

Features

- Wide 4.5V to 40V Input Voltage Range
- 5V and adjustable versions
- Output Adjustable from 1.23V to 37V
- Maximum Duty Cycle 100%
- Minimum Drop Out 1.5V
- Fixed 150KHz Switching Frequency
- 3A Constant Output Current Capability
- Internal Optimize Power Transistor
- High efficiency
- Excellent line and load regulation
- TTL shutdown capability
- ON/OFF pin with hysteresis function
- Built in thermal shutdown function
- Built in current limit function
- Built in second current limit function
- Available in TO-252 package

Applications

- LCD Monitor and LCD TV
- Digital Photo Frame
- Set-up Box
- ADSL Modem
- Telecom / Networking Equipment

General Description

The XL1507 is a 150 KHz 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 enable function, an over current protection function is built inside. When second current limit function happens, the operation frequency will be reduced from 150KHz to 50KHz. An internal compensation block is built in to minimize external component count.



Figure1. Package Type of XL1507 (TO252-5L)

Pin Configurations (TO252-5L)

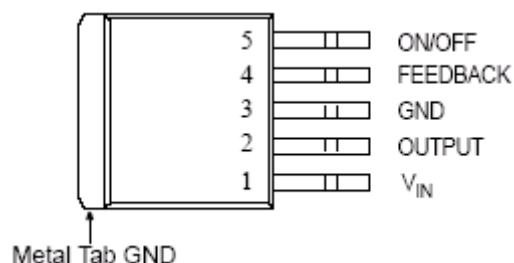


Figure2. Pin Configuration of XL1507 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	V_{IN}	Supply Voltage Input Pin. XL1507 operates from a 4.5V to 40V DC voltage. Bypass V_{in} to GND with a suitably large capacitor to eliminate noise on the input.
2	OUTPUT	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output.
3	GND	Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL1507.
4	FEEDBACK	Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.23V.
5	ON/OFF	Enable Pin. Drive ON/OFF pin low to turn on the device, drive it high to turn it off. Floating is default low.

