

General Description

The SX1301 is a current mode boost DC-DC converter. Its PWM circuitry with built-in 0.25Ω power MOSFET make this regulator highly power efficient. The internal compensation network also minimizes as much as 6 external component counts. The non-inverting input of error amplifier connects to a 0.6V precision reference voltage and internal soft-start function can reduce the inrush current.

The SX1301 is available in the SOT23-6L package and provides space-saving PCB for the application fields.

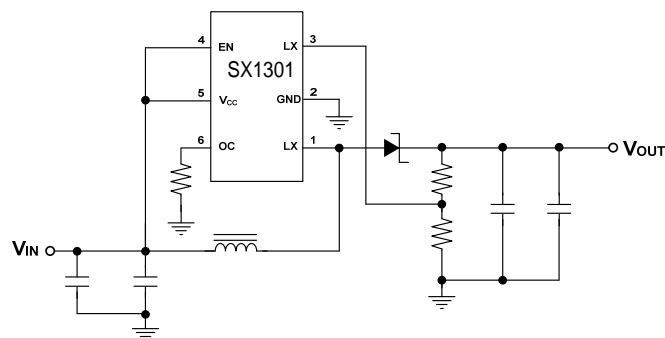
Features

- Adjustable Output up to 24V
- Internal Fixed PWM frequency: 1.0MHz
- Precision Feedback Reference Voltage: 0.6V ($\pm 2\%$)
- Internal 0.25Ω, 2.5A, 26V Power MOSFET
- Shutdown Current: 0.1μA
- Over Voltage Protection
- Over Temperature Protection
- Adjustable Over Current Protection: 0.5A ~ 2.5A
- Package: SOT23-6L

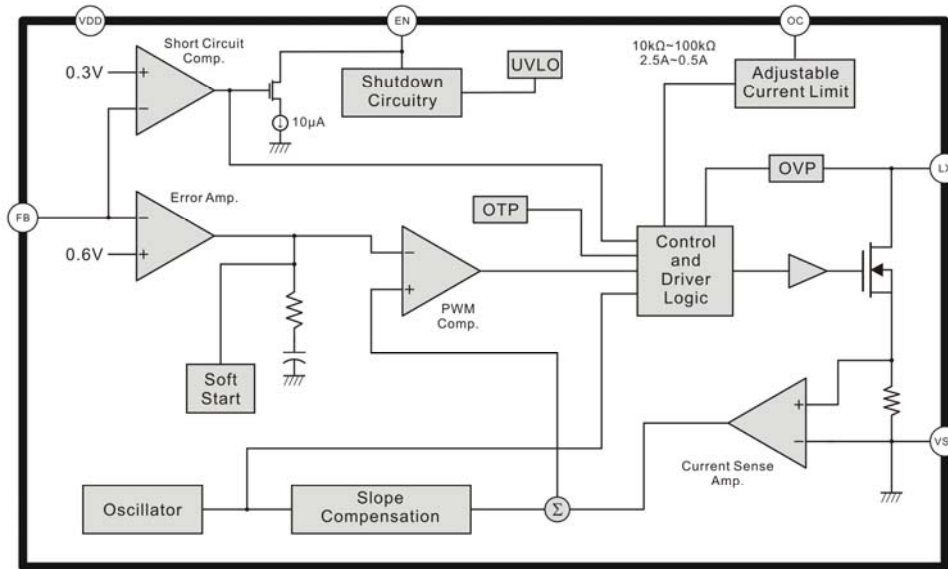
Applications

- Chargers
- LCD Displays
- Digital Cameras
- Handheld Devices
- Portable Products

Typical Application Circuit

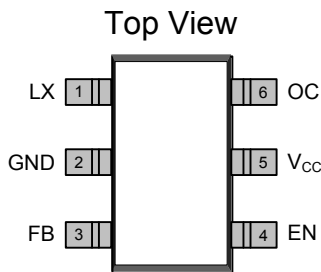


Function Block Diagram

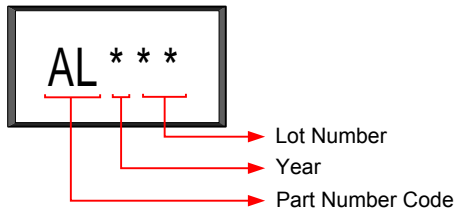


Pin Descriptions

SOT23-6L



Name	No.	I / O	Description
LX	1	O	Power Switch Output
GND	2	P	IC Ground
FB	3	I	Error Amplifier Inverting Input
EN	4	I	Enable Control (Active High)
V _{CC}	5	P	IC Power Supply
OC	6	I	Adjustable Current Limit (Floating Available)

Marking Information**SOT23-6L**

Lot Number: Wafer lot number's last two digits

For Example: 132386TB → 86

Year: Production year's last digit

Part Number Code: Part number identification code for this product. It should be always "AL".

