

LM317M

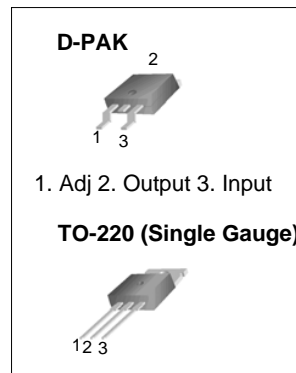
3-Terminal 0.5A Positive Adjustable Regulator

Features

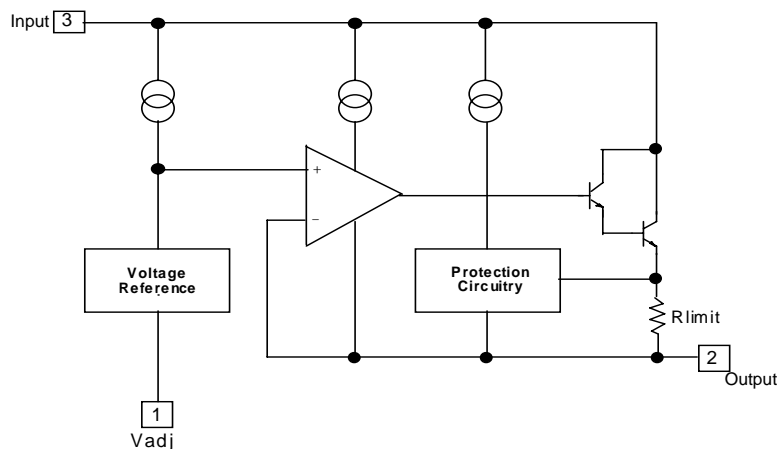
- Output Current in Excess of 0.5A
- Output Adjustable Between 1.2V and 37V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- Floating Operation for High Voltage Applications

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	$V_I - V_O$	40	V
Power Dissipation	P_D	Internally Limited	W
Thermal Resistance Junction-Case (TO-220)	$R_{\theta JC}$	5	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction-Air (TO-220)	$R_{\theta JA}$	81	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction-Air (D-PAK (Note1,2))	$R_{\theta JA}$	100	$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature Range	T_J	0 ~ +125	$^{\circ}\text{C}$
Storage Temperature Range	TSTG	-65 ~ +125	$^{\circ}\text{C}$

Electrical Characteristics

($V_I - V_O = 5\text{V}$, $I_O = 0.1\text{A}$, $0^{\circ}\text{C} \leq T_J \leq +125^{\circ}\text{C}$, $P_{D\text{MAX}} = 7.5\text{W}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Line Regulation (Note3)	Rline	$T_A = +25^{\circ}\text{C}$, $3\text{V} \leq V_I - V_O \leq 40\text{V}$	-	0.01	0.04	%/V
		$3\text{V} \leq V_I - V_O \leq 40\text{V}$	-	0.02	0.07	
Load Regulation (Note3)	Rload	$T_A = +25^{\circ}\text{C}$, $10\text{mA} \leq I_O \leq 0.5\text{A}$ $V_O \leq 5\text{V}$ $V_O \geq 5\text{V}$	-	5 0.1	25 0.5	mV %/V _O
		$10\text{mA} \leq I_O \leq 0.5\text{A}$ $V_O \leq 5\text{V}$ $V_O \geq 5\text{V}$	-	20 0.3	70 1.5	mV %/V _O
Adjustment Pin Current	I _{ADJ}	-	-	50	100	μA
Adjustment Pin Current Change	ΔI_{ADJ}	$3\text{V} \leq V_I - V_O \leq 40\text{V}$ $10\text{mA} \leq I_O \leq 0.5\text{A}$, $P_D < P_{D\text{MAX}}$	-	0.2	5	μA
Reference Voltage	V _{REF}	$3\text{V} < V_I - V_O < 40\text{V}$ $10\text{mA} \leq I_O \leq 0.5\text{A}$, $P_D < P_{D\text{MAX}}$	1.20	1.25	1.30	V
Temperature Stability	ST _T	-	-	0.7	-	%/V _O
Minimum Load Current to Maintain Regulation	I _{L(MIN)}	$V_I - V_O = 40\text{V}$	-	3.5	10	mA
Maximum Output Current	I _{O(MAX)}	$V_I - V_O \leq 15\text{V}$, $P_D < P_{D\text{MAX}}$	0.5	0.9	-	
		$V_I - V_O = 40\text{V}$ $P_D < P_{D\text{MAX}}$, $T_A = +25^{\circ}\text{C}$	0.15	0.25	-	A
RMS Noise, % of V _{OUT}	e _N	$T_A = +25^{\circ}\text{C}$, $10\text{Hz} < f < 10\text{kHz}$	-	0.003	-	%/V _O
Ripple Rejection	RR	$V_O = 10\text{V}$, $f = 120\text{Hz}$ without C _{ADJ} C _{ADJ} = 10 μF (Note4)	66	65 80	-	dB
Long-Term Stability	ST	$T_J = +125^{\circ}\text{C}$, 1000Hours	-	0.3	1	%/1000Hrs