Function Block

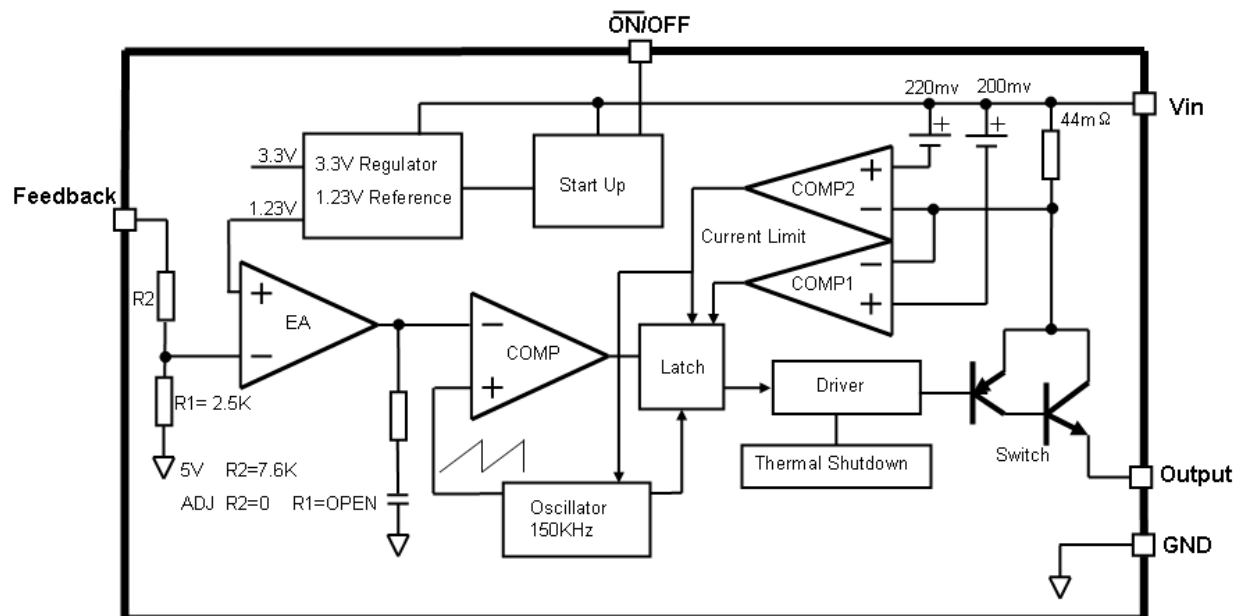


Figure3. Function Block Diagram of XL1507

Typical Application Circuit

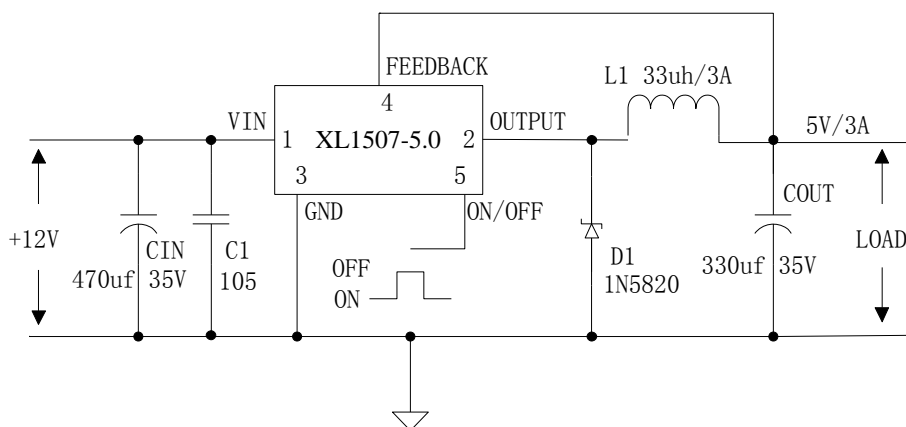
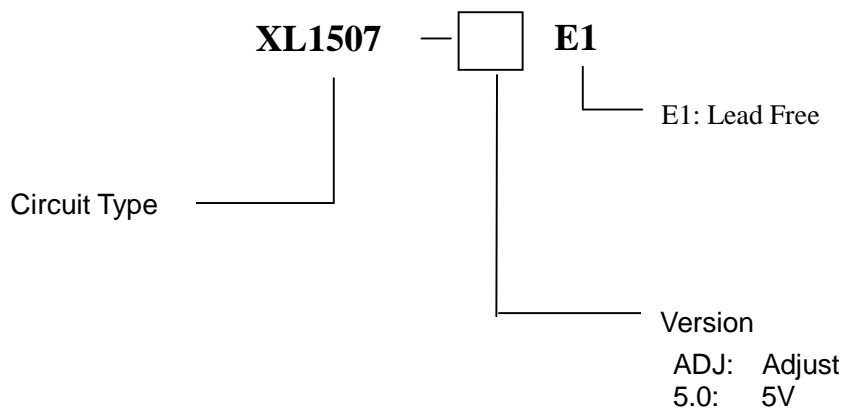


Figure4. XL1507 Typical Application Circuit 12V-5V/3A

Ordering Information



Order Information	Marking ID	Package Type	Packing Type Supplied As
XL1507-ADJE1	XL1507-ADJE1	TO252-5L	2500 Units on Tape & Reel
XL1507-5.0E1	XL1507-5.0E1	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 45	V
Feedback Pin Voltage	V _{FB}	-0.3 to V _{in}	V
ON/OFF Pin Voltage	V _{ON/OFF}	-0.3 to V _{in}	V
Output Switch Pin Voltage	V _{Output}	-0.3 to V _{in}	V
Power Dissipation	P _D	Internally limited	mW
Thermal Resistance (TO252) (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.

XL1507-5.0 Electrical Characteristics

T_a = 25 °C ;unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V _{OUT}	Output Voltage	V _{in} = 7V to 40V I _{load} =0.2A to 3A	4.8	5	5.2	V
Efficiency	η	V _{in} =12V , V _{out} =5V I _{out} =3A	-	80	-	%

XL1507-ADJ Electrical Characteristics

T_a = 25 °C ;unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V _{OUT}	Output Voltage	V _{in} = 4.5V to 40V I _{load} =0.2A to 3A	1.193	1.23	1.267	V
Efficiency	η	V _{in} =12V , V _{out} =3V I _{out} =3A	-	73	-	%

Electrical Characteristics (DC Parameters)

