

3-TERMINAL ADJUSTABLE REGULATORS

1. Description

The LM317 is an adjustable 3-terminal positive voltage regulator capable of supplying in excess of 1.5A over an output voltage range of 1.25V to 32V. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage. Further, it employs internal current limiting, thermal shutdown and safe area compensation, making it essentially blow-out proof.

The LM317 serves a wide variety of applications including local, on card regulation. This device can also be used to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the LM317 can be used as a precision current regulator.

The LM317 is available in TO-220, TO-252, TO-263 and SOT-223 packages.

2. Features

- Typical 1% Output Voltage Tolerance
- Output voltage adjustable from 1.25V to 32V
- Output current in excess of 1.5A
- Internal short circuit protection
- Internal over temperature protection
- Output transistor safe area compensation

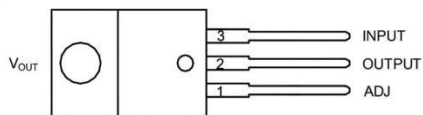
3. Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD Player
- Network Interface Card/Switch
- Telecom Equipment
- Printer and other Peripheral Equipment

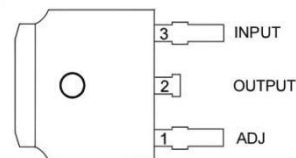
4. Order Information

Mode	Package	Ordering Number	Packing Option
LM317	TO-220	LM317YTO220G/TB	Tube,50
	SOT-223	LM317YSOT223G/TR	Tape and Reel,2500
	TO-252	LM317YTO252G/TR	Tape and Reel,2500
	TO-263	LM317YTO263G/TR	Tape and Reel,800

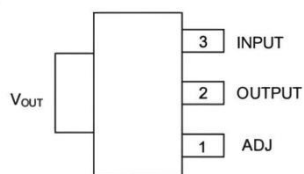
5. Pin Configuration (Top View)



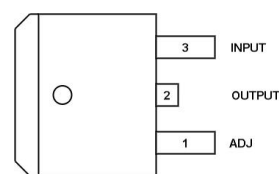
TO-220



TO-252

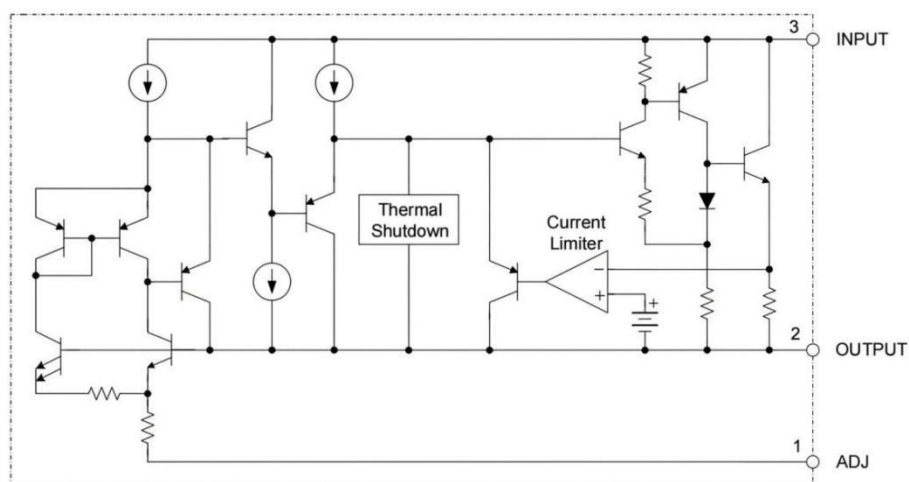


SOT-223



TO-263

6. Functional Block Diagram



7. Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
$V_{IN}-V_{OUT}$	Input - Output Voltage Difference	32	V
T_J	Maximum junction temperature	150	°C
T_S	Storage temperature	-65 to +150	°C
ESD	Human body model	4000	V

8. Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
T_J	Operating Junction Temperature Range	-40	125	°C

