



Description

The SX2107 is a synchronous step-down DC/DC converter that provides wide 4.5V to 24V input voltage range and 2A continuous load current capability.

The SX2107 fault protection includes cycle-by-cycle current limit, UVLO, output overvoltage protection and thermal shutdown. The adjustable soft-start function prevents inrush current at turn-on. This device uses current mode control scheme which provides fast transient response. Internal Compensation function reduces external compensation components and simplifies the design process. In shutdown mode, the supply current is less than 1 μ A.

The SX2107 is available in a SOT-23-6 package, provides good thermal conductance.

Features

- High Efficiency up to 94%
- Low Rds(on) Integrated Power MOSFET
- Internal Compensation Function
- Wide Input Voltage Range: 3.8V to 24V
- Adjustable Output Voltage from 0.8V to 17.85V
- 2A Output Current
- Fixed 1.4KHz Switching Frequency
- Current Mode Operation
- Cycle-by-Cycle Current Limit
- Over-Temperature Protection with Auto Recovery
- Output Overvoltage Protection
- Under Voltage Lockout
- <1 μ A Shutdown Current
- SOT-23-6 Package

Applications

- STB (Set-Top-Box)
- LCD Displays, TVs
- Distributed Power Systems
- Networking, XDSL Modems

Pin Assignments

S6 Package (SOT-23-6)

