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

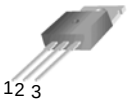
Description

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.

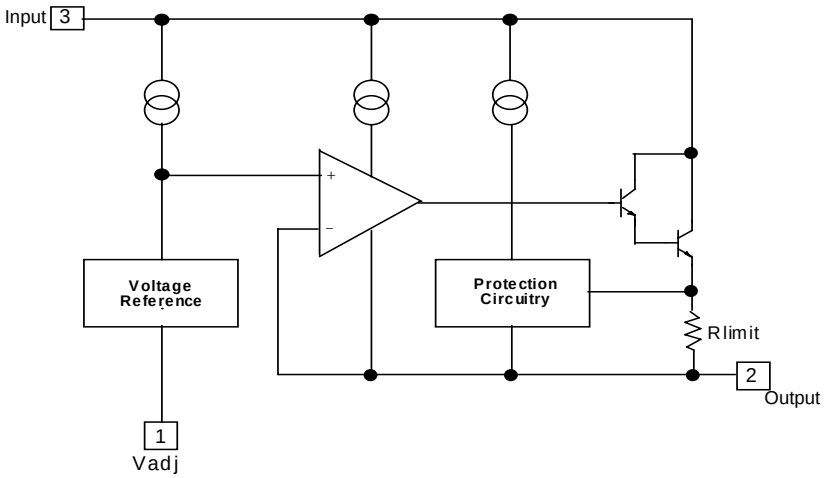
D-PAK

1. Adj 2. Output 3. Input

TO-220 (Single Gauge)



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) Thermal Resistance Junction-Air (TO-220) Thermal Resistance Junction-Air (D-PAK (Note1,2))	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	5 81 100	°C/W °C/W °C/W
Operating Junction Temperature Range	T_j	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-65 ~ +125	°C

Electrical Characteristics

(V_I-V_O = 5V, I_O = 0.1A, 0°C ≤ T_J ≤ +125°C, P_{DMAX} = 7.5W, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Line Regulation (Note3)	Rline	T_A = +25°C, 3V ≤ V_I –V_O ≤ 40V	-	0.01	0.04	%/ V
		3V ≤ V_I –V_O ≤ 40V	-	0.02	0.07	
Load Regulation (Note3)	Rload	T_A =+25°C, 10mA ≤ I_O ≤ 0.5A V_O ≤ 5V V_O ≥ 5V	-	5 0.1	25 0.5	mV %/V_O
		10mA ≤ I_O ≤ 0.5A V_O ≤ 5V V_O ≥ 5V	-	20 0.3	70 1.5	mV %/V_O
Adjustment Pin Current	I_{ADJ}	-	-	50	100	uA
Adjustment Pin Current Change	ΔI_{ADJ}	3V ≤ V_I - V_O ≤ 40V 10mA ≤ I_O ≤ 0.5A, P_D < P_{DMAX}	-	0.2	5	uA
Reference Voltage	V_{REF}	3V < V_I - V_O < 40V 10mA ≤ I_O ≤ 0.5A, P_D < P_{DMAX}	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 = 40V	-	3.5	10	mA
Maximum Output Current	$I_{O(MAX)}$	V_I - V_O ≤ 15V, P_D < P_{DMAX}	0.5	0.9	-	
		V_I - V_O = 40V P_D < P_{DMAX}, T_A =+25°C	0.15	0.25	-	A
RMS Noise, % of V_{OUT}	e_N	T_A = +25°C, 10Hz < f < 10kHz	-	0.003	-	%/V_O
Ripple Rejection	RR	V_O = 10V, f = 120Hz without C_{ADJ} C_{ADJ} = 10uF (Note4)	66	65 80	-	dB
Long-Term Stability	ST	T_J = +125°C, 1000Hours	-	0.3	1	%/1000Hrs

Note:

1. 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_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.
4. C_{ADJ}, when used, is connected between the adjustment pin and ground.

