

## 400KHz 60V 3A Switching Current Boost / Buck-Boost / Inverting DC/DC Converter

### Features

- Wide 3.6V to 32V Input Voltage Range
- Positive or Negative Output Voltage Programming with a Single Feedback Pin
- Current Mode Control Provides Excellent Transient Response
- 1.25V reference adjustable version
- Fixed 400KHz Switching Frequency
- Maximum 3A Switching Current
- SW PIN Built in Over Voltage Protection
- Excellent line and load regulation
- EN PIN TTL shutdown capability
- Internal Optimize Power MOSFET
- High efficiency up to 92%
- Built in Frequency Compensation
- Built in Soft-Start Function
- Built in Thermal Shutdown Function
- Built in Current Limit Function
- Available in TO252-5L package

### Applications

- Automotive and Industrial Boost / Buck-Boost / Inverting Converters
- Portable Electronic Equipment

### General Description

The XL6008 regulator is a wide input range, current mode, DC/DC converter which is capable of generating either positive or negative output voltages. It can be configured as either a boost, flyback, SEPIC or inverting converter. The XL6008 built in N-channel power MOSFET and fixed frequency oscillator, current-mode architecture results in stable operation over a wide range of supply and output voltages.

The XL6008 regulator is special design for portable electronic equipment.



Figure1. Package Type of XL6008

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**Pin Configurations**

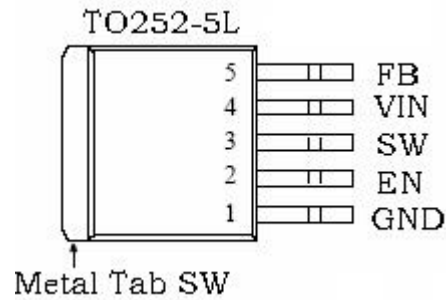


Figure2. Pin Configuration of XL6008 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	GND	Ground Pin.
2	EN	Enable Pin. Drive EN pin low to turn off the device, drive it high to turn it on. Floating is default high.
3	SW	Power Switch Output Pin (SW).
4	VIN	Supply Voltage Input Pin. XL6008 operates from a 3.6V to 32V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
5	FB	Feedback Pin (FB). The feedback threshold voltage is 1.25V.

