diagram

Electrical Characteristics

(Operating Conditions: T_A=25 ℃,V_{IN}=12V unless otherwise specified.)

PARAMETER	SYMBOL	CONDITION	SC88DY44A			UNITS
			MIN	TYP	MAX	
Input Voltage	V_{IN}		4.75		32	V
Output Voltage	V_{OUT}		0.925		20	V
Shutdown Supply Current		V_{EN}=0V		1	3	μA
Supply Current		V_{EN}=2.0V;V_{FB}=1.0V		1.3	1.5	mA
Feedback Voltage	V_{FB}	4.75V≤V_{IN}≤23V	0.9	0.925	0.95	V
Error Amplifier Voltage Gain	A_{EA}			400		V/V
Error Amplifier Tran conductance	G_{EA}	Δ I_C = ±10μA		820		μA/V
Switch Leakage Current		V_{EN} = 0V, V_{SW} = 0V			10	μA
Oscillation Frequency	Fosc1			380		KHz
Short circuit Oscillation Frequency	Fosc2	V_{FB} = 0V		110		KHz
Maximum Duty Cycle	D_{MAX}	V_{FB} = 1.0V		90		%
Minimum On Time				220		ns
EN Shutdown Threshold Voltage		V_{EN} Rising	1.1	1.5	2	V
EN Shutdown Threshold Voltage Hysteresis				210		mV
EN Lockout Threshold Voltage			2.2	2.5	2.7	V
EN Lockout Threshold Voltage Hysteresis				210		mV
Input Under Voltage Lockout Threshold				4.3		V
Input Under Voltage Lockout Threshold Hysteresis		V_{IN} Rising		210		mV
Soft-Start Current		V_{SS} = 0V		6		μA
Soft-Start Period		C_{SS} = 0.1μF		15		ms
Thermal Shutdown				160		℃

