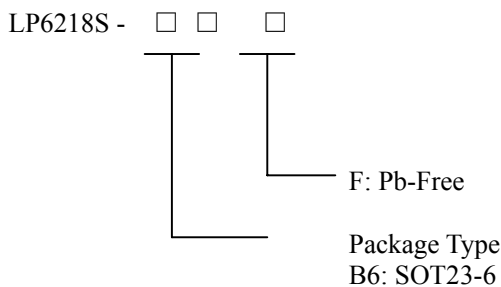


## High Efficiency 2.6A Boost DC/DC Converter

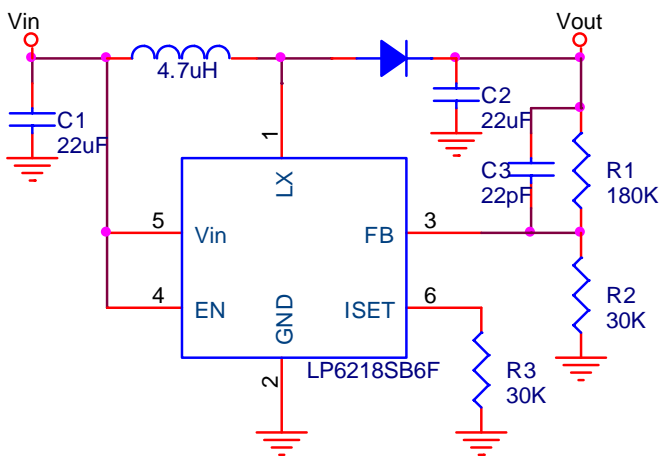
### General Description

The LP6218S is a current mode boost DC-DC converter. Its PWM circuitry with built-in 2.6A Current power MOSFET makes this converter highly power efficiently. Selectable high switching frequency allows faster loop response and easy filtering with a low noise output. The non-inverting input its error amplifier is connected to an internal 0.6V precision reference voltage. Soft-Start time can be programmed with an external capacitor, which sets the input current ramp rate. Current mode control and external compensation network make it easy and flexible to stabilize the system.

### Ordering Information



### Typical Application Circuit



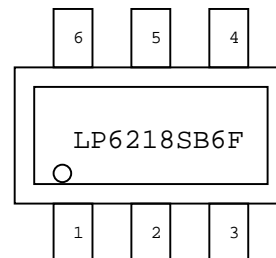
### Features

- ◆ Up to 94% efficiency
- ◆ Output to Input Disconnect at Shutdown Mode
- ◆ Shut-down current:<1uA
- ◆ Output voltage Up to 12V
- ◆ Internal Compensation, Soft-start
- ◆ 1.2MHz fixed frequency switching
- ◆ High switch on current:2.6A
- ◆ Available in SOT23-6 Package