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**Function Block**

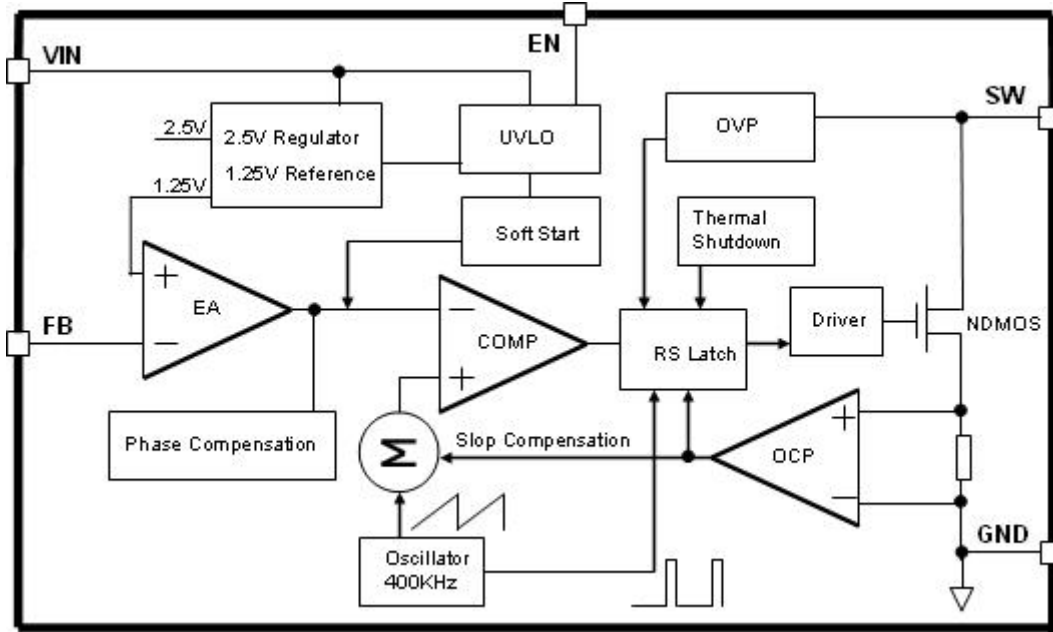


Figure3. Function Block Diagram of XL6008

**Typical Application Circuit**

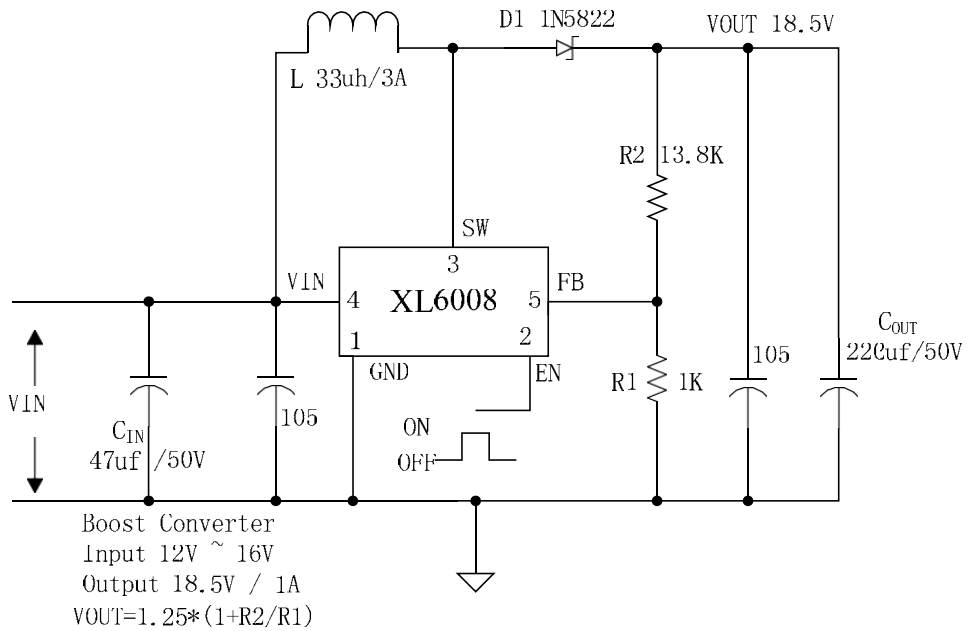


Figure4. XL6008 Typical Application Circuit (Boost Converter)

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### Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL6008E1	XL6008E1	TO252-5L	2500 Units on Tape & Reel

XLSEMI Pb-free products, as designated with “E1” suffix in the par number, are RoHS compliant.

### Absolute Maximum Ratings (Note1)

Parameter	Symbol	Value	Unit
Input Voltage	$V_{in}$	-0.3 to 36	V
Feedback Pin Voltage	$V_{FB}$	-0.3 to $V_{in}$	V
EN Pin Voltage	$V_{EN}$	-0.3 to $V_{in}$	V
Output Switch Pin Voltage	$V_{Output}$	-0.3 to 60	V
Power Dissipation	$P_D$	Internally limited	mW
Thermal Resistance (TO252-5L) (Junction to Ambient, No Heatsink, Free Air)	$R_{JA}$	50	°C/W
Operating Junction Temperature	$T_J$	-40 to 125	°C
Storage Temperature	$T_{STG}$	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	$T_{LEAD}$	260	°C
ESD (HBM)		>2000	V

**Note1:** Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**400KHz 60V 3A Switching Current Boost / Buck-Boost / Inverting DC/DC Converter**
**XL6008 Electrical Characteristics**

$T_a = 25^\circ\text{C}$ ; unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<i>System parameters test circuit figure4</i>						
VFB	Feedback Voltage	$V_{in} = 12\text{V to } 16\text{V}, V_{out}=18\text{V}$ $I_{load}=0.1\text{A to } 1\text{A}$	1.213	1.25	1.287	V
Efficiency	$\eta$	$V_{in}=12\text{V}, V_{out}=18.5\text{V}$ $I_{out}=1\text{A}$	-	92	-	%