Ordering Information

Part Number	Code	Operating Temperature	Package	MOQ	Description
SX1301LR-G1	AL	-40°C ~ 85°C	SOT23-6L	3000EA	Tape & Reel

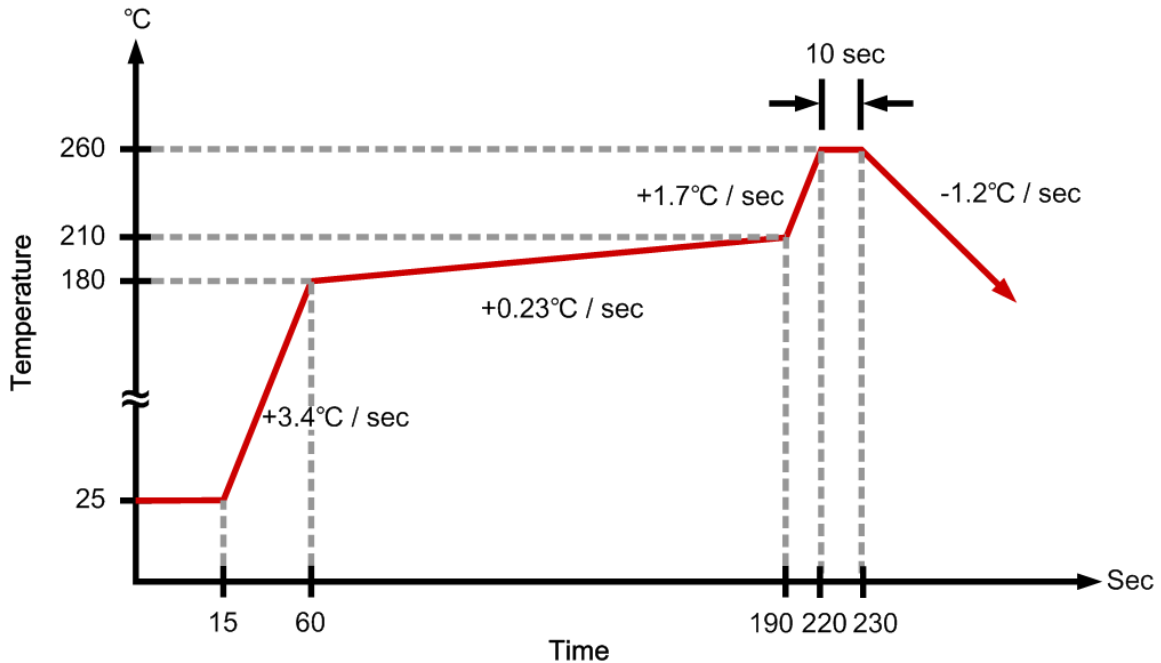
Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}		0		6	V
OVP Voltage	V_{OVP}		0		27	V
LX Voltage	V_{LX}		0		24	V
EN,FB Voltage			0		6	V
Power Dissipation	P_D	SOT23-6L @ $T_A=25^\circ\text{C}$			455	mW
Thermal Resistance (Note1)	θ_{JA}	SOT23-6L			+220	$^\circ\text{C} / \text{W}$
Junction Temperature	T_J				+150	$^\circ\text{C}$
Operating Temperature	T_{OP}		-40		+85	$^\circ\text{C}$
Storage Temperature	T_{ST}		-65		+150	$^\circ\text{C}$
Lead Temperature		(soldering, 10 sec)			+260	$^\circ\text{C}$

Note1:

θ_{JA} is measured in the natural convection at $T_A=25^\circ\text{C}$ on a low effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

IR Re-flow Soldering Curve



Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V _{IN}		2.6		5.5	V
Operating Temperature Range	T _A	Ambient Temperature	-40		+85	°C