Typical Performance Characteristics

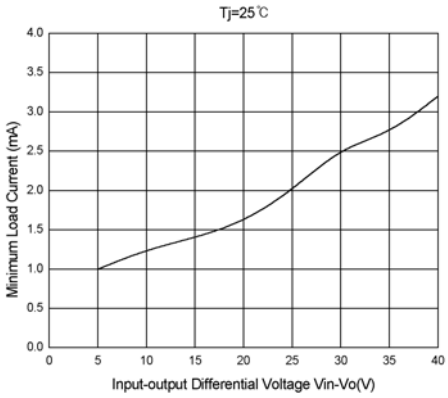


Figure 1. Minimum Load Current

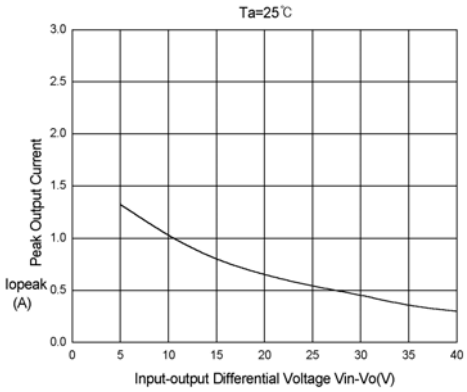


Figure 2. Peak Output Current vs. Input-Output Differential Voltage

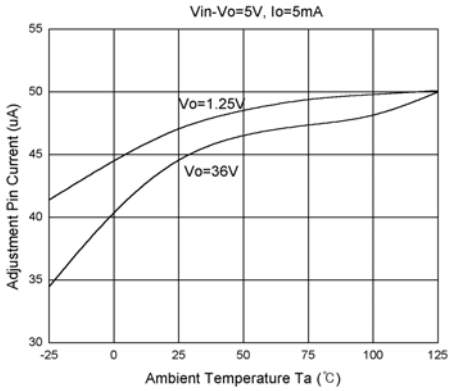


Figure 3. Adjustment Pin Current vs. Temperature

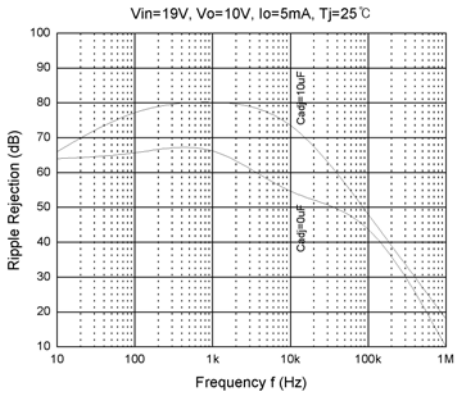


Figure 4. Ripple Rejection vs. Frequency

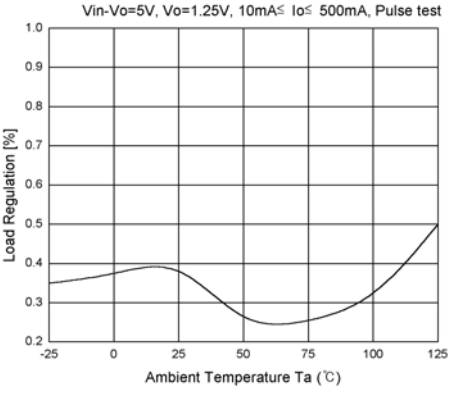


Figure 5. Load Regulation vs. Temperature

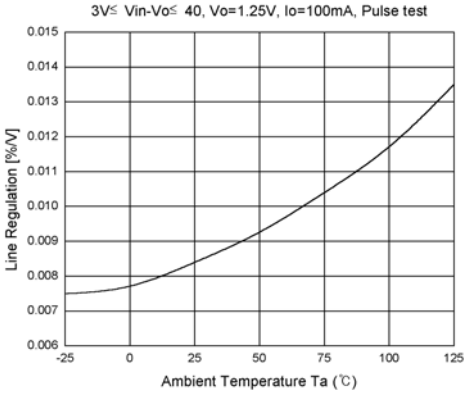


Figure 6. Line Regulation vs. Temperature

Typical Performance Characteristics (Continued)

