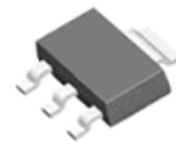


## Adjustable Positive Voltage Regulator

### General Description

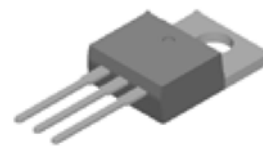
- The LM317 is an adjustable 3-terminal positive voltage regulator, designed to supply 1A of output current with voltage adjustable from 1.3V ~ 37V.
- The LM317 is available in SOT-223, D-PACK, TO-220 and D2-PACK packages.



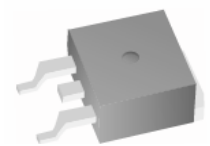
SOT-223



D-PACK  
(TO-252)



TO-220



D2-PACK  
(TO-263)

### Features

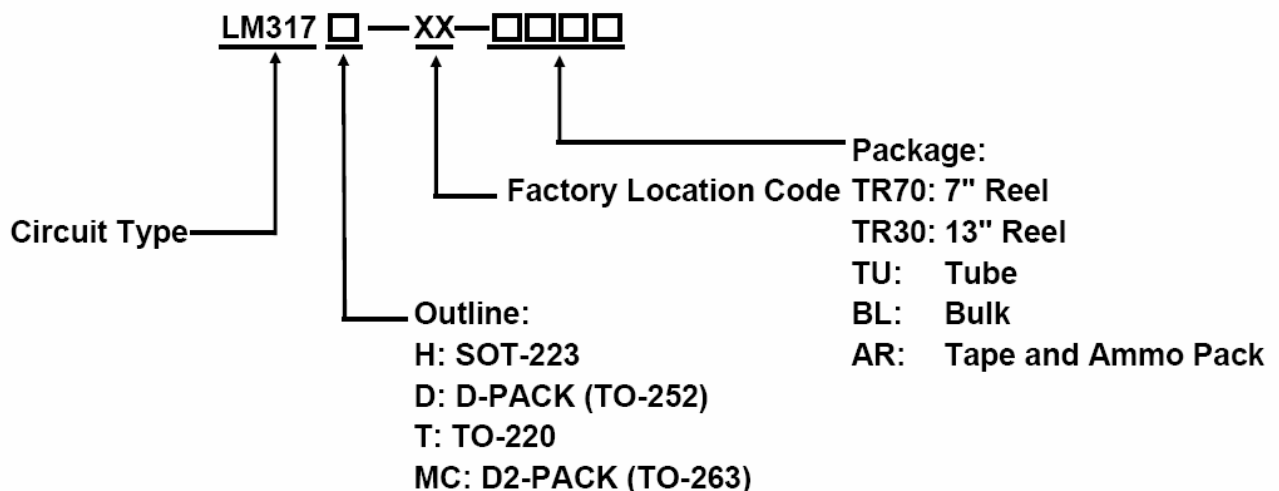
- Output Voltage adjustable from 1.3V ~ 37V
- Output current in excess of 1A
- Internal short circuit protection
- Internal over temperature protection
- Output transistors safe area compensation
- RoHS Compliance