$V_{in} = 12V$, $GND=0V$, V_{in} & GND parallel connect a 220uf/50V capacitor; $I_{out}=500mA$, $T_a = 25^{\circ}C$; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	V_{in}		4.5		40	V
Shutdown Supply Current	I_{STBY}	$V_{ON/OFF}=5V$		80	200	μA
Quiescent Supply Current	I_q	$V_{ON/OFF}=0V$, $V_{FB}=V_{in}$		2	10	mA
Oscillator Frequency	F_{osc}		127	150	173	Khz
Switch Current Limit	I_L	$V_{FB}=0$	3.6	4.8	6.9	A
ON/OFF Pin Threshold	$V_{ON/OFF}$	High (Regulator OFF) Low (Regulator ON)		1.4 0.8		V
ON/OFF Pin Input Leakage Current	I_H	$V_{ON/OFF}=2.5V$ (OFF)		5	15	μA
	I_L	$V_{ON/OFF}=0.5V$ (ON)		0.2	5	μA
Output Saturation Voltage	V_{CE}	$V_{FB}=0V$ $I_{out}=3A$		1.3	1.5	V
Max. Duty Cycle	D_{MAX}	$V_{FB}=0V$		100		%

Test Circuit and Layout guidelines

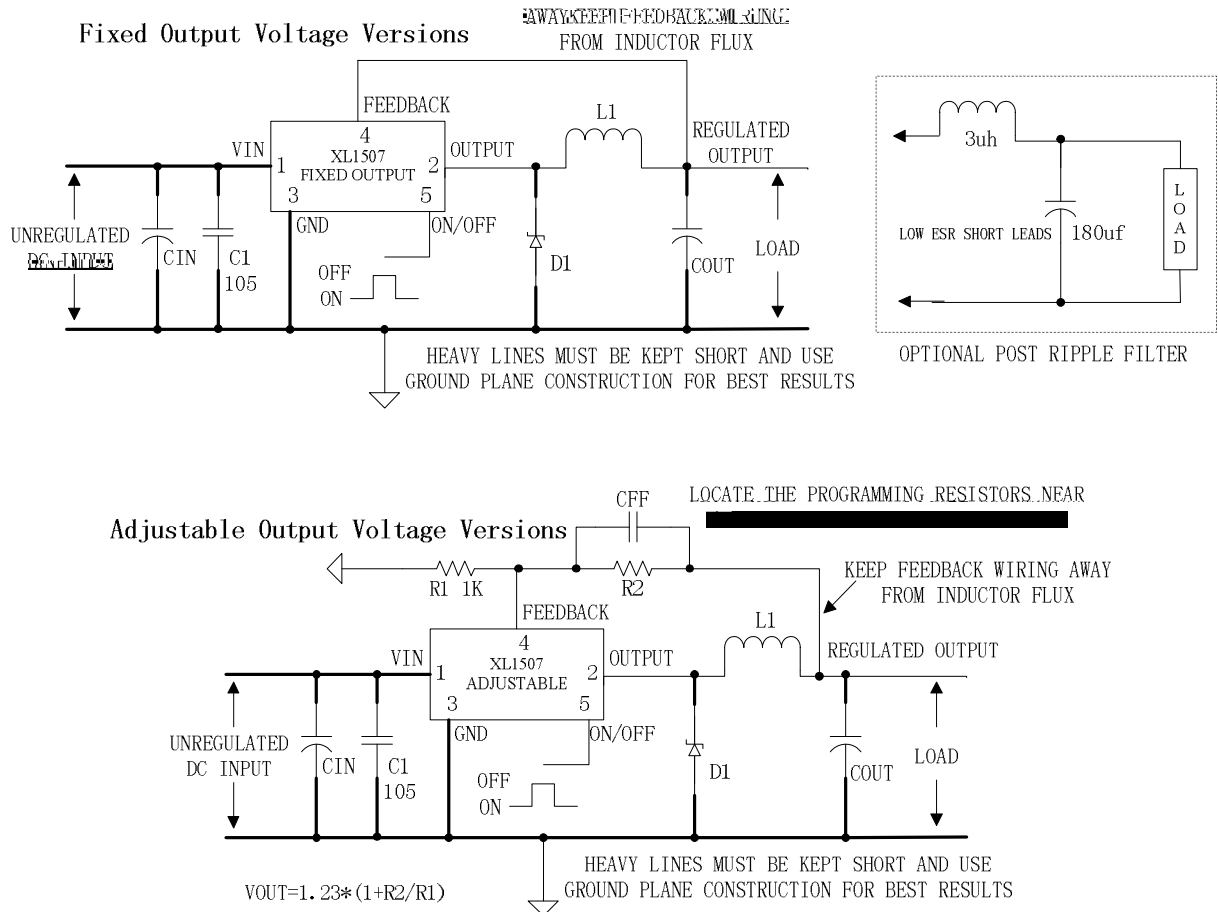


Figure5. Standard Test Circuits and Layout Guides

Select R1 to be approximately 1K, use a 1% resistor for best stability.

