

## Features

- n Wide 4.5V to 40V Input Voltage Range
- n Output Adjustable from 1.235V to 37V
- n Minimum Drop Out 1.5V
- n Fixed 52kHz Switching Frequency
- n 3A Constant Output Current Capability
- n Internal Optimize Power Transistor
- n Excellent line and load regulation
- n **With output constant current loop**
- n Built in thermal shutdown function
- n Built in current limit function
- n **Built in output over voltage protection**
- n TO263-5L package

## General Description

The XL4102 is a 52KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 3A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 100%. An over current protection function is built inside. An internal compensation block is built in to minimize external component count.

## Applications

- n Car Charger
- n Battery Charger



TO263-5L

Figure1. Package Type of XL4102

3A 52kHz 40V Buck Li Battery Charger

XL4102

## Pin Configurations

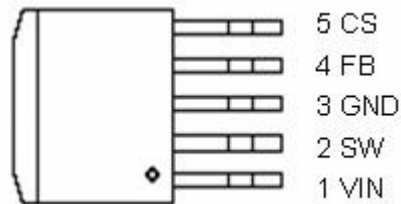


Figure2. Pin Configuration of XL4102 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	VIN	Supply Voltage Input Pin. XL4102 operates from a 4.5V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
2	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output.
3	GND	Ground Pin.(Note: <b>Connected the back exposed PAD to Pin3.</b> )
4	FB	Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.235V.
5	CS	Output Current Sense Pin; ( $I_{load}=0.155V/R_{cs}$ )

3A 52kHz 40V Buck Li Battery Charger

XL4102

**Function Block**

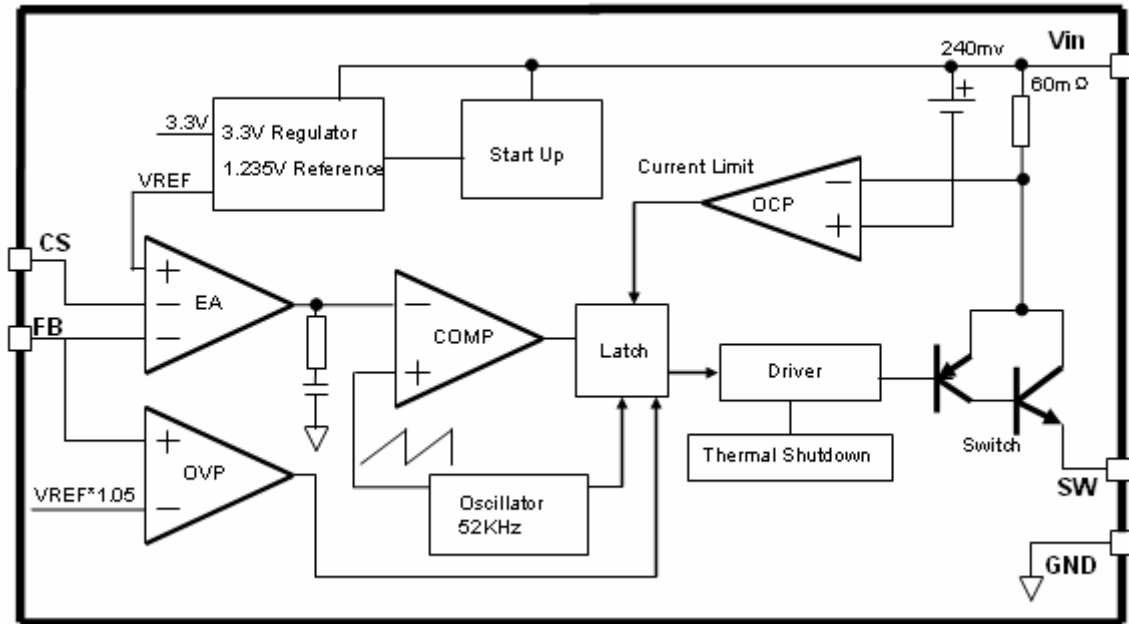


Figure3. Function Block Diagram of XL4102

**Typical Application Circuit (Car Charger)**

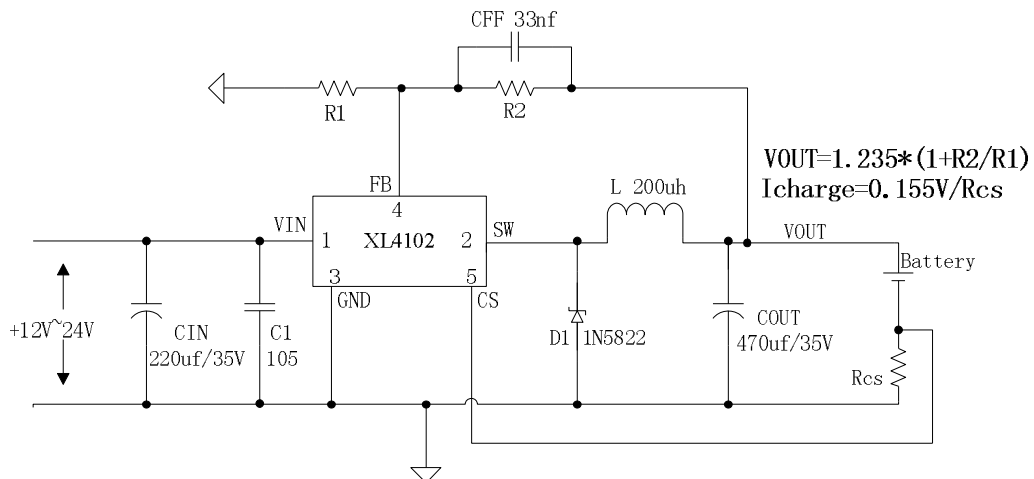


Figure4. XL4102 Typical Application Circuit (Li Battery Charger)