### Applications

- ◇ Battery products
- ◇ Host Products
- ◇ Panel

### Pin Configurations



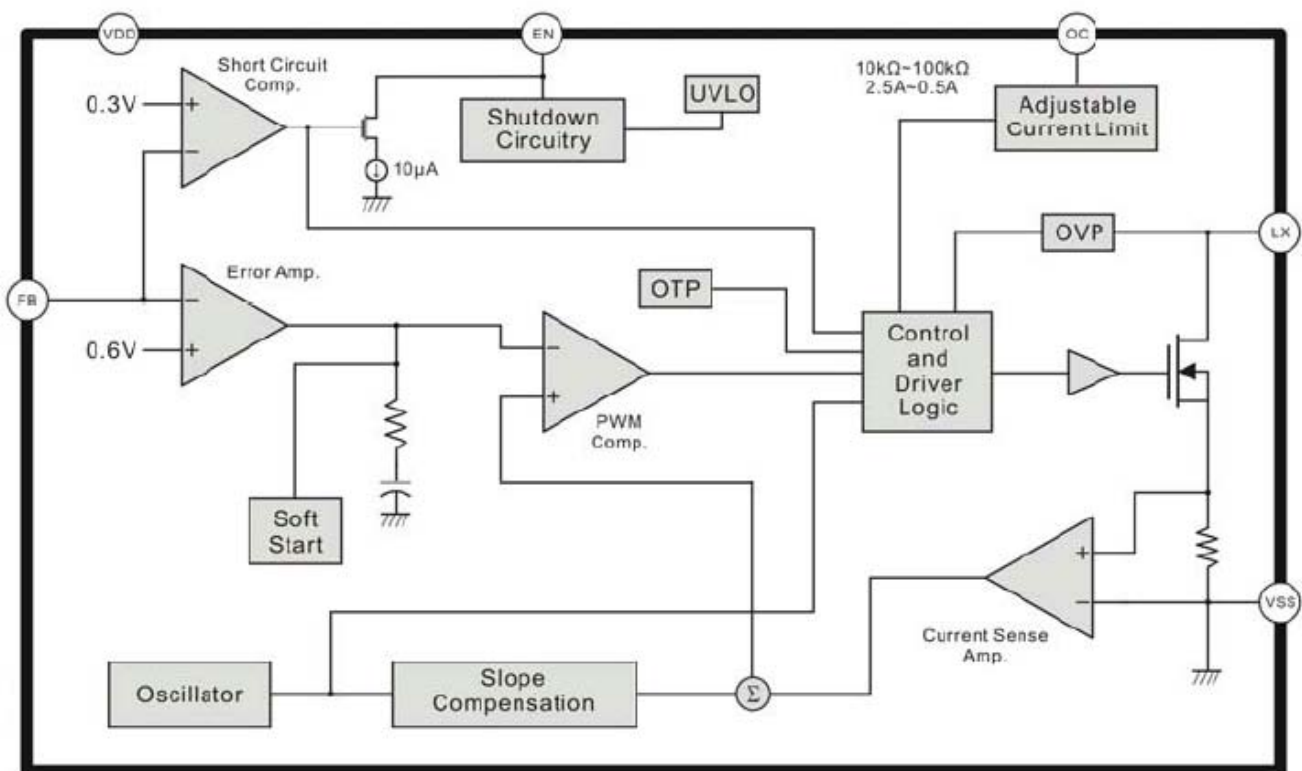
### Marking Information

Please see website:[www.lowpowersemi.com](http://www.lowpowersemi.com).

## Functional Pin Description

PIN	PIN Name	Description
5	VIN	Power Supply pin.
2	GND	Ground.
6	NC	No connector.
1	SW/LX	Output switching node. SW is the drain of the internal low-side N-Channel MOSFET and high-side P-Channel MOSFET. Connect the inductor to SW to Complete the step-up converter.
4	EN	Regulator On/off Control Input. A logic high input(VEN>1.4V) turns on the regulator. A logic low input(VEN<0.4V) puts the LP6218S into low current shutdown mode.
3	FB	Regulation Feedback Input. Connect to an external resistive voltage divider from the output to FB to set the output voltage.

## Function Block Diagram



## Absolute Maximum Ratings

Supply Input Voltage-----6V  
 Power Dissipation, PD @ TA = 25° C  
 SOT23-6-----450mW  
 Package Thermal Resistance  
 SOT23-6,  $\theta_{JA}$  -----165°C/W  
 Lead Temperature (Soldering, 10 sec.) -----260°C

### Recommended Operating Conditions

Supply Input Voltage-----2.2V to 6V  
 EN Input Voltage -----0V to 5.5V  
 Operation Junction Temperature Range -----40°C to 125°C  
 Operation Ambient Temperature Range-----40°C to 85°C

## Electrical Characteristics

(Vin=2.4V, Vout=3.5V, Cin=10uF, Cout=22uF, L1=4.7uH, R1=178K, R2=100K)

Parameter	Conditions	LP6218S			Units
		Min	Typ	Max	
Supply Voltage		1.6		6	V
Output Voltage Range		2.5		6	V
Supply Current(Shutdown)	VEN=VOUT=0V, VSW=5V		0.05	1	uA
Supply Current	VFB=1.3V		0.19		mA
Feedback Voltage			0.6		V
Feedback Input Current	VFB=1.2V		50		nA
Switching Frequency			1.20		MHz
Maximum Duty Cycle		80	90	95	%
EN Input Low Voltage				0.4	V
EN Input High Voltage		1.4			V
Switch mosfet Current Limit		2.6			A
High-side On Resistance	Vout=3.3V		220	300	mΩ
Mosfet Voltage			14		V

## Operation Information

The LP6218S uses a 1.2MHz fixed-frequency, current-mode regulation architecture to regulate the output voltage. The LP6218S measures the output voltage through an external resistive voltage divider and compares that to the internal 0.6V reference to generate the error voltage to the inductor current to regulate the output voltage. the use of current-mode regulation improves transient response and control loop stability.

When the LP6218S is disable(EN=Low),both power switches are off. There is no current path from SW to OUT. There fore, the output voltage discharges to ground. When the LP6218S is enabled(EN=High),a limited start-current charges the output voltage rising to SW, then the part operates in force PWM mode for regulating the output voltage to the target value. At the beginning of each cycle, the N-channel MOSFET switch is turned on, forcing the inductor current to rise, The current at the source of the switch is internally measured and converted to a voltage by the current sense amplifier. That voltage is compared to the error voltage. When the inductor current rises sufficiently, the PWM comparator turns off the switch, forcing the inductor current to the output capacitor through the internal P-Channel MOSFET rectifier, which forces the inductor current to decrease. The peak inductor current is controlled by the error voltage. Thus the output voltage controls the inductor current to satisfy the lode.

### Setting the Output Voltage

Set the output voltage by selecting the resistive voltage divider ratio. The voltage divider drops the output voltage to the 0.6V feedback voltage. Use a 100K resistor for R2 of the voltage divider. Determine the high-side resistor R1 by the equation:

$$V_{out}=(R1/R2+1) \times V_{FB}$$

### Current Limitation

The internal power-MOS switch current is monitored cycle-by-cycle and is limited to the value not exceed

1.6A (Typ.). When the switch current reaches the limited value, the internal power-MOS is turned off immediately until the next cycle. Keep traces at this pin as short as possible. Do not put capacitance at this pin.