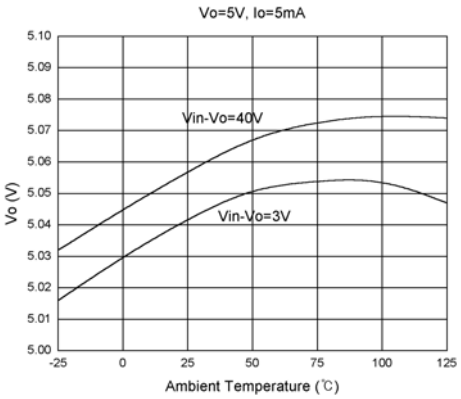


Figure 7. Outputvoltage vs. Temperature

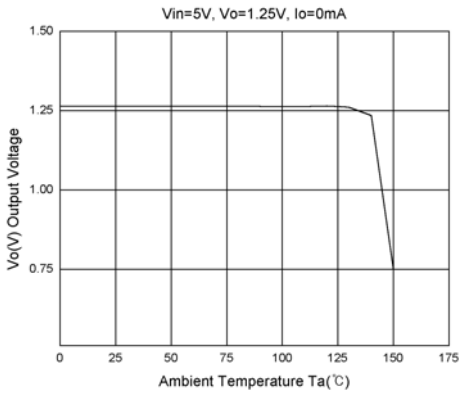


Figure 8. Thermal Shutdown

Typical Application

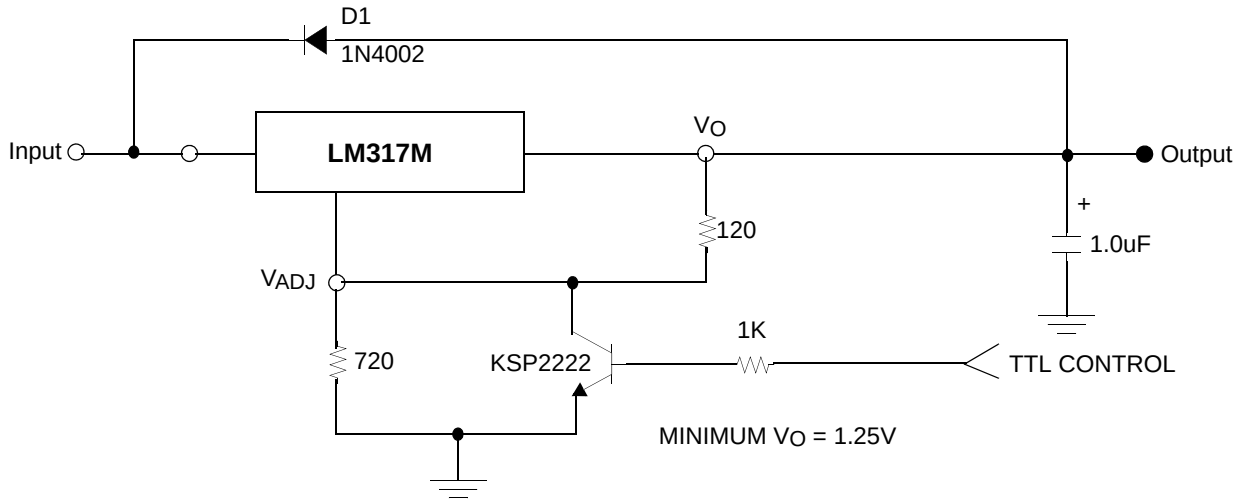


Figure 1. 1 5V Electronic Shutdown Regulator

D1 protects the device during an input short circuit.

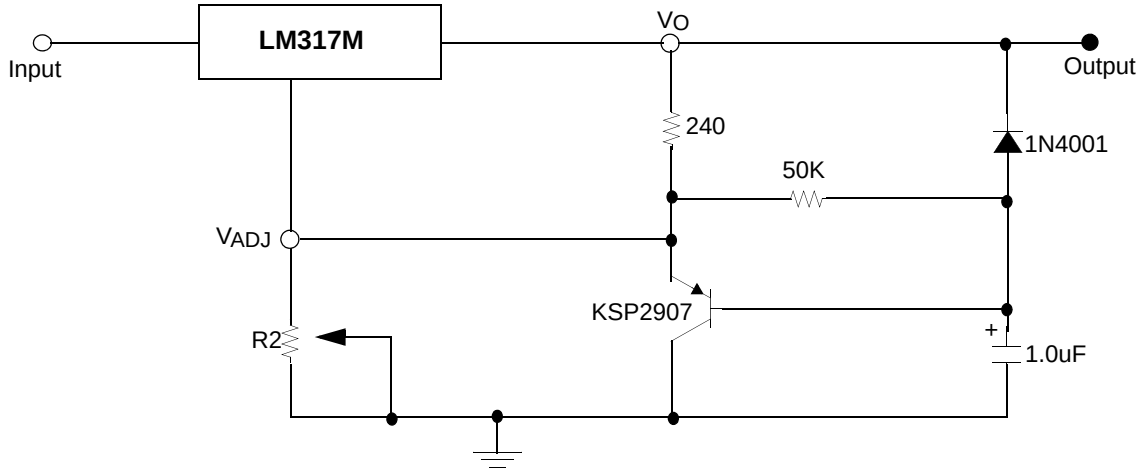
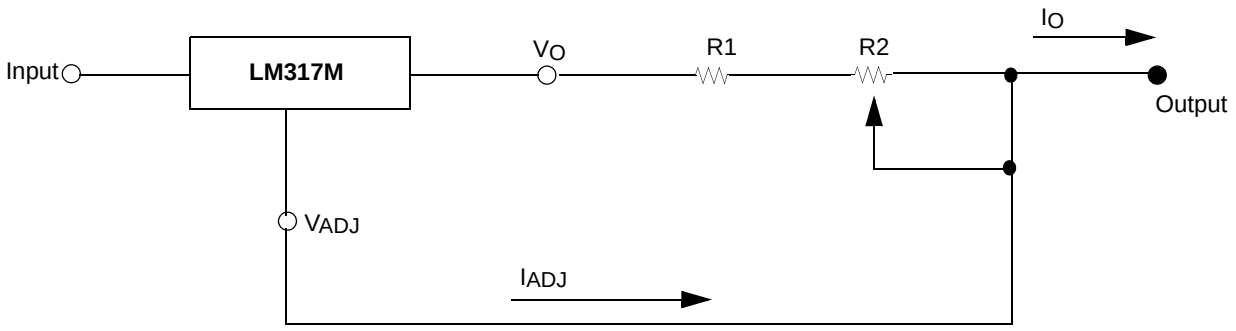