DC Electrical Characteristics (V_{CC}=3.3V, T_A=25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
System Supply Input						
Input Supply Range	V _{CC}		2.6		5.5	V
Under Voltage Lockout	V _{UVLO}			2.2		V
UVLO Hysteresis				0.1		V
Quiescent Current	I _{CC}	V _{FB} =0.66V, No switching		0.16		mA
Average Supply Current	I _{CC}	V _{FB} =0.55V, Switching		2.84		mA
Shutdown Supply Current	I _{CC}	V _{EN} =GND		0.1		μA
Oscillator						
Operation Frequency	F _{OSC}	V _{FB} =1.0V	0.8	1.0	1.2	MHz
Frequency Change with Voltage	Δf / Δ	V _{CC} =2.7V to 5.5V		5		%
Maximum Duty Cycle	T _{DUTY}			90		%
Reference Voltage						
Feedback Voltage	V _{REF}		0.588	0.6	0.612	V
Line Regulation		V _{CC} =2.7V ~ 5.5V		0.05		% / V
Enable Control						
Enable Voltage	V _{EN}		0.96			V
Enable sink current	I _{EN}	FB < 0.3V		20		μA
Shutdown Voltage	V _{EN}				0.6	V
MOSFET						
On Resistance of Driver	R _{DS (ON)}	I _{LX} =0.1A		0.25		Ω
Protection						
OVP Threshold Voltage	V _{OVP}			27		V
OVP Sink Current	I _{SINK}			5		μA
OCP Current	I _{OCP}		2		2.6	A
Adjustable OCP Current	I _{OCP}	With External Resistor : 10k~100k	0.5		2.6	A
OTP Temperature	T _{OTP}			+150		°C

Function Description

Operation

The SX1301 is a current mode boost converter. The constant switching frequency is 1MHz and operates with pulse width modulation (PWM). Build-in 26V / 2A MOSFET provides a high output voltage. The control loop architecture is peak current mode control; therefore slope compensation circuit is added to the current signal to allow stable operation for duty cycles larger than 50%.

Soft Start Function

Soft start circuitry is integrated into SX1301 to avoid inrush current during power on. After the IC is enabled, the output of error amplifier is clamped by the internal soft-start function, which causes PWM pulse width increasing slowly and thus reducing input surge current.

Current Limit Program

A resistor between OC and GND pin programs peak switch current. The resistor value should be between 10k and 100k. The current limit will be set from 2.5A to 0.5A. Do not float or short to ground. This is a high impedance node. Keep traces at this pin as short as possible. Do not put capacitance at this pin.

Over Voltage Protection (OVP)

In some condition, the resistive divider may be unconnected, which will cause PWM signal to operate with maximum duty cycle and output voltage is boosted higher and higher. The power MOSFET will be turned off immediately, when the output voltage exceeds the OVP threshold level. The SX1301's OVP threshold is 27V.

Over Temperature Protection (OTP)

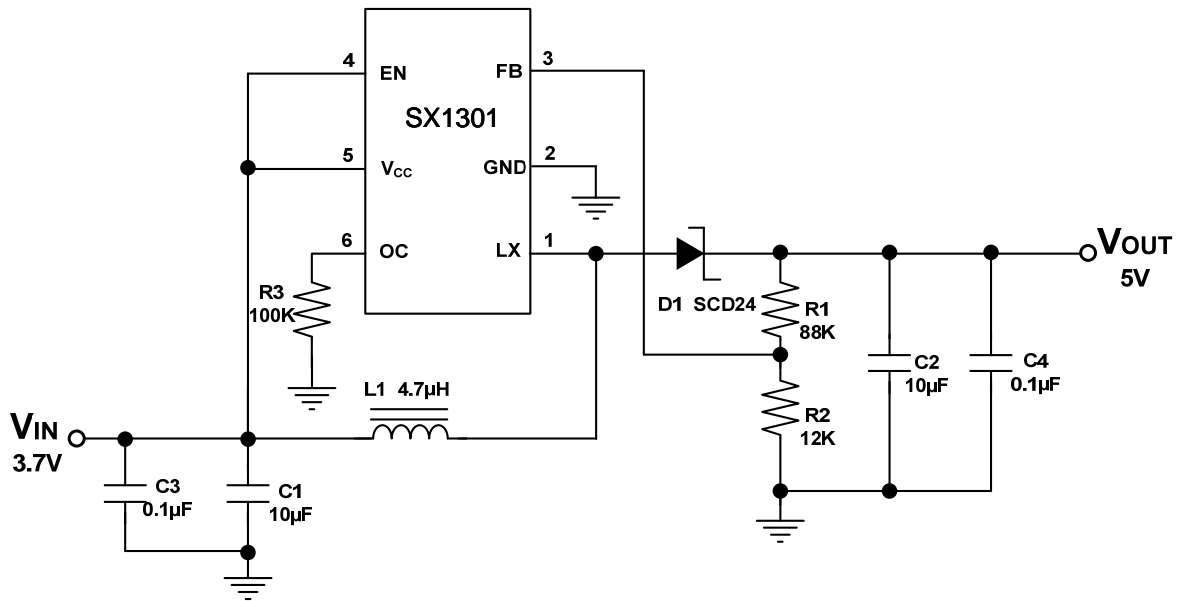
SX1301 will turn off the power MOSFET automatically when the internal junction temperature is over 150°C. The power MOSFET wake up when the junction temperature drops 30°C under the OTP threshold temperature.

