

# LM317M

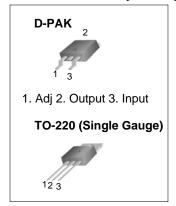
# 3-Terminal 0.5A Positive Adjustable Regulator

#### **Features**

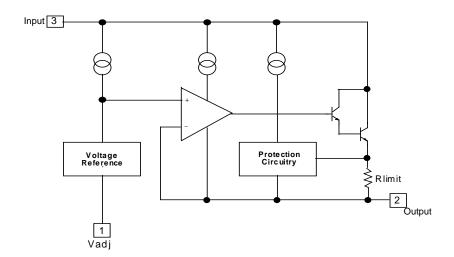
- Output Current in Excess of 0.5A
- Output Adjustable Between 1.2V and 37V
- Internal Thermal Overload Protection
- · Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- Floating Operation for High Voltage Applications

## **Description**

The LM317M is a 3-terminal adjustable positive voltage regulator capable of supplying in excess of 500mA over an output voltage range of 1.2V to 37V. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage.



## **Internal Block Diagram**



## **Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Input-Output Voltage Differential	VI - VO	40	V
Power Dissipation	PD	Internally Limited	W
Thermal Resistance Junction-Case (TO-220) Thermal Resistance Junction-Air (TO-220) Thermal Resistance Junction-Air (D-PAK (Note1,2))	RθJC RθJA RθJA	5 81 100	°C/W °C/W °C/W
Operating Junction Temperature Range	Tj	0 ~ +125	°C
Storage Temperature Range	TSTG	-65 ~ +125	°C

#### **Electrical Characteristics**

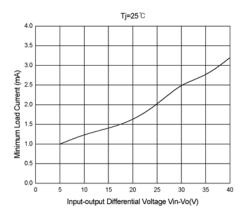
(V<sub>I</sub>-V<sub>O</sub> = 5V, I<sub>O</sub> = 0.1A,  $0^{\circ}$ C  $\leq$  T<sub>J</sub>  $\leq$  +125 $^{\circ}$ C, P<sub>DMAX</sub> = 7.5W, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Line Regulation (Note3)		$T_A = +25^{\circ}C, 3V \le V_I - V_O \le 40V$	-	0.01	0.04	%/ V
	Rline	$3V \le VI - VO \le 40V$	-	0.02	0.07	
Load Regulation (Note3)	Rload	$T_A = +25^{\circ}C, \ 10mA \le I_O \le 0.5A$ $V_O \le 5V$ $V_O \ge 5V$	-	5 0.1	25 0.5	mV %/Vo
		$\begin{array}{l} 10mA \leq I_O \leq 0.5A \\ V_O \leq 5V \\ V_O \geq 5V \end{array}$	-	20 0.3	70 1.5	mV %/VO
Adjustment Pin Current	IADJ	-	-	50	100	uA
Adjustment Pin Current Change	Δladj	$3V \leq V_I - V_O \leq 40V \\ 10mA \leq I_O \leq 0.5A, \ P_D < P_{DMAX}$	-	0.2	5	uA
Reference Voltage	VREF	$ \begin{array}{l} 3V < V_{I} \text{ - } V_{O} < 40V \\ 10 \text{mA} \ \leq I_{O} \leq 0.5 \text{A}, \ P_{D} < P_{DMAX} \end{array} $	1.20	1.25	1.30	V
Temperature Stability	STT	-	-	0.7	-	%/Vo
Minimum Load Current to Maintain Regulation	I <sub>L(MIN)</sub>	VI - VO = 40V	-	3.5	10	mA
Maximum Output Current	IO(MAX)	$V_I - V_O \le 15V, P_D < P_{DMAX}$	0.5	0.9	-	
		V <sub>I</sub> - V <sub>O</sub> = 40V P <sub>D</sub> < P <sub>DMAX</sub> , T <sub>A</sub> =+25°C	0.15	0.25	-	Α
RMS Noise, % of VOUT	eN	TA = +25°C, 10Hz < f < 10kHz	-	0.003	-	%/Vo
Ripple Rejection	RR	V <sub>O</sub> = 10V, f = 120Hz without C <sub>ADJ</sub> C <sub>ADJ</sub> = 10uF (Note4)	66	65 80	-	dB
Long-Term Stability	ST	T <sub>J</sub> = +125°C, 1000Hours	-	0.3	1	%/1000Hrs