### Applications

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



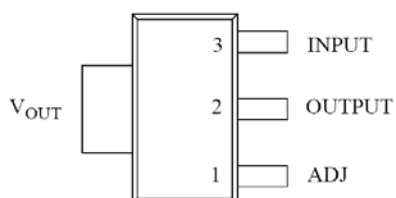
### Ordering Information



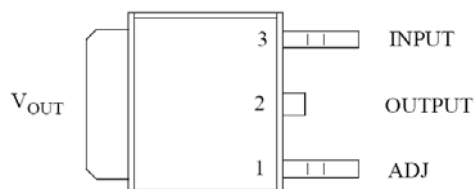
# Adjustable Positive Voltage Regulator

## LM317

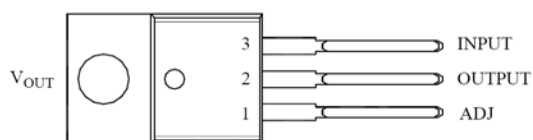
### Pin Configuration



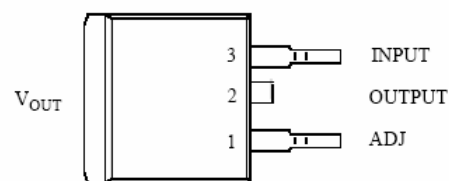
**Outline: H  
SOT-223**



**Outline: D  
D-PACK (TO-252)**

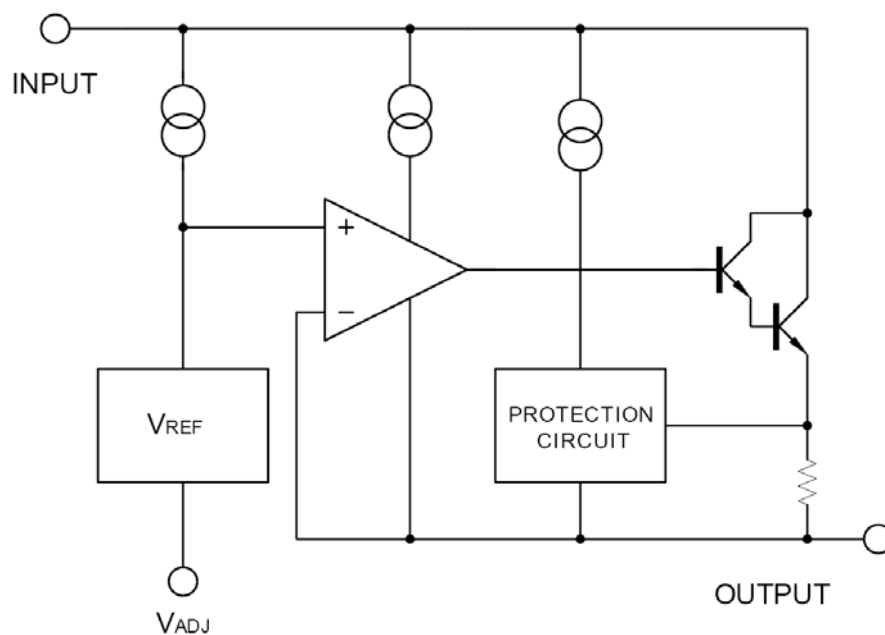


**Outline: T  
TO-220**



**Outline: MC  
D2-PACK (TO-263)**

### Block Diagram



# Adjustable Positive Voltage Regulator

## LM317

### Absolute Maximum Ratings (Ta=25° C, unless otherwise specified)

Symbol	Description	Ratings	Unit	
V <sub>IN-V<sub>OUT</sub></sub>	Input - Output Voltage Differential	40	V	
I <sub>O</sub>	Max. Output Current	1.0	A	
T <sub>J</sub>	Operating Junction Temperature	125	° C	
T <sub>OPR</sub>	Operating Temperature Range	-40 ~ 85	° C	
T <sub>STG</sub>	Storage Temperature Range	-40 ~ 150	° C	
P <sub>D</sub>	Power Dissipation	Internal limited	mW	
R <sub>thJC</sub>	Thermal Resistance Junction-Case	T: TO-220	5	° C/W
		MC: D2-PACK (TO-263)	5	
		D: D-PACK (TO-252)	12	
		H: SOT-223	23	
R <sub>thJA</sub>	Thermal Resistance Junction-Ambient	T: TO-220	54	° C/W
		MC: D2-PACK (TO-263)	64	
		D: D-PACK (TO-252)	112	
		H: SOT-223	165	

**Note:** Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond Absolute maximum ratings.

### Electrical Characteristics

(V<sub>IN-V<sub>OUT</sub></sub>=5V, I<sub>OUT</sub>=10mA, T<sub>A</sub>=25°C, unless otherwise specified)

Symbol	Description	LM317			Unit	Conditions
		Min.	Typ.	Max.		
ΔV <sub>OUT</sub> /V <sub>OUT</sub>	Line Regulation	-	0.01	0.04	%/V	3V ≤ V <sub>IN-V<sub>OUT</sub></sub> ≤ 40V
ΔV <sub>OUT</sub>	Load Regulation	-	5	25	mV	10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> ≤ 5V
		-	0.1	0.5	mV	10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> ≥ 5V
I <sub>ADJ</sub>	Adjustable Pin Current	-	50	100	μA	-
ΔI <sub>ADJ</sub>	Adjustable Pin Current Change	-	0.2	5	μA	3V ≤ V <sub>IN-V<sub>OUT</sub></sub> ≤ 40V, 10mA ≤ I <sub>OUT</sub> ≤ 1A, P <sub>D</sub> ≤ 20W
V <sub>REF</sub>	Reference Input Voltage	1.20	1.25	1.30	V	3V ≤ V <sub>IN-V<sub>OUT</sub></sub> ≤ 40V, 10mA ≤ I <sub>OUT</sub> ≤ 1A, P <sub>D</sub> ≤ 20W
-	Temperature Stability	-	0.7	-	%/V <sub>OUT</sub>	T <sub>MIN</sub> ≤ T <sub>J</sub> ≤ T <sub>MAX</sub>