C1 and CFF are optional; in order to increase stability and reduce the input power line noise, CIN and C1 must be placed near to PIN1 and PIN3;

For output voltages greater than approximately 10V, an additional capacitor CFF is required. The compensation capacitor is typically between 100 pf and 33 nf, and is wired in parallel with the output voltage setting resistor, R2. It provides additional stability for high output voltage, low input-output voltages, and/or very low ESR output capacitors, such as solid tantalum capacitors.

$CFF = 1 / (31 * 1000 * R2)$; This capacitor type can be ceramic, plastic, silver mica, etc. (Because of the unstable characteristics of ceramic capacitors made with Z5U material, they are not recommended.)

XL1507 Series Buck Regulator Design Procedure (Fixed Output)

Conditions			Inductor (L1)	Output Capacitor (COUT)			
Output Voltage (V)	Load Current (A)	Max Input Voltage (V)		Inductance (uh)	Through Hole Electrolytic		Surface Mount Tantalum
			Panasonic HFQ Series (uf/V)		Nichicon PL Series (uf/V)	AVX TPS Series (uf/V)	Sprague 595D Series (uf/V)
3.3	3	5	22	470/25	560/16	330/6.3	390/6.3
		7	22	560/35	560/35	330/6.3	390/6.3
		10	22	680/35	680/35	330/6.3	390/6.3
		40	33	560/35	470/35	330/6.3	390/6.3
	2	6	22	470/25	470/35	330/6.3	390/6.3
		10	33	330/35	330/35	330/6.3	390/6.3
5	3	8	22	470/25	560/16	220/10	330/10
		10	22	560/25	560/25	220/10	330/10
		15	33	330/35	330/35	220/10	330/10
		40	47	330/35	270/35	220/10	330/10
	2	9	22	470/25	560/16	220/10	330/10
		20	68	180/35	180/35	100/10	270/10
12	3	15	22	470/25	470/25	100/16	180/16
		18	33	330/25	330/25	100/16	180/16
		30	68	180/25	180/25	100/16	120/20
		40	68	180/35	180/25	100/16	120/20
	2	15	33	330/25	330/25	100/16	180/16
		20	68	180/25	180/25	100/16	120/20
		40	150	82/25	82/25	68/20	68/25