#### Note:

- Thermal resistance test board Size: 76.2mm \* 114.3mm \* 1.6mm(1S0P) JEDEC standard: JESD51-3, JESD51-7
- 2. Assume no ambient airflow.
- 3. Load and Line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
- 4. CADJ, when used, is connected between the adjustment pin and ground.

# **Typical Performance Characteristics**



**Figure 1. Minimum Load Current** 

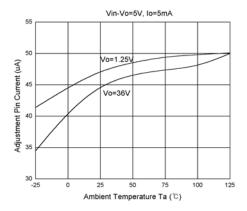


Figure 3. Adjustment Pin Current vs. Temperature

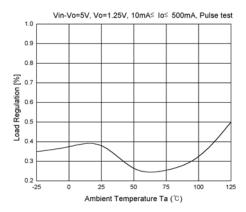


Figure 5. Load Regulation vs. Temperature

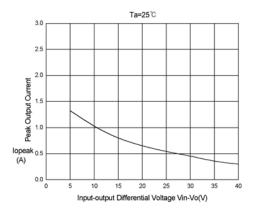


Figure 2. Peak Output Current vs. Input-Output Differential Voltage

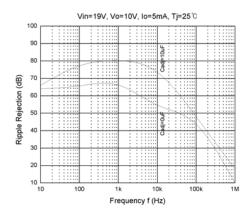


Figure 4. Ripple Rejection vs. Frequency

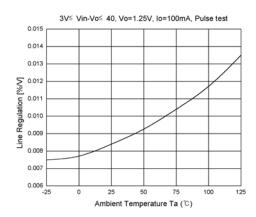


Figure 6. Line Regulation vs. Temperature

# **Typical Performance Characteristics** (Continued)

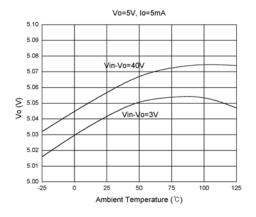


Figure 7. Outputvoltage vs. Temperature

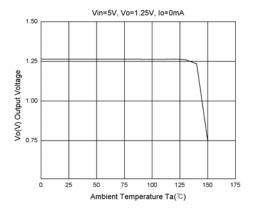


Figure 8. Thermal Shutdown

# **Typical Application**

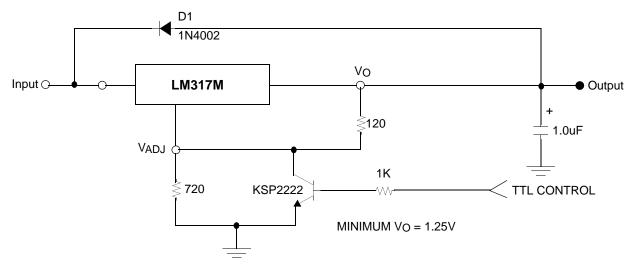


Figure 1. 1 5V Electronic Shutdown Regulator

D1 protects the device during an input short circuit.

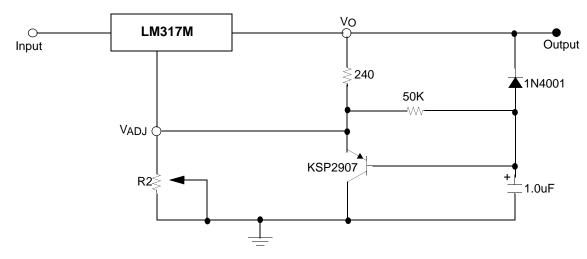
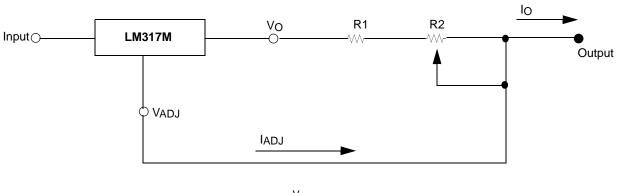