Note:

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

Typical Performance Characteristics

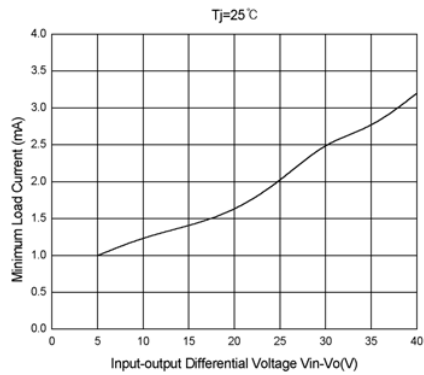


Figure 1. Minimum Load Current

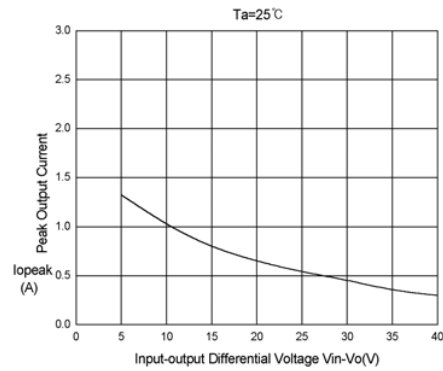


Figure 2. Peak Output Current vs. Input-Output Differential Voltage

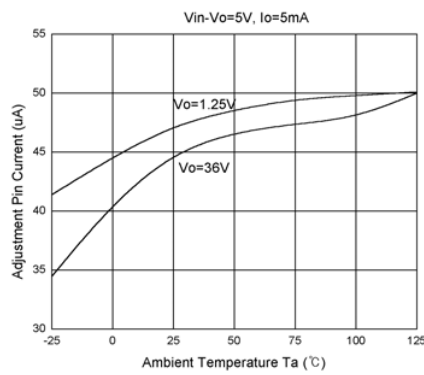


Figure 3. Adjustment Pin Current vs. Temperature

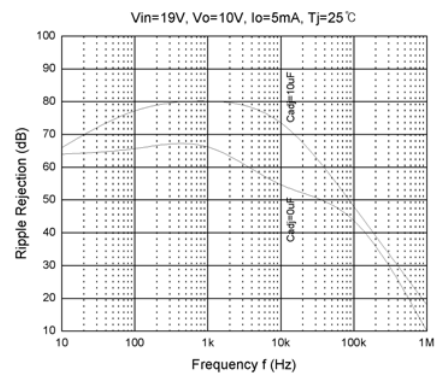


Figure 4. Ripple Rejection vs. Frequency

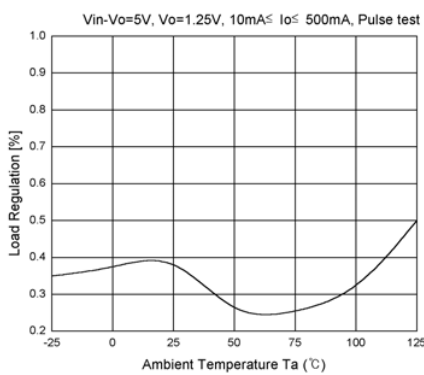