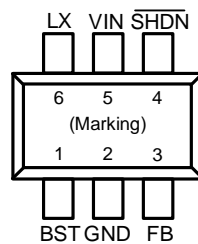


Figure 1. Pin Assignment of SX2107



Typical Application Circuit

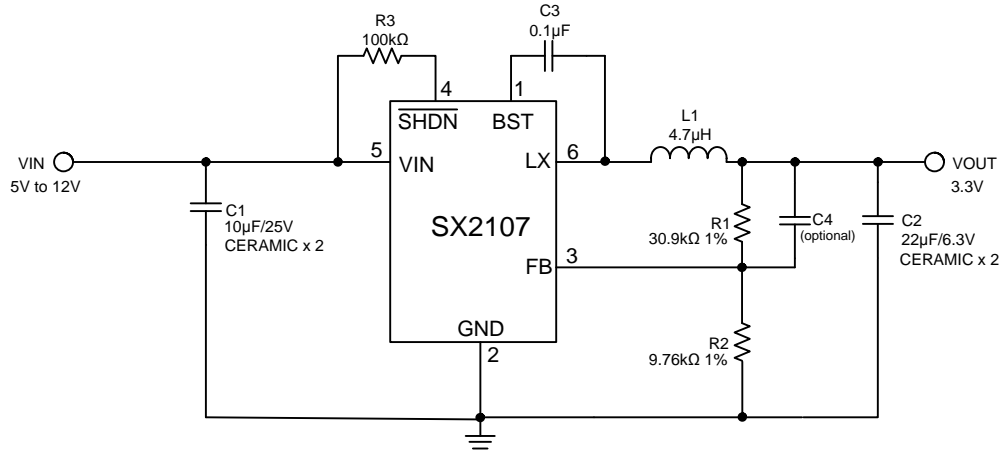


Figure 2. C_{IN}/C_{OUT} use Ceramic Capacitors Application Circuit

$$V_{OUT} = 0.8 \times 1 \left(+ \frac{R1}{R2} \right) V$$

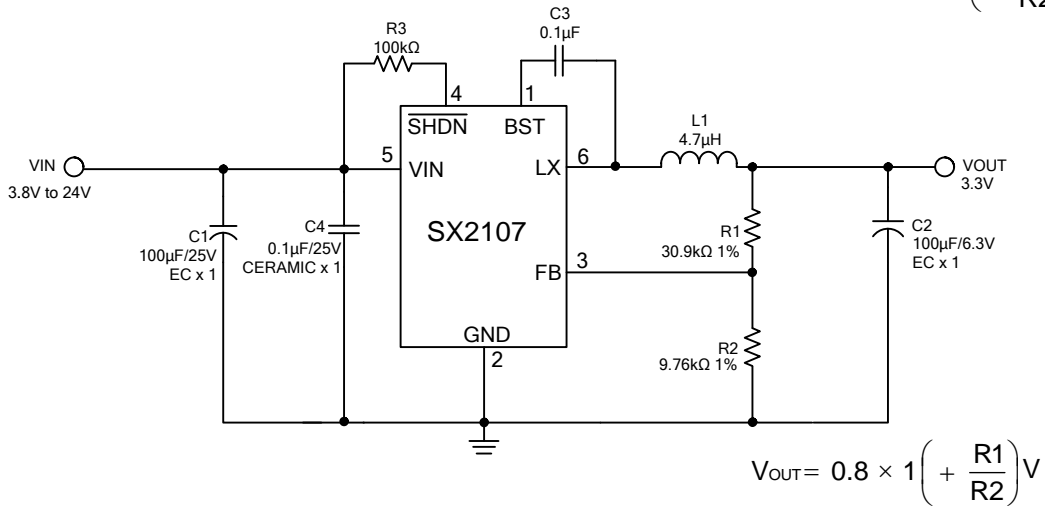


Figure 3. C_{IN}/C_{OUT} use Electrolytic Capacitors Application Circuit

$$V_{OUT} = 0.8 \times 1 \left(+ \frac{R1}{R2} \right) V$$



Functional Pin Description

I/O	Pin Name	Pin No.	Pin Function
I	FB	3	Voltage Feedback Input Pin. Connect FB and V_{OUT} with a resistive voltage divider. This IC senses feedback voltage via FB and regulates it at 0.8V.
I	VIN	5	Power Supply Input Pin. Drive VIN pin by 3.8V to 24V voltage to power on the chip.
I	$\overline{\text{SHDN}}$	4	Enable Input Pin. This pin is a digital control input that turns the converter on or off. Connect to VIN with a 100K Ω resistor for self-startup.
I	GND	2	Ground Pin.
O	LX	6	Power Switching Output. LX is the output of the internal high side NMOS switch.
O	BST	1	High Side Gate Drive Boost Pin. A 10nF or greater capacitor must be connected from this pin to LX. It can boost the gate drive to fully turn on the internal high side NMOS.

Block Diagram

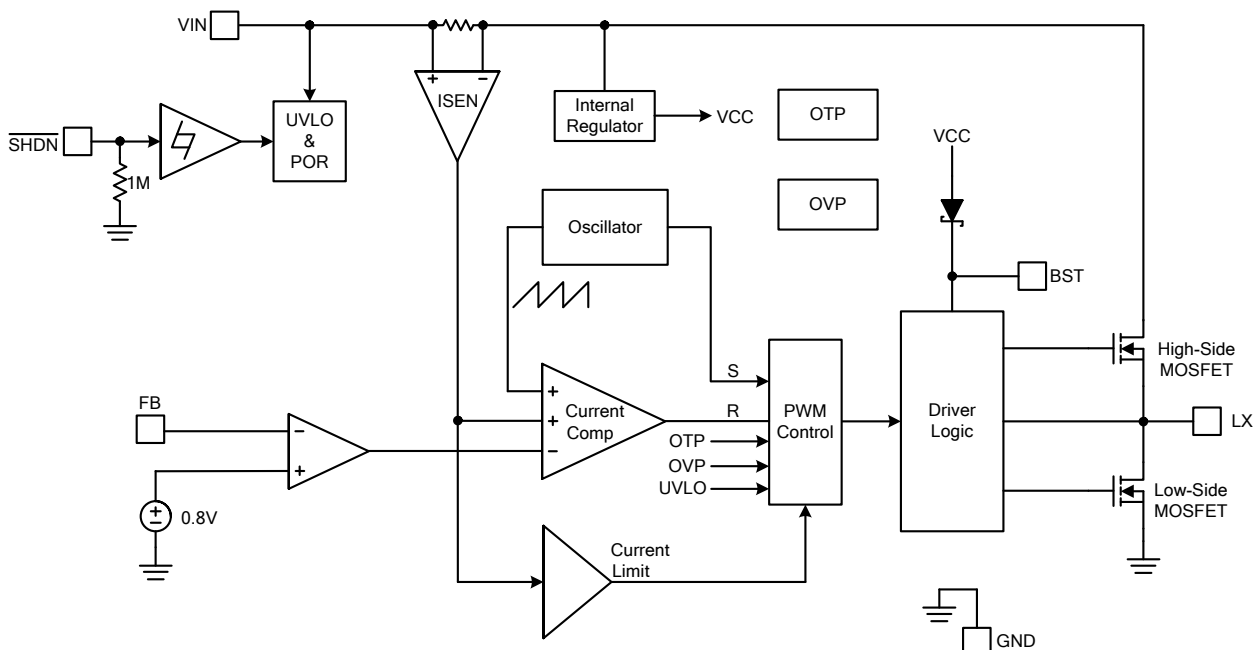


Figure 4. Block Diagram of SX2107



Absolute Maximum Ratings (Note 1)

• Supply Voltage V_{IN} -----	-0.3V to +24V
• Enable Voltage $V_{\overline{SHDN}}$ -----	-0.3V to +24V
• LX Voltage V_{LX} (50ns) -----	-1V to $V_{IN}+0.3V$
• BST Pin Voltage V_{BST} -----	$V_{LX}-0.3V$ to $V_{LX}+6V$
• All Other Pins Voltage -----	-0.3V to +6V
• Maximum Junction Temperature (T_J) -----	+150°C
• Storage Temperature (T_S) -----	-65°C to +150°C
• Lead Temperature (Soldering, 10sec.) -----	+260°C
• Power Dissipation @ $T_A=25^\circ C$, (P_D)	
SOT-23-6 -----	+0.40W
• Package Thermal Resistance, (θ_{JA}):	
SOT-23-6 -----	+250°C/W
• Package Thermal Resistance, (θ_{JC}):	
SOT-23-6 -----	+130°C/W

Note 1 : Stresses beyond this listed under "Absolute Maximum Ratings" may cause permanent damage to the device.