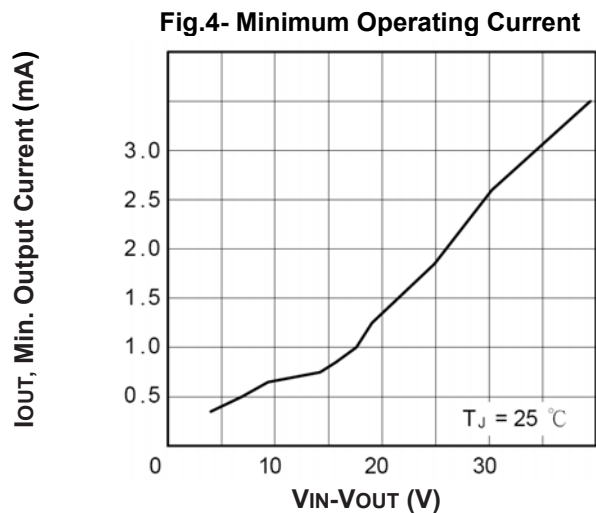
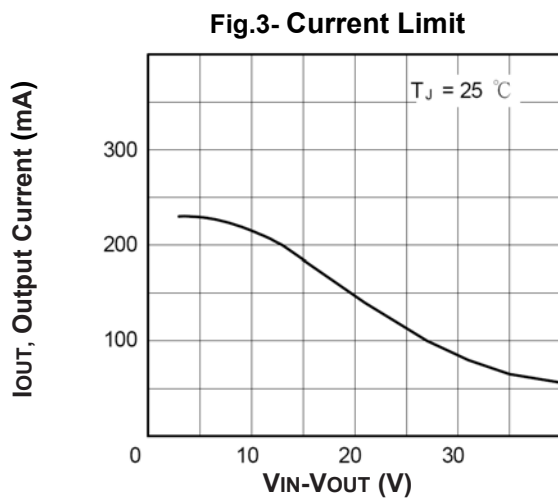
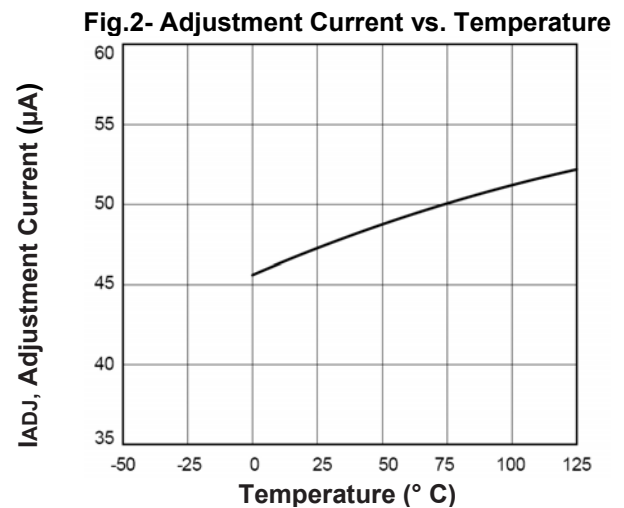
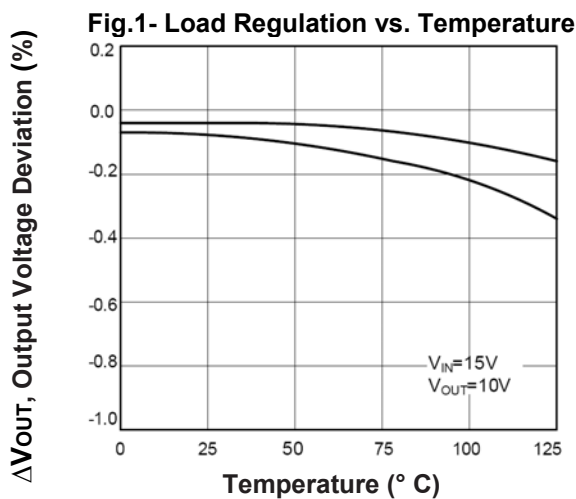
# Adjustable Positive Voltage Regulator