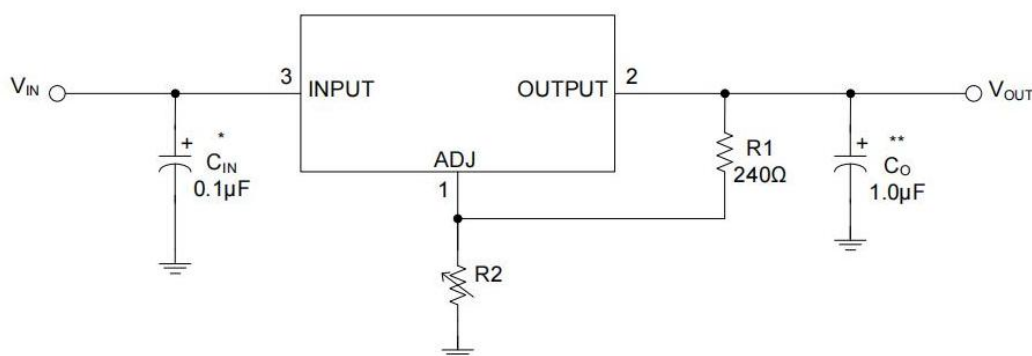
9. Electrical Characteristics

($V_{IN}-V_{OUT}=5V$, $I_{OUT}=10mA$, $T_A=25^{\circ}C$, unless otherwise specified.) *

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference voltage	$10mA \leq I_{OUT} \leq 1.5A$, $3V \leq (V_{IN}-V_{OUT}) \leq 32V$, $P_D \leq 20W$	1.2	1.25	1.3	V
S_V	Line regulation	$3V \leq (V_{IN}-V_{OUT}) \leq 32V$		0.01	0.04	%/V
S_I	Load regulation	$0mA \leq I_{OUT} \leq 1.5A$		0.2	0.4	%
I_{LIMIT}	Current Limit	$V_{IN}-V_{OUT}=3V$	1.8	2.2		A
I_{ADJ}	Adjust pin current			50	100	μA
ΔI_{ADJ}	Adjust pin current change	$10mA \leq I_{OUT} \leq 1.5A$, $3V \leq (V_{IN}-V_{OUT}) \leq 32V$, $P_D \leq 20W$		0.2	5	μA
	Minimum current load	$V_{IN}-V_{OUT}=32V$		3.5	10	mA
RR	Ripple rejection	$f=120Hz$, $C_{OUT}=1\mu F$ Tantalum, $(V_{IN}-V_{OUT})=3V$, $I_{OUT}=1.5A$	60	75		dB
	Temperature stability	$T_{MIN} \leq T_J \leq T_{MAX}$		0.7		%
E_N	RMS output noise (% of V_{OUT})	$T_A=25^{\circ}C$, $10Hz \leq f \leq 10kHz$		0.003		%
θ_{JC}	Thermal resistance, Junction to case	TO-220		5		$^{\circ}C/W$
		TO-252		12		
		SOT-223		23		
θ_{JA}	Thermal resistance, Junction to ambient	TO-220		54		$^{\circ}C/W$
		TO-252		112		
		SOT-223		165		
	Thermal shutdown hysteresis			25		$^{\circ}C$

*: Maximum Power Dissipation is Package Type and Case Temperature dependent.

10. Typical Application Circuit



*= C_{IN} is required if the regulator is located near power supply filter.