**Electrical Characteristics (DC Parameters)**

$V_{in} = 12\text{V}$ ,  $GND=0\text{V}$ ,  $V_{in}$  &  $GND$  parallel connect a  $220\mu\text{f}/50\text{V}$  capacitor;  $I_{out}=0.5\text{A}$ ,  $T_a = 25^\circ\text{C}$ ; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	$V_{in}$		3.6		32	V
Shutdown Supply Current	$I_{STBY}$	$V_{EN}=0\text{V}$		70	100	$\mu\text{A}$
Quiescent Supply Current	$I_q$	$V_{EN}=2\text{V},$ $V_{FB}=V_{in}$		2.5	5	$\text{mA}$
Oscillator Frequency	$F_{osc}$		320	400	480	KHz
Switch Current Limit	$I_L$	$V_{FB}=0$		3		A
Output Power NMOS	$R_{dson}$	$V_{in}=12\text{V},$ $I_{sw}=3\text{A}$		110	120	mohm
EN Pin Threshold	$V_{EN}$	High (Regulator ON) Low (Regulator OFF)		1.4 0.8		V
EN Pin Input Leakage Current	$I_H$	$V_{EN}=2\text{V (ON)}$		3	10	$\mu\text{A}$
	$I_L$	$V_{EN}=0\text{V (OFF)}$		3	10	$\mu\text{A}$
Max. Duty Cycle	$D_{MAX}$	$V_{FB}=0\text{V}$		90		%

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**Schottky Diode Selection Table**

Current	Surface Mount	Through Hole	VR (The same as system maximum input voltage)				
			20V	30V	40V	50V	60V
1A		✓	1N5817	1N5818	1N5819		
3A		✓	1N5820	1N5821	1N5822		
		✓	MBR320	MBR330	MBR340	MBR350	MBR360
	✓		SK32	SK33	SK34	SK35	SK36
	✓			30WQ03	30WQ04	30WQ05	
		✓		31DQ03	31DQ04	31DQ05	
		✓	SR302	SR303	SR304	SR305	SR306

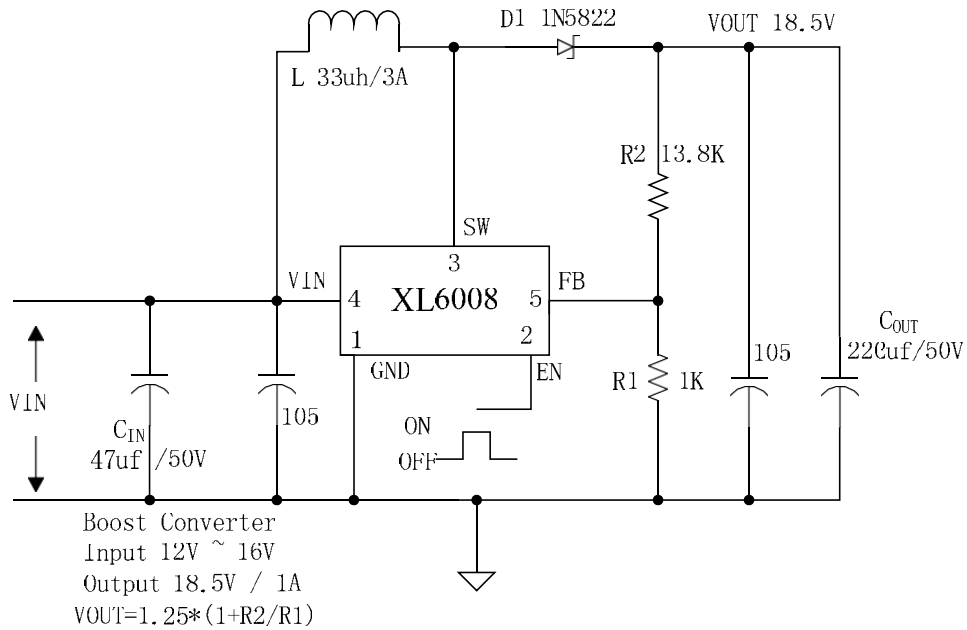
**Typical System Application – Boost (Output 18.5V/1A)**