Figure 2. Slow Turn-On Regulator



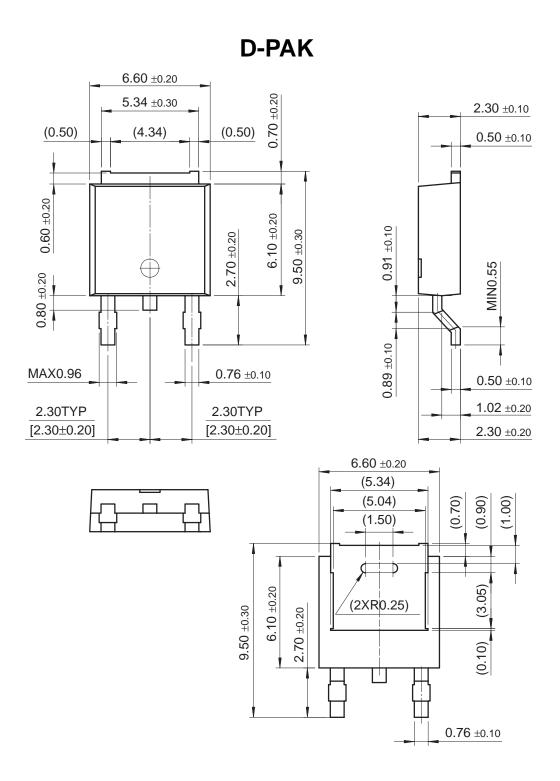
$$\begin{split} I_{OMAX} &= \left(\frac{V_{REF}}{R1}\right) + I_{ADJ} \cong \frac{1.25V}{R1} \\ I_{OMAX} &= \left(\frac{V_{REF}}{R1 + R2}\right) + I_{ADJ} \cong \frac{1.25V}{R1 + R2} \\ 5mA &< I_O < 500mA \end{split}$$

Figure 3. Current Regulator

## **Mechanical Dimensions**

### **Package**

#### **Dimensions in millimeters**

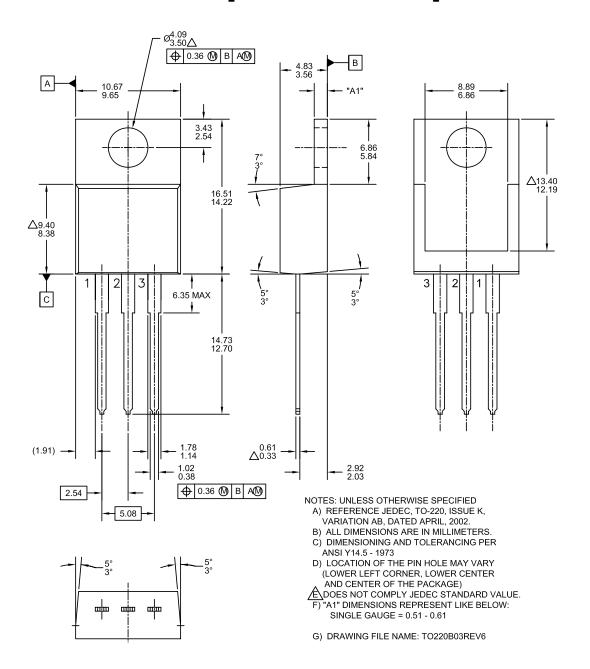


## **Mechanical Dimensions** (Continued)

### **Package**

#### **Dimensions in millimeters**

# **TO-220 [ SINGLE GAUGE ]**



### **Ordering Information**

Product Number	Package	Operating Temperature	
LM317MDT	D-PAK	0 ∼ 125°C	
LM317MT	TO-220 (Single Gauge)	0 ~ 123 C	

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