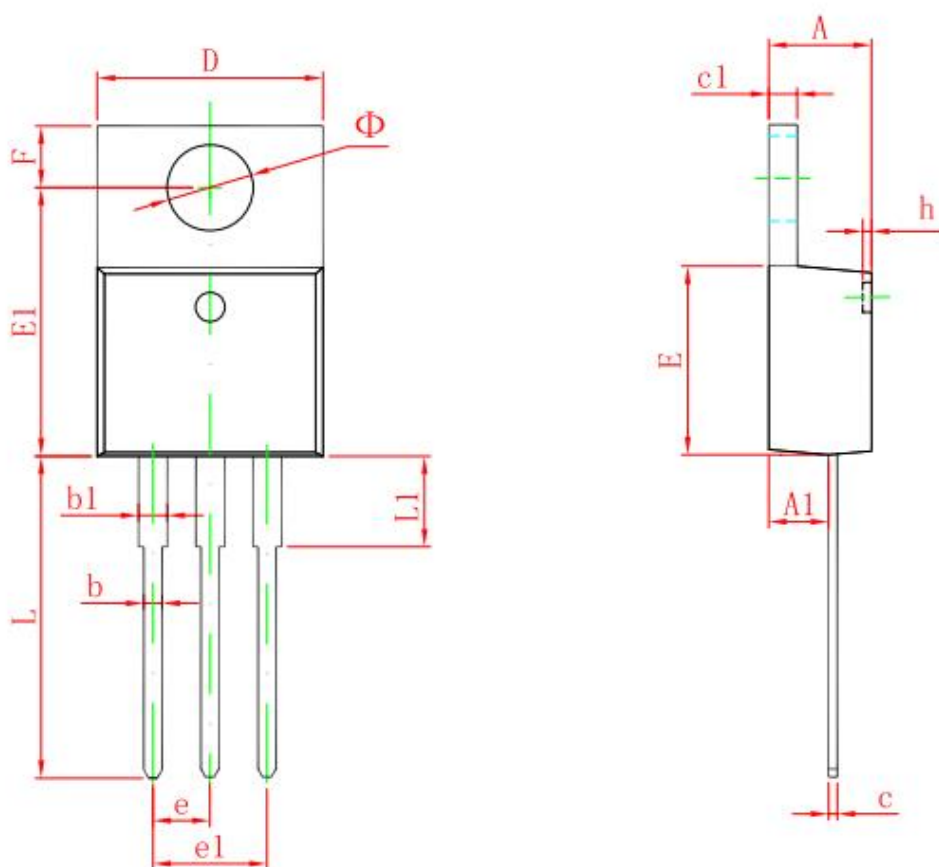
**= C_O is needed for stability and it improves transient response.

$$V_{OUT} = V_{REF} \times (1 + R2/R1) + I_{ADJ} \times R2$$

Since I_{ADJ} is controlled to less than 100 μA , the error associated with this term is negligible in most applications.