## LM317

Symbol	Description	LM317			Unit	Conditions	
		Min.	Typ.	Max.			
$I_{L(MIN)}$	Minimum Load Current for Regulation	-	3.5	10	mA	$V_{IN}-V_{OUT}=40V$	
$I_{O(MAX)}$	Maximum Output Current	0.3	0.4	-	A	$V_{IN}-V_{OUT}=40V, P_D \leq 20W$	
eN	RMS Noise vs. % of $V_{OUT}$	-	0.003	-	%/ $V_{OUT}$	$10Hz \leq f \leq 10KHz$	
RR	Ripple Rejection	$C_{ADJ}=0$	-	65	-	dB	$V_{OUT}=10V, f=120Hz$
		$C_{ADJ}=10\mu F$	66	80	-		

**Note:**  $C_{ADJ}$  is connected between Adjust pin and Ground.

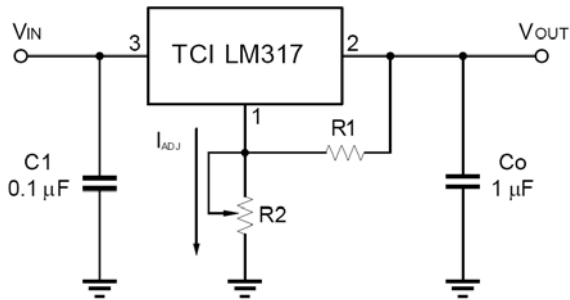
### Typical Characteristics Curves



# Adjustable Positive Voltage Regulator

## LM317

### Typical Application



$V_{OUT} = 1.25V * (1 + R2/R1) + I_{ADJ} * R2$   
 C 1 is required when regulator is an appreciated distance from pow supply . Co is needed to improve transient response .

Fig.5-Programmable Voltage Regulator

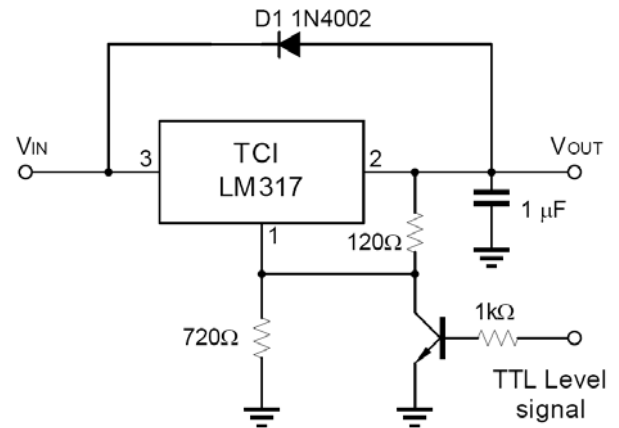


Fig.6- Regulator with On-off Control

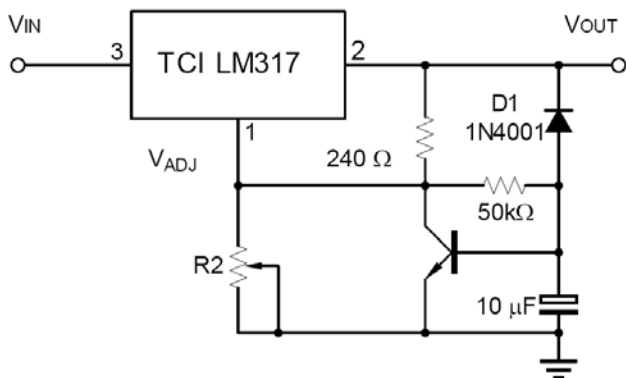
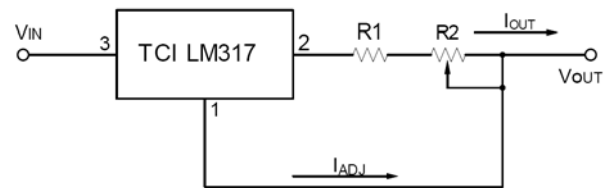