Figure 5. Load Regulation vs. Temperature

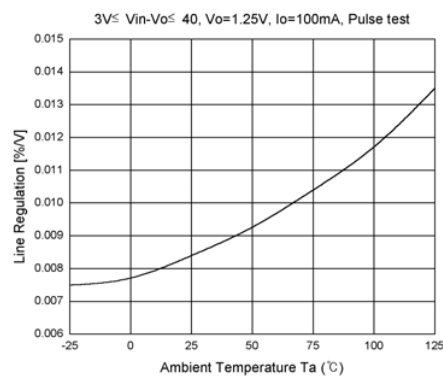


Figure 6. Line Regulation vs. Temperature

Typical Performance Characteristics (Continued)

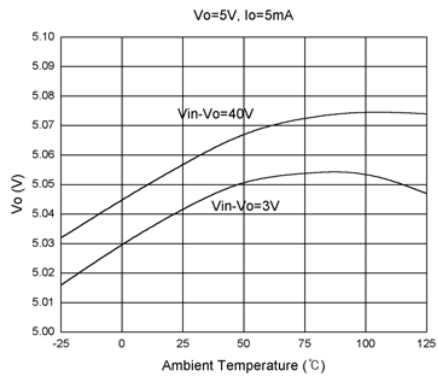


Figure 7. Output voltage vs. Temperature

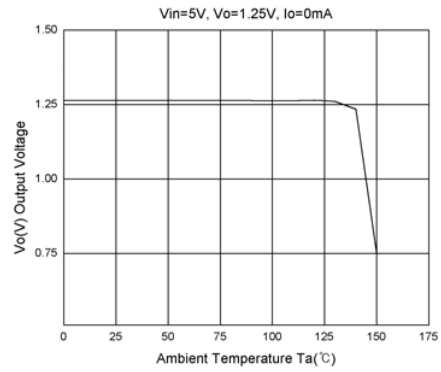


Figure 8. Thermal Shutdown

Typical Application

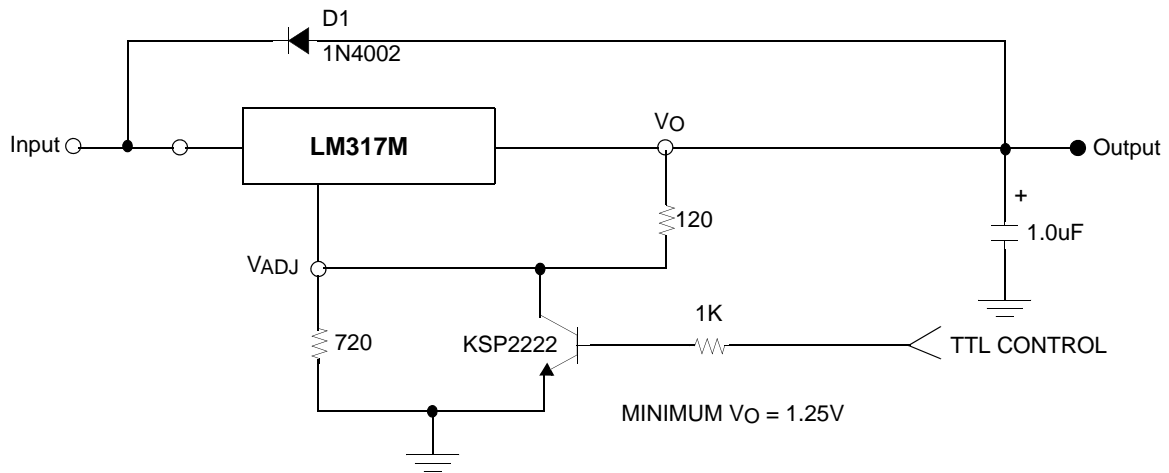


Figure 1. 1.5V Electronic Shutdown Regulator

D1 protects the device during an input short circuit.