Typical Performance Characteristics

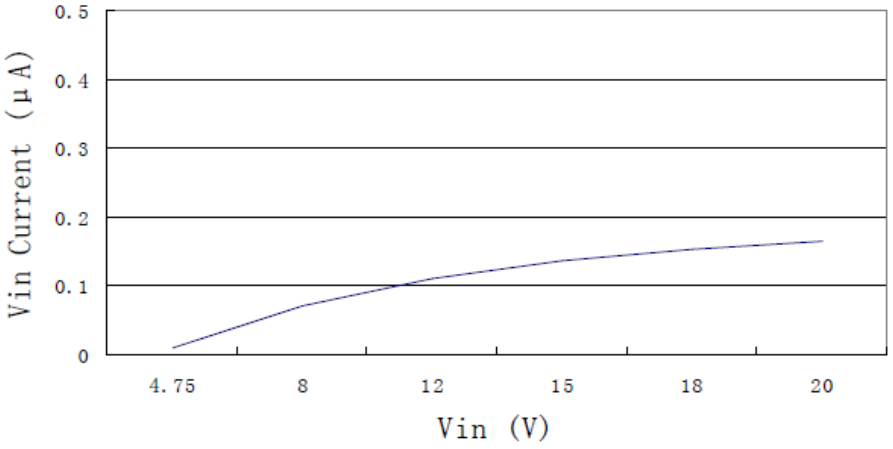


Figure 3：**Input Voltage VS Shutdown Current**

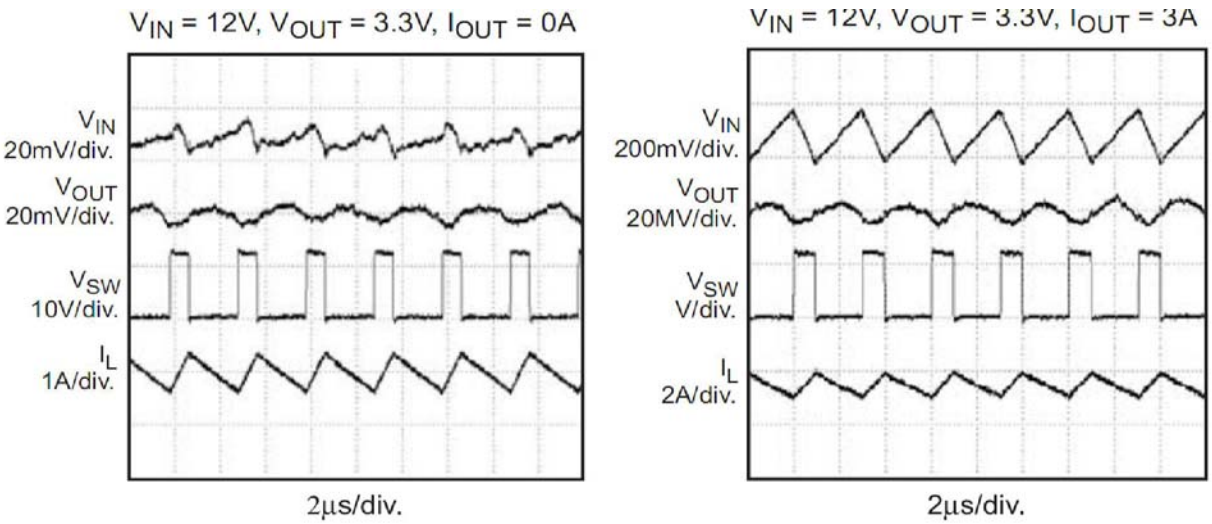


Figure 4：**Steady State Test Waveforms**

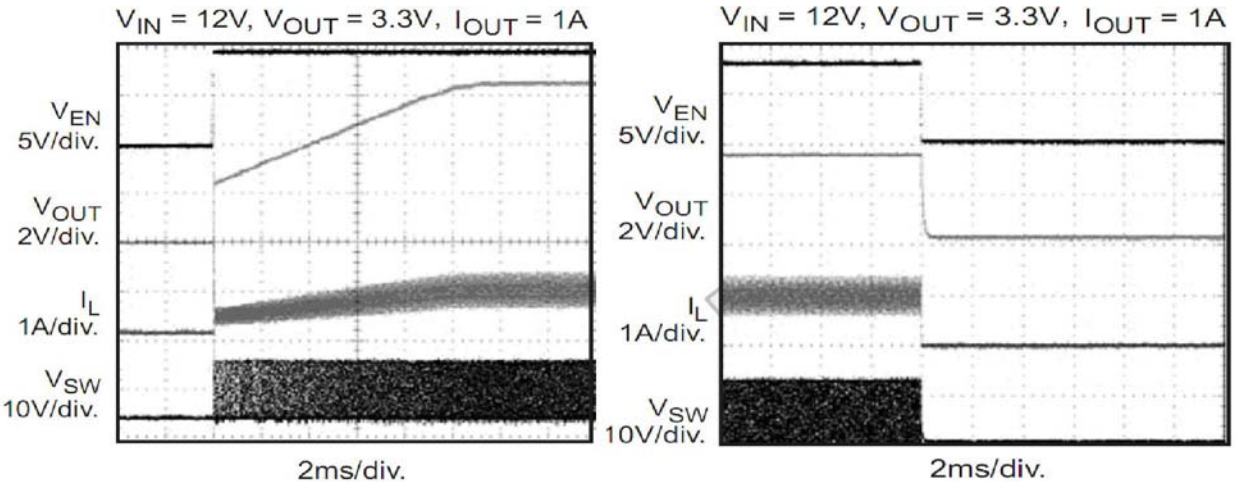
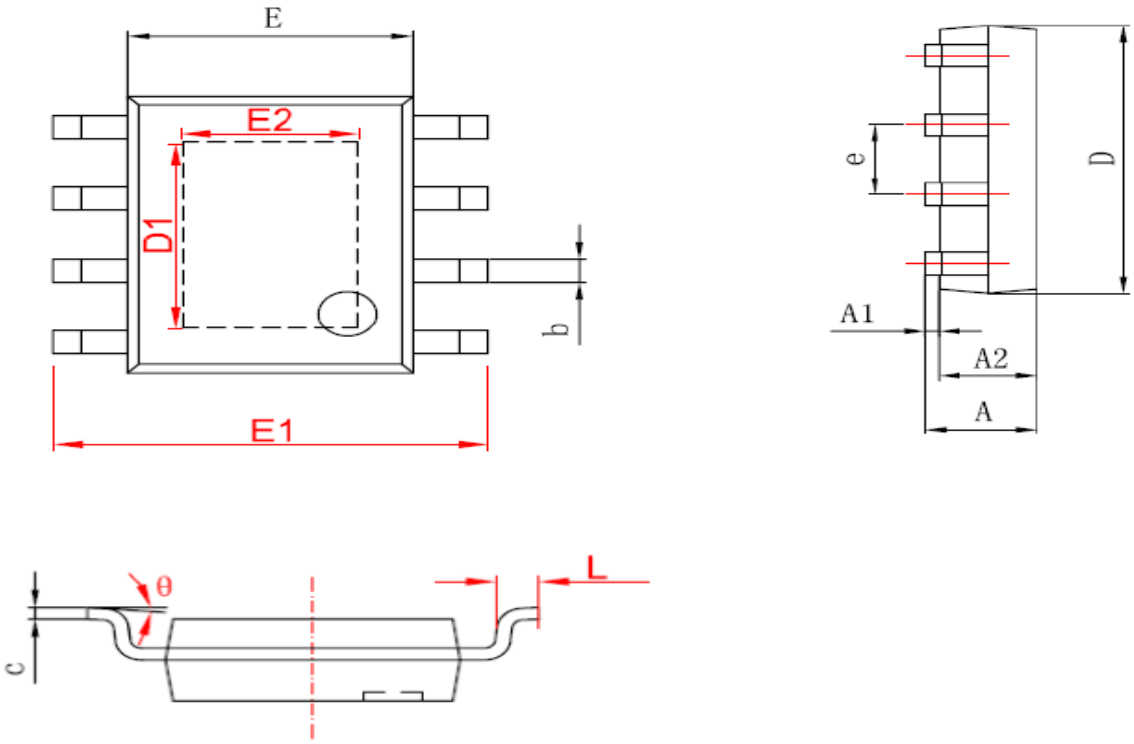


Figure 5：**Startup Through Enable Waveforms**

Packaging Information

SOP-8PP Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°