Fig.7- Soft Start Application



$$I_{O(MAX)} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

$$I_{O(MIN)} = \left( \frac{V_{REF}}{R1+R2} \right) + I_{ADJ} = \frac{1.25V}{R1+R2}$$

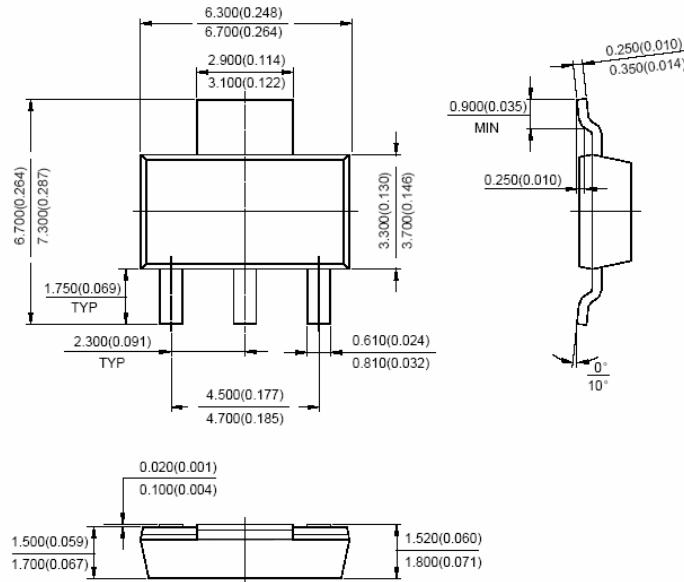
5mA < I<sub>OUT</sub> < 100mA

Fig.8- Constant Current Application

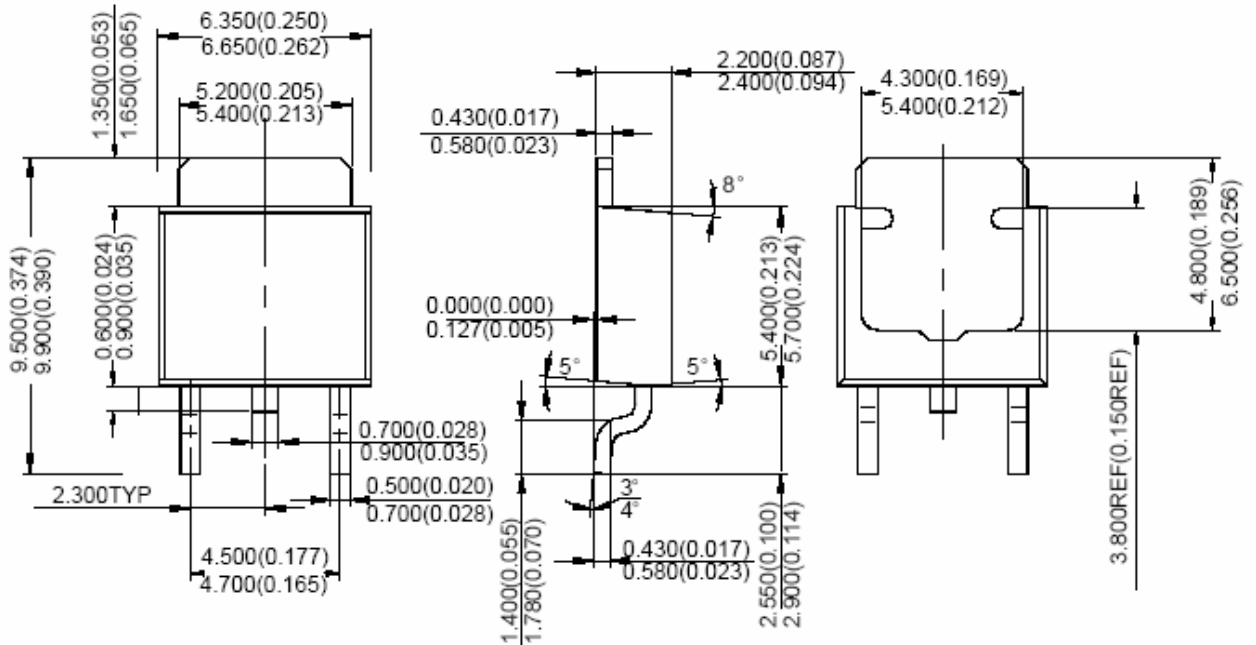