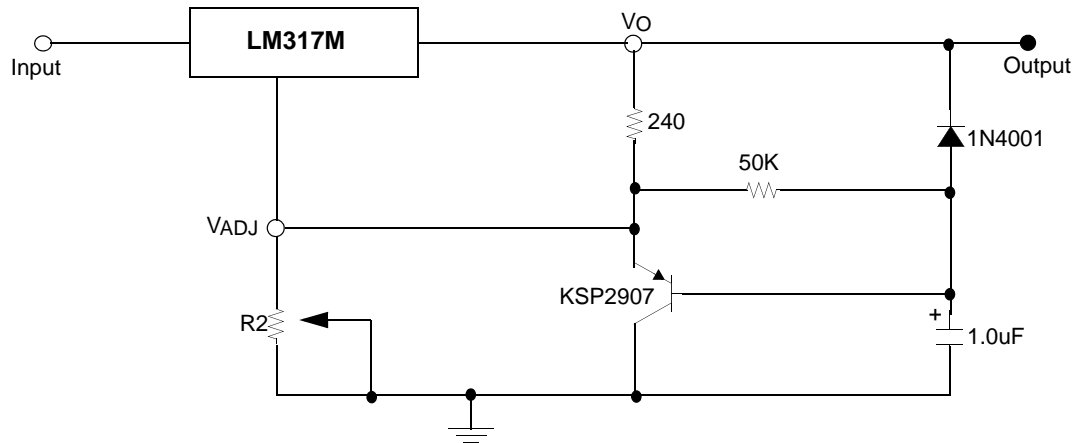
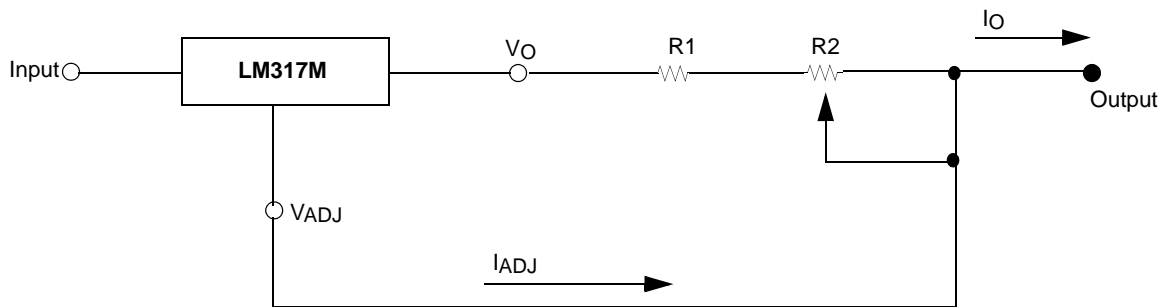


Figure 2. Slow Turn-On Regulator



$$I_{O\text{MAX}} = \left(\frac{V_{\text{REF}}}{R_1} \right) + I_{\text{ADJ}} \cong \frac{1.25\text{V}}{R_1}$$

$$I_{O\text{MAX}} = \left(\frac{V_{\text{REF}}}{R_1 + R_2} \right) + I_{\text{ADJ}} \cong \frac{1.25\text{V}}{R_1 + R_2}$$