Typical System Application for 5V Version

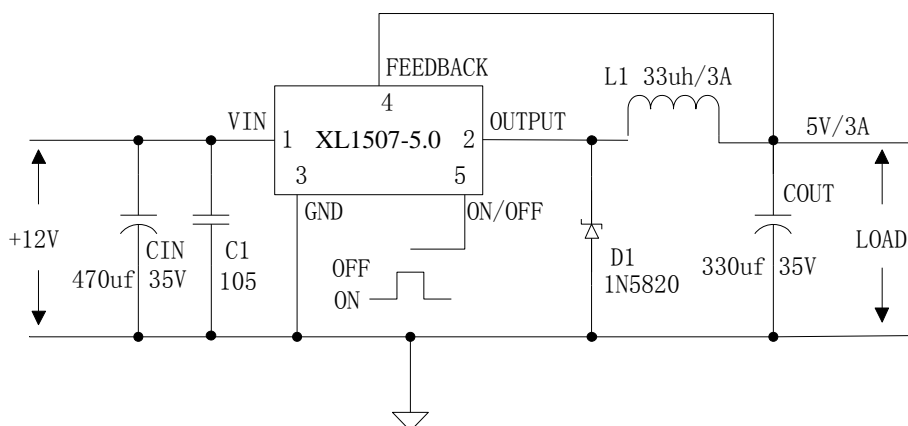


Figure7. XL1507-5.0 System Parameters Test Circuit

Typical System Application for ADJ Version

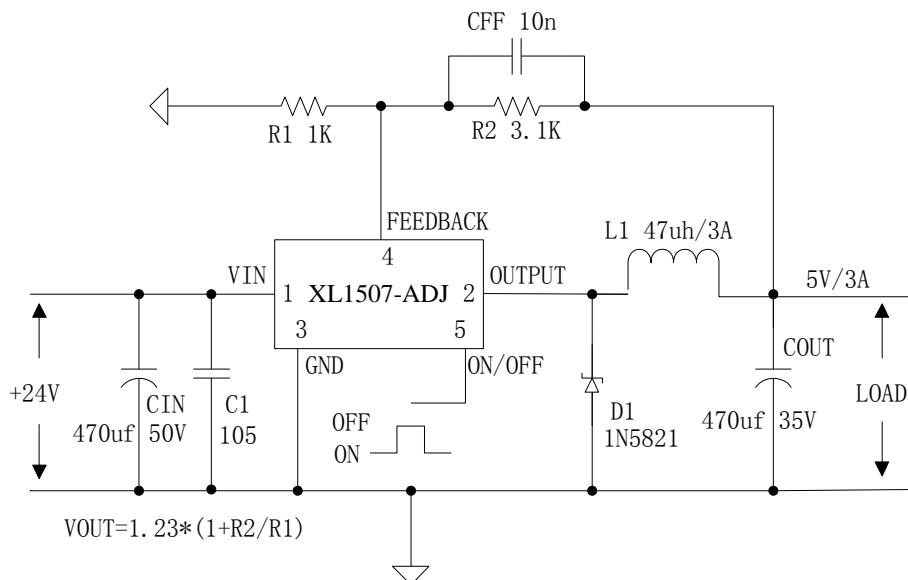
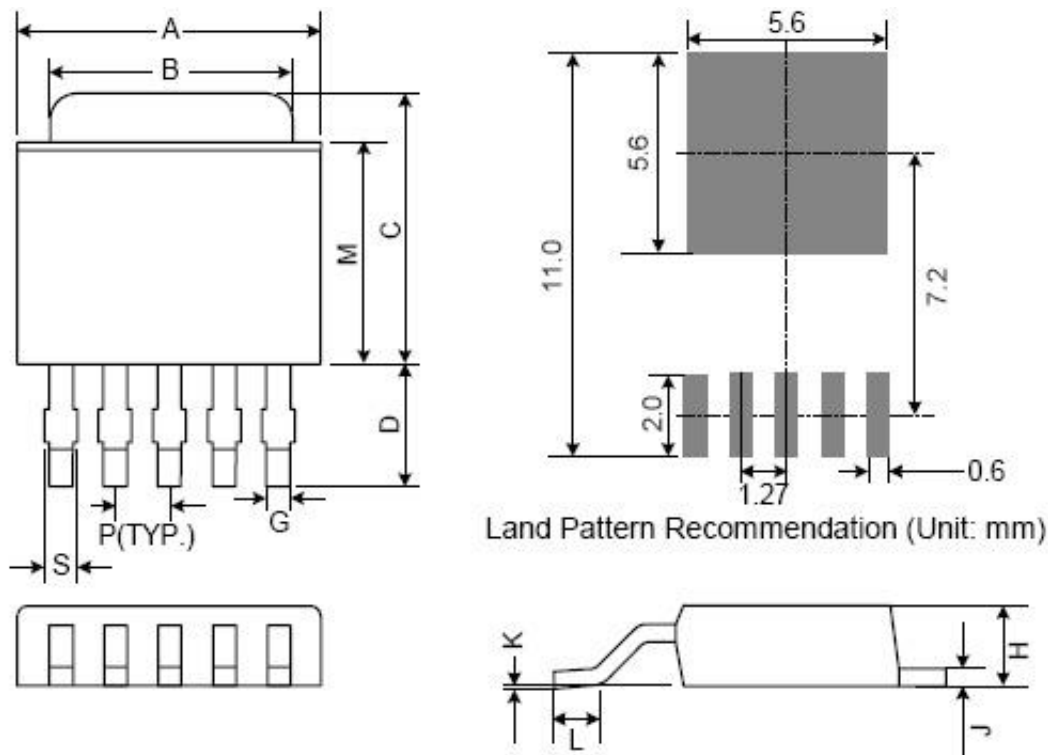


Figure9. XL1507-ADJ System Parameters Test Circuit

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	2.43	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