Figure5. XL6008 Typical System Application (Boost Converter)

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**Typical System Application – SEPIC Buck-Boost (Input 10V~30V, Output 12V/2A)**

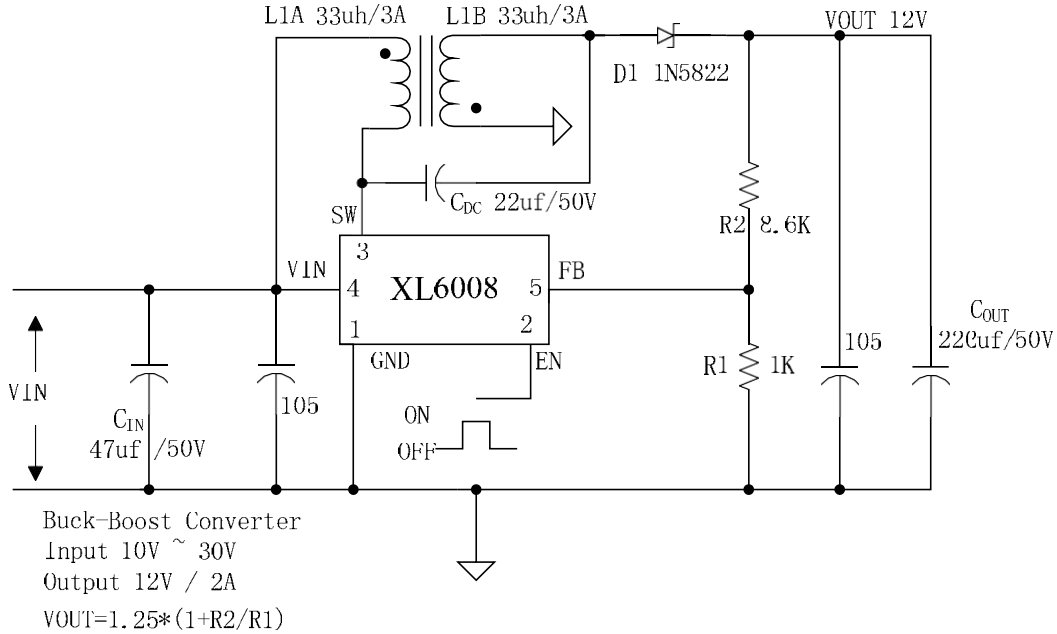
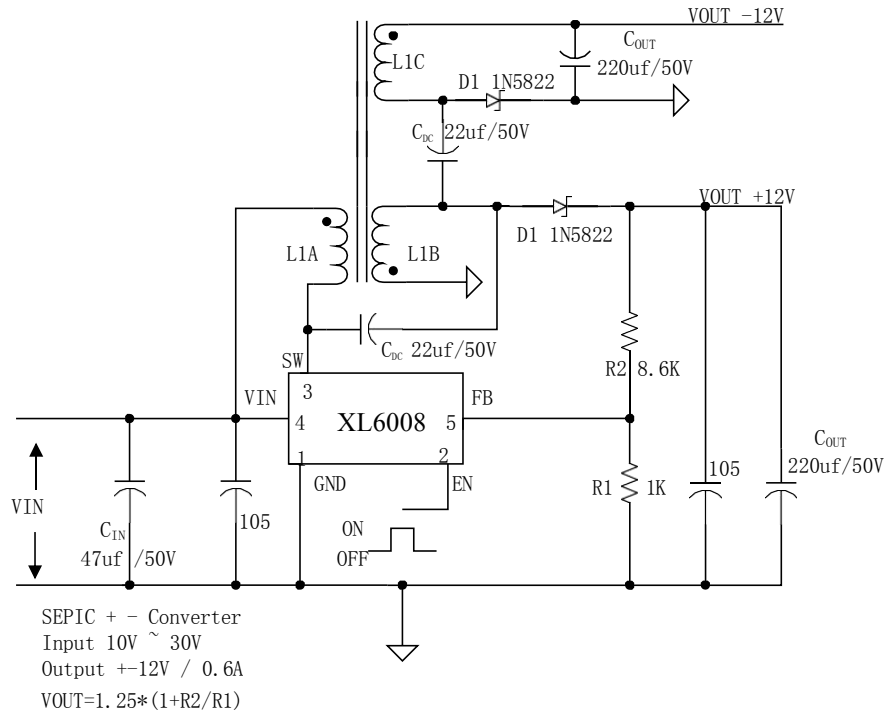