### Inductor Selection

For a better efficiency in high switching frequency converter, the inductor selection has to use a proper core material such as ferrite core to reduce the core loss and choose low ESR wire to reduce copper loss. The most important point is to prevent the core saturated when handling the maximum peak current. Using a shielded inductor can minimize radiated noise in sensitive applications. The maximum peak inductor current is the maximum input current plus the half of inductor ripple current. The calculated peak current has to be smaller than the current limitation in the electrical characteristics. A typical setting of the inductor ripple current is 20% to 40% of the maximum input current. If the selection is 40%, the maximum peak inductor current is

$$\begin{aligned} I_{PEAK} &= I_{IN(MAX)} + \frac{1}{2} I_{RIPPLE} = 1.2 \times I_{IN(MAX)} \\ &= 1.2 \times \left[ \frac{I_{OUT(MAX)} \times V_{OUT}}{\eta \times V_{IN(MIN)}} \right] \end{aligned}$$

The minimum inductance value is derived from the following equation :

$$L = \frac{\eta \times V_{IN(MIN)}^2 \times [V_{OUT}-V_{IN(MIN)}]}{0.4 \times I_{OUT(MAX)} \times V_{OUT}^2 \times f_{OSC}}$$

Depending on the application, the recommended inductor value is between 2.2μH to 10μH.

### Diode Selection

To achieve high efficiency, Schottky diode is good choice for low forward drop voltage and fast switching time. The output diode rating should be able to handle the maximum output voltage, average power dissipation and the pulsating diode peak current.

bigger than ceramic capacitor. The output voltage ripple consists of two components: one is the pulsating output ripple current flows through the ESR, and the other is the capacitive ripple caused by charging and discharging.

$$\begin{aligned} V_{\text{RIPPLE}} &= V_{\text{RIPPLE\_ESR}} + V_{\text{RIPPLE\_C}} \\ &\cong I_{\text{PEAK}} \times R_{\text{ESR}} + \frac{I_{\text{PEAK}}}{C_{\text{OUT}}} \left( \frac{V_{\text{OUT}} - V_{\text{IN}}}{V_{\text{OUT}} \times f_{\text{OSC}}} \right) \end{aligned}$$

### Input Capacitor Selection

For better input bypassing, low-ESR ceramic capacitors are recommended for performance. A 10 $\mu$ F input capacitor is sufficient for most applications. For a lower output power requirement application, this value can be decreased.

### Layout Guideline

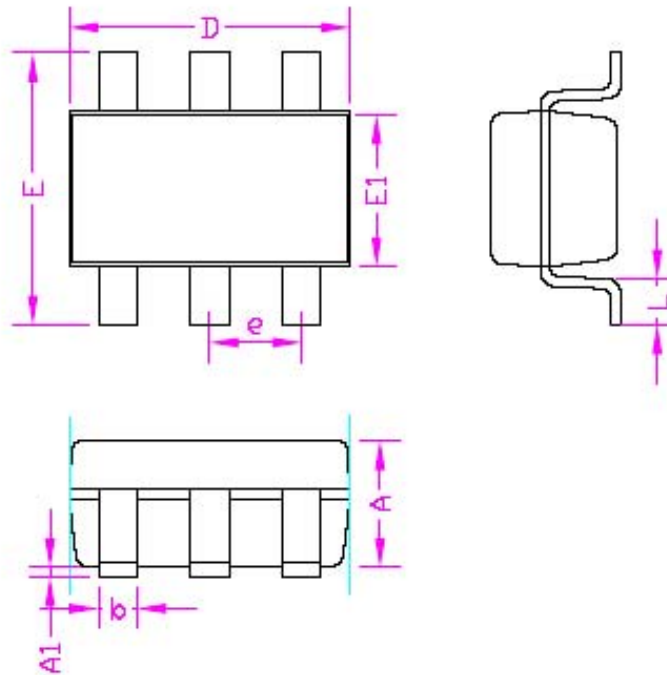
For high frequency switching power supplies, the PCB layout is important step in system application design. In order to let IC achieve good regulation, high efficiency and stability, it is strongly recommended the power components should be placed as close as possible. The set traces should be wide and short. The feedback pin and then works of feedback and compensation should keep away from the power loops, and be shielded with a ground trace or plane to prevent noise coupling.

### Output Capacitor Selection

For lower output voltage ripple, low-ESR ceramic capacitors are recommended. The tantalum capacitors can be used as well, but the ESR is

## Packaging Information

SOT23-6



SYMBOLS	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.45	-	0.057
A1	0.00	0.15	0.000	0.006
b	0.30	0.50	0.012	0.020
D	2.90		0.114	
E1	1.60		0.063	
e	0.95		0.037	
E	2.60	3.00	0.102	0.118
L	0.3	0.60	0.012	0.024