5mA < IO < 500mA

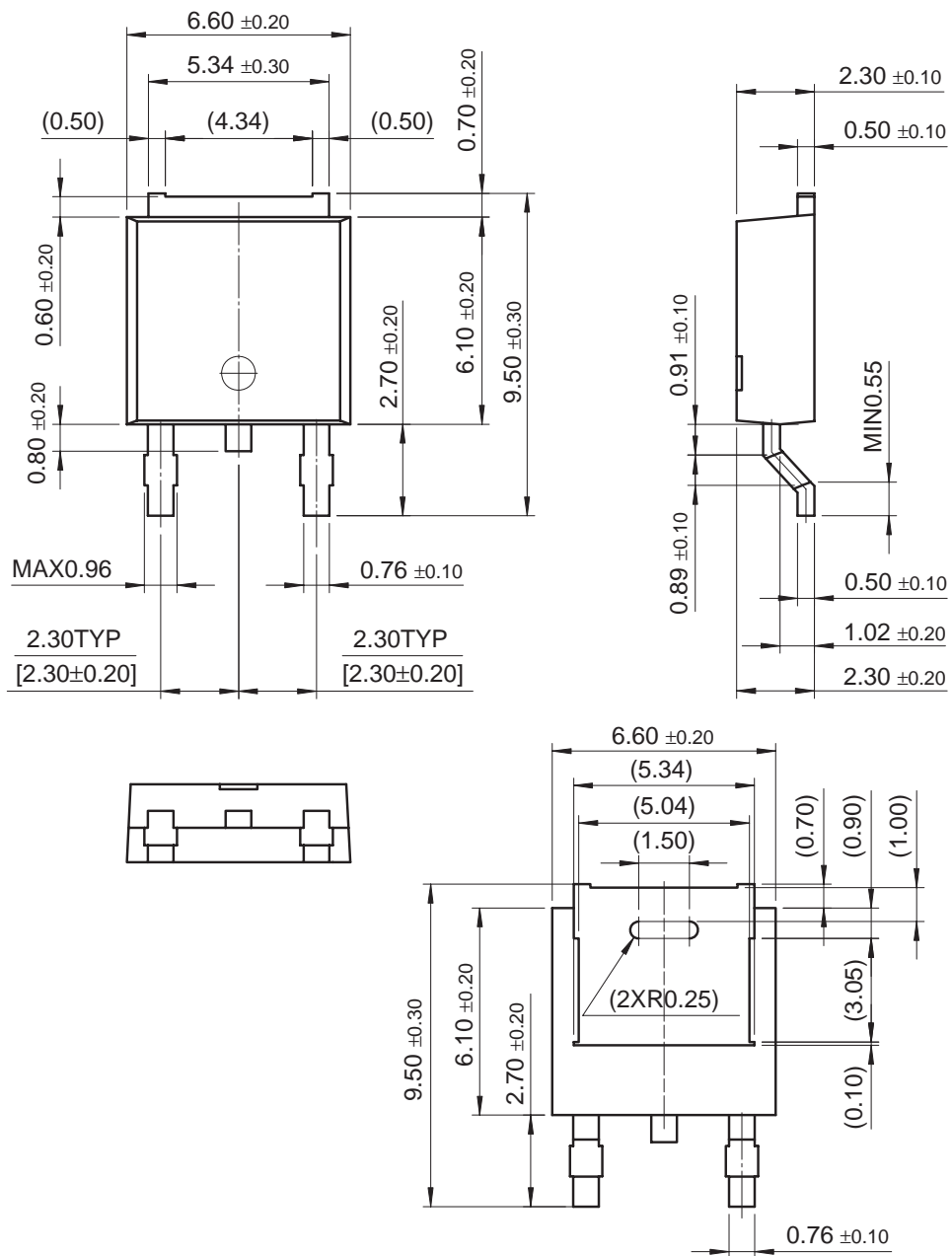
Figure 3. Current Regulator

Mechanical Dimensions

Package

Dimensions in millimeters

D-PAK