Recommended Operating Conditions

• Supply Voltage V_{IN} -----	+3.8V to +24V
• Enable Voltage $V_{\overline{SHDN}}$ -----	0V to V_{IN}
• Operation Temperature Range -----	-40°C to +85°C



Electrical Characteristics

($V_{IN}=12V$, $T_A=25^{\circ}C$, unless otherwise specified.)

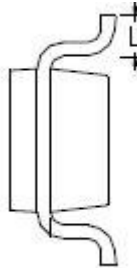
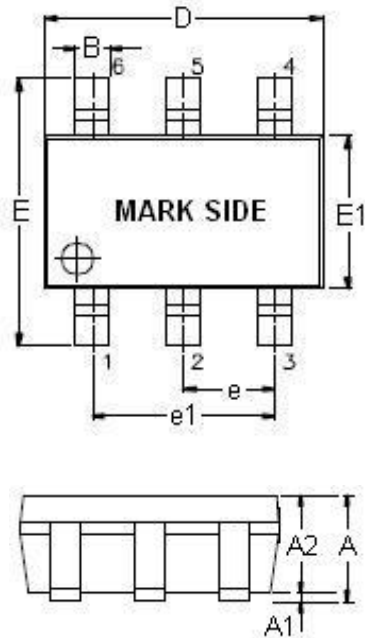
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
V_{IN} Input Supply Voltage	V_{IN}		3.8		24	V
V_{IN} Quiescent Current	I_{DDQ}	$V_{\overline{SHDN}}=1.8V$, $V_{FB}=1.0V$		2.5		mA
V_{IN} Shutdown Supply Current	I_{SD}	$V_{\overline{SHDN}}=0V$			1	μA
Feedback Voltage	V_{FB}	$4.5V \leq V_{IN} \leq 21V$	0.779	0.8	0.821	V
Feedback OVP Threshold Voltage	V_{OVP}			1.4		V
High-Side MOSFET $R_{DS(ON)}$ (Note 2)	$R_{DS(ON)}$			120		m Ω
Low-Side MOSFET $R_{DS(ON)}$ (Note 2)	$R_{DS(ON)}$			110		m Ω
High-Side MOSFET Leakage Current	$I_{LX(leak)}$	$V_{\overline{SHDN}}=0V$, $V_{LX}=0V$			10	μA
High-Side MOSFET Current Limit (Note 2)	$I_{LIMIT(HS)}$	Minimum Duty	2.5	3		A
Low-Side MOSFET Current Limit (Note 2)	$I_{LIMIT(LS)}$	From Drain to Source		1.5		A
Error Amplifier Voltage Gain (Note 2)				400		V/V
Oscillation frequency	F_{OSC}		1000	1400	1800	KHz
Short Circuit Oscillation Frequency	$F_{OSC(short)}$	$V_{FB}=0V$		140		KHz
Maximum Duty Cycle	D_{MAX}	$V_{FB}=0.6V$		90		%
Minimum On Time (Note 2)	T_{MIN}			60		ns
Input UVLO Threshold	$V_{UVLO(Vth)}$	V_{IN} Rising		4.3		V
Under Voltage Lockout Threshold Hysteresis	$V_{UVLO(HYS)}$			400		mV
\overline{SHDN} Input Low Voltage	$V_{\overline{SHDN}}(L)$				0.4	V
\overline{SHDN} Input High Voltage	$V_{\overline{SHDN}}(H)$		2			V
\overline{SHDN} Input Current	$I_{\overline{SHDN}}$	$V_{IN}=2V$		2		μA
Thermal Shutdown Threshold (Note 2)	T_{SD}			170		$^{\circ}C$

Note 2 : Not production tested.



Outline Information

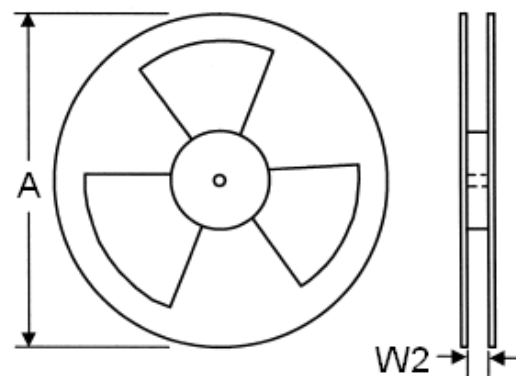
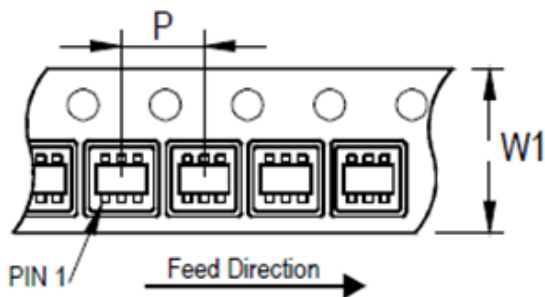
SOT-23-6 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
B	0.30	0.50
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.90	1.00
e1	1.80	2.00
L	0.30	0.60

Note : Followed From JEDEC MO-178-C.

Carrier dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
8	4	7	180	8.4	300~1000	3,000