Output Disconnect

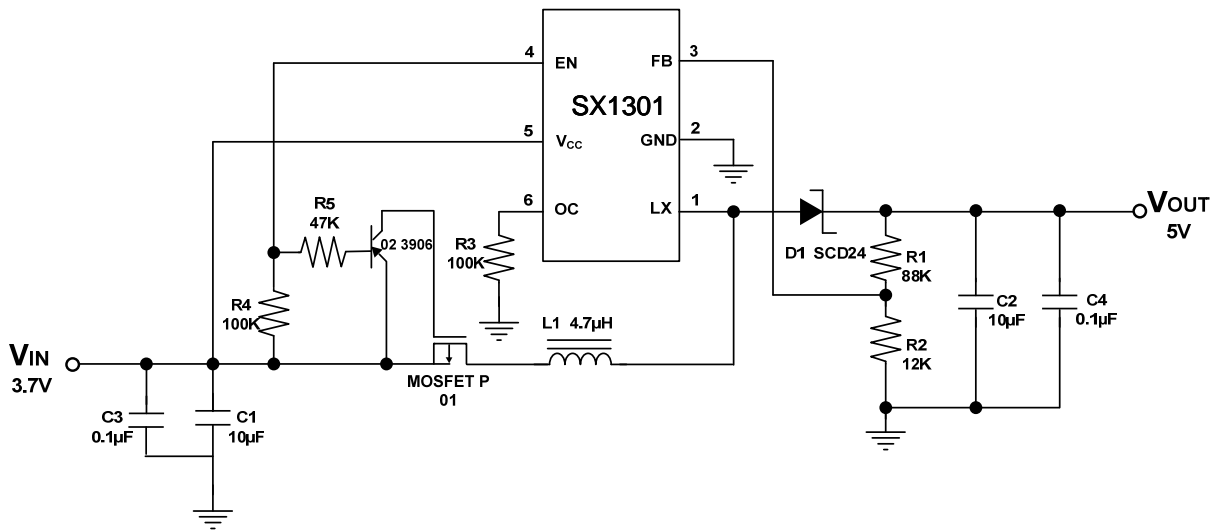
When power on and the EN pin will be pulled high. The SX1301 start up and operates. The external PMOS is turned on and current through it for output loading. While output loading is increase, output voltage is drop. When the FB pin voltage is under 0.3V, the EN pin sinks 20μA current, the external PMOS will be turn off. The output short condition will be disconnected.

Application Information

General Application Circuit



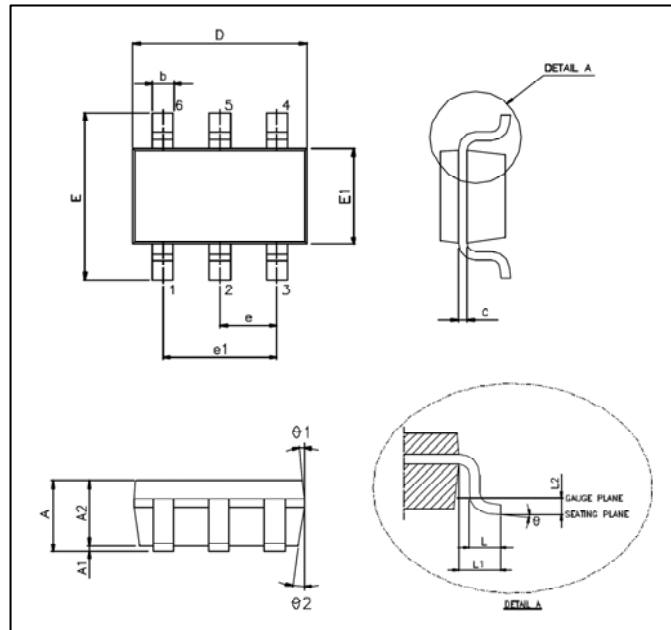
General Boost Converter



SCP Detect and Load Disconnect

Package Outline

SOT23-6L



Unit: mm

Symbols	Min. (mm)	Max. (mm)
A	1.050	1.450
A1	0.050	0.150
A2	0.900	1.300
b	0.300	0.500
c	0.080	0.220
D	2.900 BSC	
E	2.800 BSC	
E1	1.600 BSC	
e	0.950 BSC	
e1	1.900 BSC	
L	0.300	0.600
L1	0.600 REF	
L2	0.250 BSC	
θ°	0°	8°
$\theta1^\circ$	3°	7°
$\theta2^\circ$	6°	15°

Note:

1. Package dimensions are in compliance with JEDEC outline: MO-178 AB.
2. Dimension "D" does not include molding flash, protrusions or gate burrs.
3. Dimension "E1" does not include inter-lead flash or protrusions.