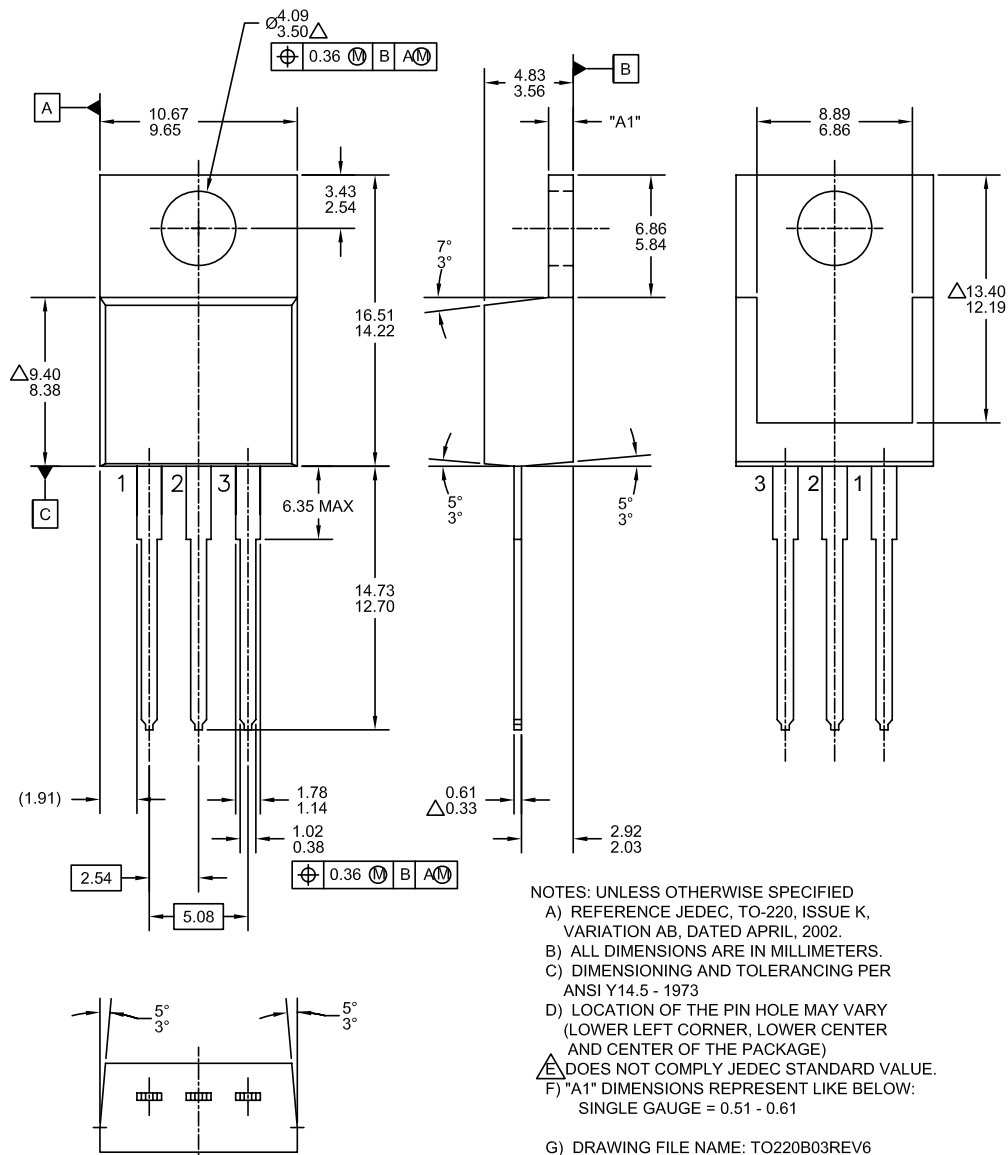


Mechanical Dimensions (Continued)

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)	

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