# Adjustable Positive Voltage Regulator

## LM317

### Dimensions in inches (mm)



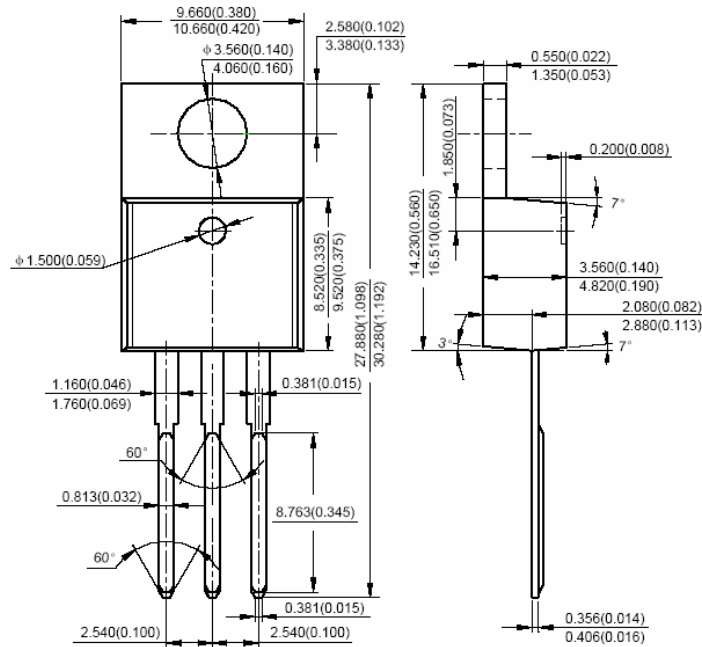
SOT-223



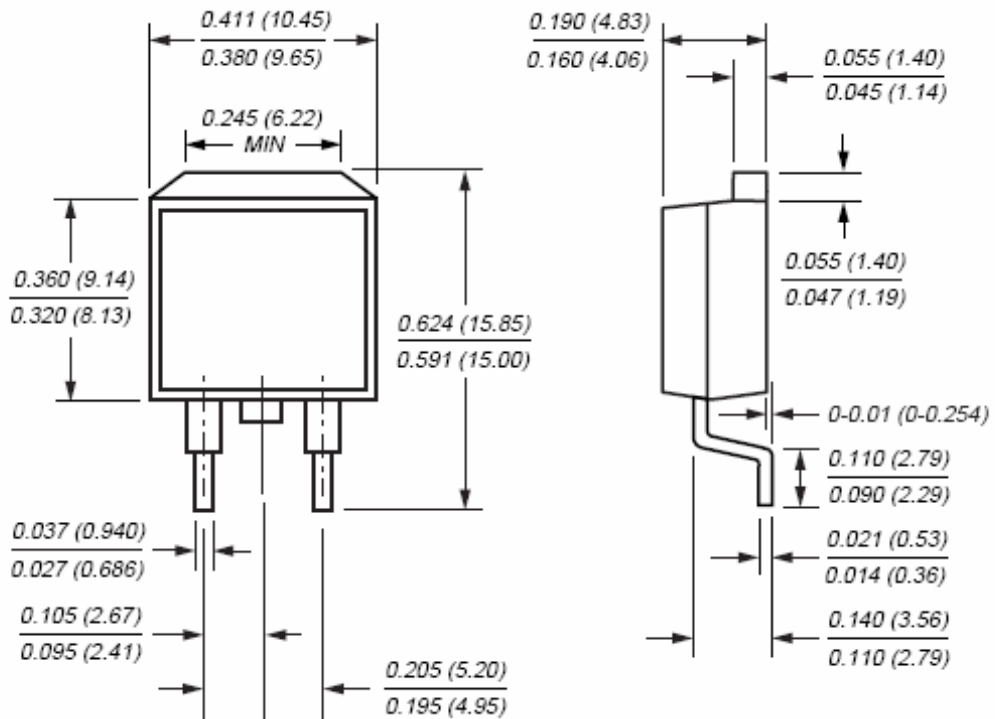
D-PACK  
(TO-252)

# Adjustable Positive Voltage Regulator

## LM317



TO-220



D2-PACK  
(TO-263)

# Adjustable Positive Voltage Regulator

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LM317

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