Figure6. XL6008 Typical System Application (SEPIC Buck-Boost Converter)

**Typical System Application for Inverting Converter**

**– SEPIC Inverting Topology (Input 10V~30V, Output + -12V/0.6A)**



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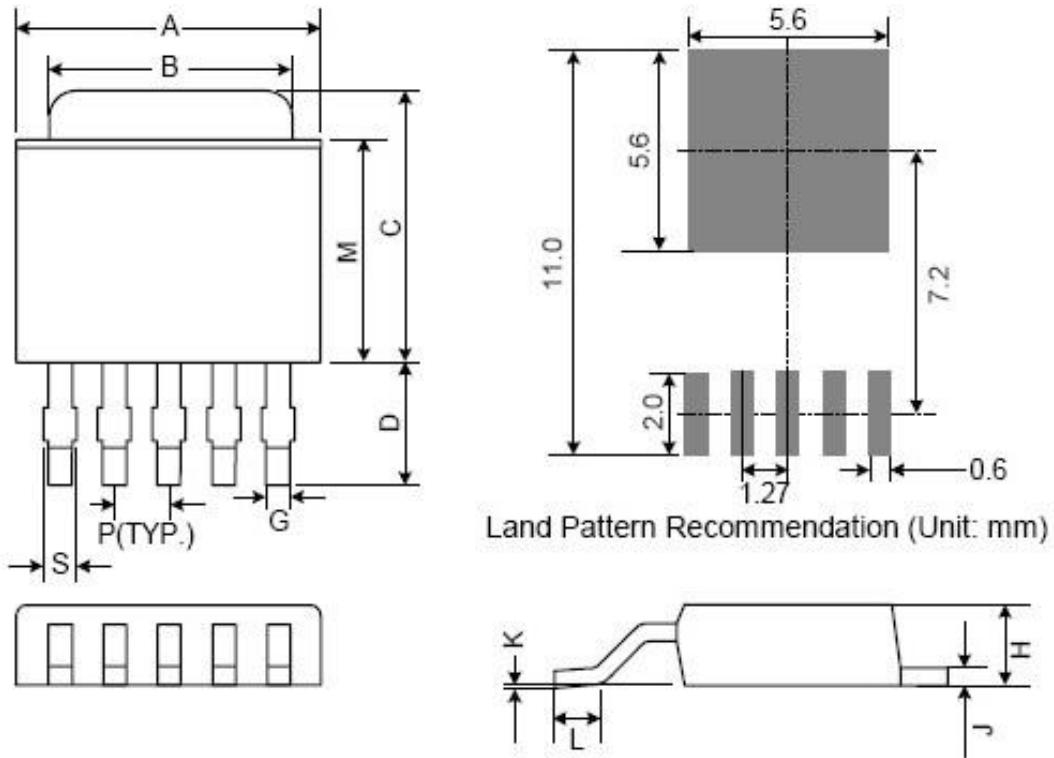
Figure7. XL6008 Typical System Application (SEPIC Inverting Converter)



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Package Information

TO252-5L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	6.35	6.60	6.85	0.250	0.260	0.270
B	5.20	5.35	5.50	0.205	0.211	0.217
C	6.80	7.00	7.30	0.268	0.276	0.287
D	2.40	2.80	3.20	0.094	0.110	0.126
P	1.27 REF.			0.050 REF.		
S	0.50	0.65	0.80	0.020	0.026	0.031
G	0.40	0.50	0.63	0.016	0.020	0.025
H	2.20	2.30	2.40	0.087	0.091	0.094
J	0.45	0.52	0.58	0.018	0.020	0.023
K	0.00	0.08	0.15	0.000	0.003	0.006
L	0.90	1.20	1.63	0.035	0.047	0.064
M	5.40	5.80	6.20	0.213	0.228	0.244