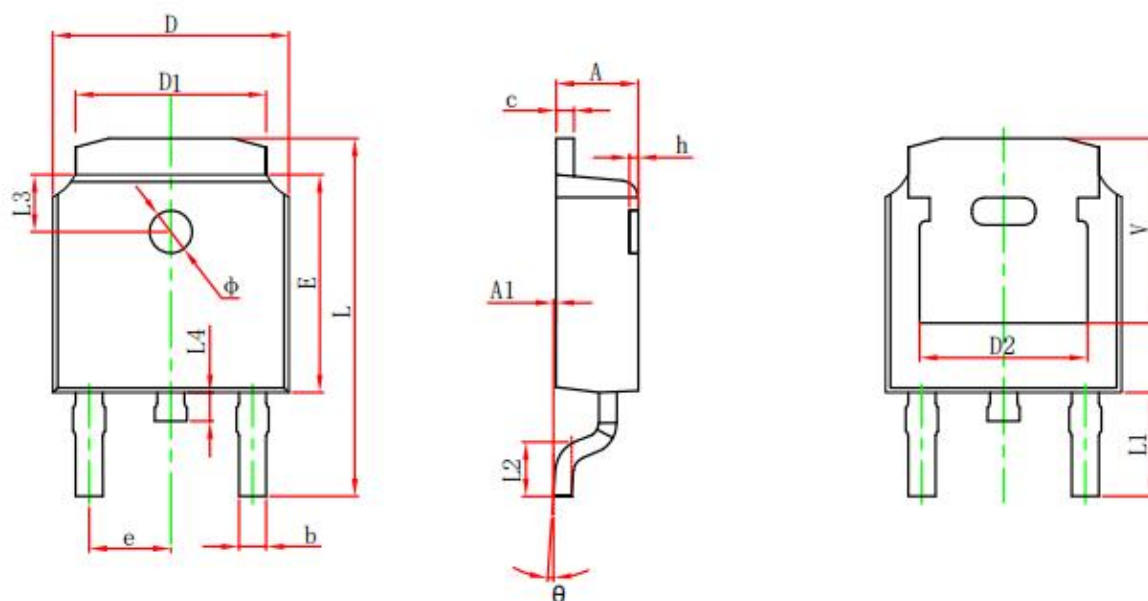
11. Package Outline Dimensions

(1) Package Type: TO-220



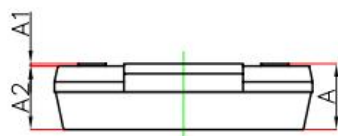
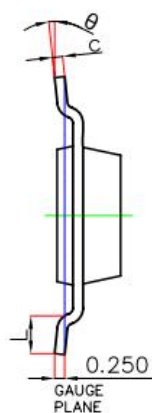
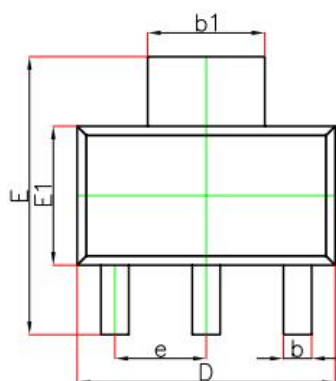
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155

(2) Package Type: TO-252



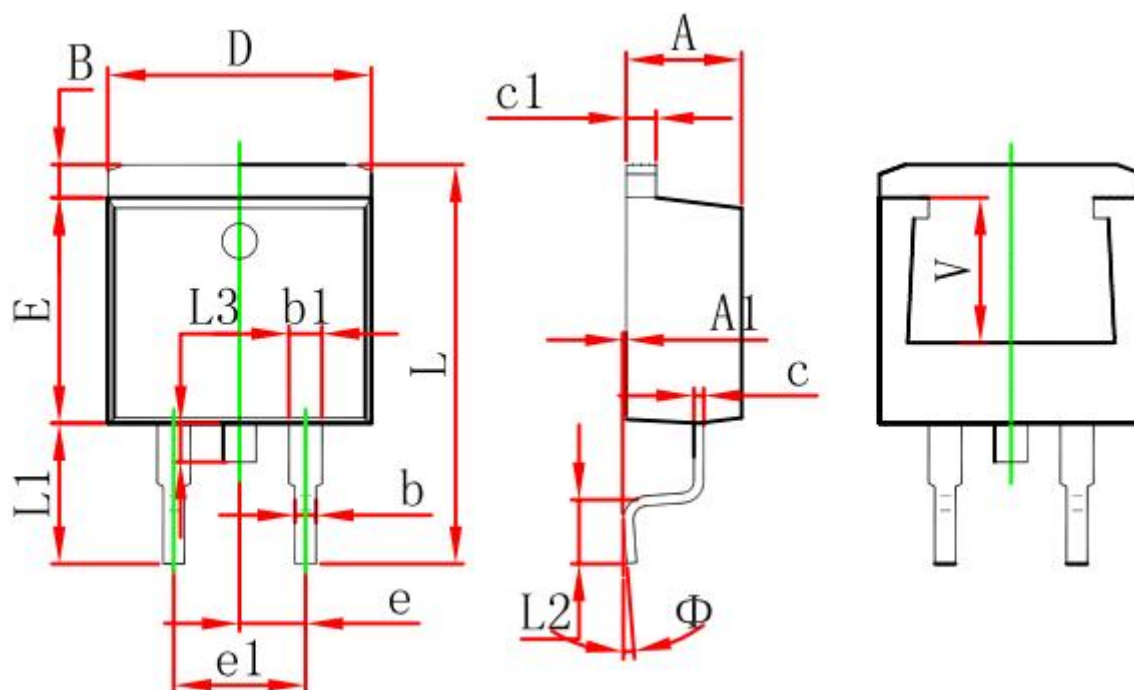
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

(3) Package Type: SOT-223



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	—	1.800	—	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b1	2.900	3.100	0.114	0.122
c	0.230	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091(BSC)	
L	0.750	—	0.030	—
theta	0°	10°	0°	10°

(4) Package Type: TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	

12. Important Notice And Disclaimer

- We reserves the right to change the instruction manual without prior notice.
- Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design and overall manufacturing to avoid potential failure risks that may cause personal injury or property damage.
- The improvement of product quality is endless, our company will be dedicated to provide customers with better products.

13. Version Modification Record

Version Number	Revision
first edition	
V0.1	1. Update the Order Information on page 2. 2. Update the Electrical Characteristics on page 4.