3A 52kHz 40V Buck Li Battery Charger

XL4102

### Ordering Information

Package	Temperature Range	Part Number	Marking ID	Packing Type
		Lead Free	Lead Free	
		XL4102E1	XL4102E1	Tube
		XL4102TRE1	XL4102E1	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 <sub>in</sub>	-0.3 to 45	V
FB Pin Voltage	V <sub>FB</sub>	-0.3 to V <sub>in</sub>	V
SW Pin Voltage	V <sub>SW</sub>	-0.3 to V <sub>in</sub>	V
Power Dissipation	P <sub>D</sub>	Internally limited	mW
Thermal Resistance (Junction to Ambient, No Heatsink, Free Air)	R <sub>JA</sub>	50	°C/W
Operating Junction Temperature	T <sub>J</sub>	-40 to 125	°C
Storage Temperature	T <sub>STG</sub>	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T <sub>LEAD</sub>	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.



3A 52kHz 40V Buck Li Battery Charger

XL4102

### XL4102 Electrical Characteristics

T<sub>a</sub> = 25 °C ;unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<i>System parameters test circuit figure4</i>						
VFB	Feedback Voltage	V <sub>in</sub> = 8V to 32V, V <sub>out</sub> =5V I <sub>load</sub> =0.2A to 3A	1.198	1.235	1.272	V
Efficiency	η	V <sub>in</sub> =12V , V <sub>out</sub> =5V I <sub>out</sub> =3A	-	80	-	%

### Electrical Characteristics (DC Parameters)

V<sub>in</sub> = 12V, GND=0V, V<sub>in</sub> & GND parallel connect a 220uf/50V capacitor; I<sub>out</sub>=500mA, T<sub>a</sub> = 25 °C; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	V <sub>in</sub>		4.5		40	V
Quiescent Supply Current	I <sub>q</sub>	V <sub>FB</sub> =V <sub>in</sub>		2	5	mA
Oscillator Frequency	F <sub>osc</sub>		44	52	60	Khz
Switch Current Limit	I <sub>L</sub>	V <sub>FB</sub> =0		3.6		A
Output Saturation Voltage	V <sub>CE</sub>	V <sub>FB</sub> =0V I <sub>SW</sub> =2A		1.1	1.4	V
Constant current sense Voltage	V <sub>CS</sub>		0.132	0.155	0.178	V



3A 52kHz 40V Buck Li Battery Charger

XL4102

**Schottky Diode Selection Table**

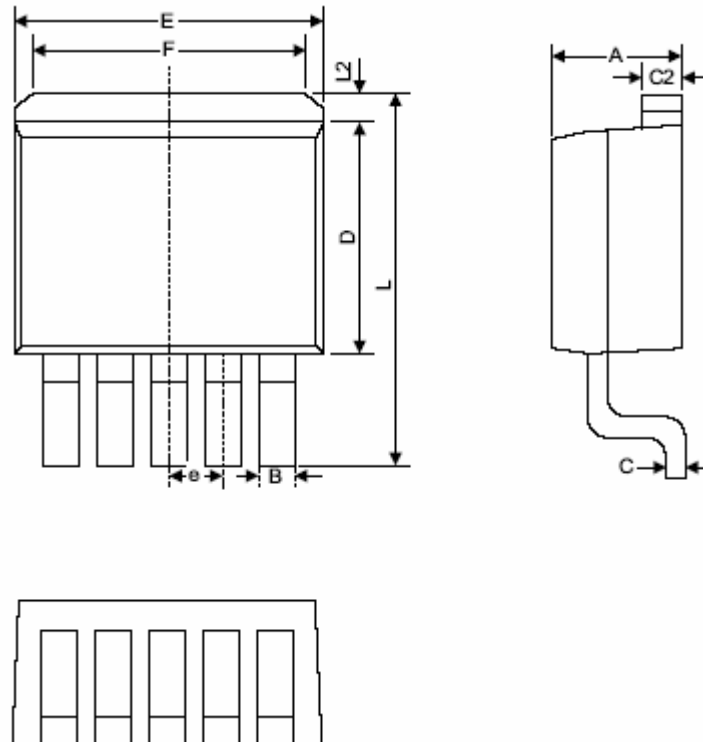
Current	Surface Mount	Through Hole	VR (The same as system maximum input voltage)				
			20V	30V	40V	50V	60V
1A		√	1N5817	1N5818	1N5819		
3A		√	1N5820	1N5821	1N5822		
		√	MBR320	MBR330	MBR340	MBR350	MBR360
	√		SK32	SK33	SK34	SK35	SK36
	√			30WQ03	30WQ04	30WQ05	
		√		31DQ03	31DQ04	31DQ05	
		√	SR302	SR303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

3A 52kHz 40V Buck Li Battery Charger

XL4102

**Package Information**

**TO263-5L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	0.160	0.190
B	0.76	1.02	0.030	0.040
C	0.36	0.64	0.014	0.025
C2	1.14	1.40	0.045	0.055
D	8.64	9.65	0.340	0.380
E	9.78	10.54	0.385	0.415
e	1.57	1.85	0.062	0.073
F	6.60	7.11	0.260	0.280
L	15.11	15.37	0.595	0.605
L2	-	1.40	-	0.055