Figure 2. Slow Turn-On Regulator



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

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

$$5mA < I_O < 500mA$$

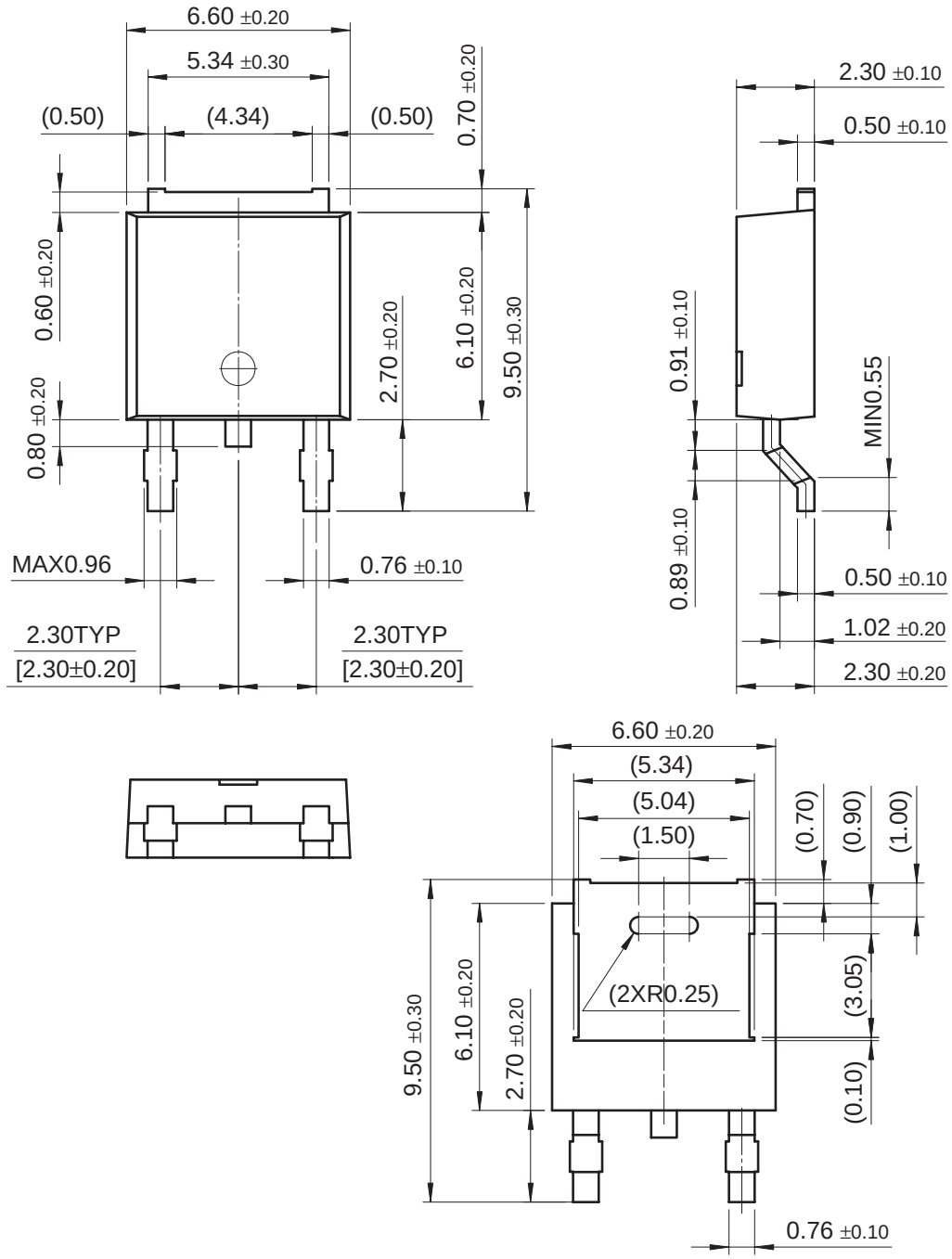
Figure 3. Current Regulator

Mechanical Dimensions

Package

Dimensions in millimeters

D-PAK

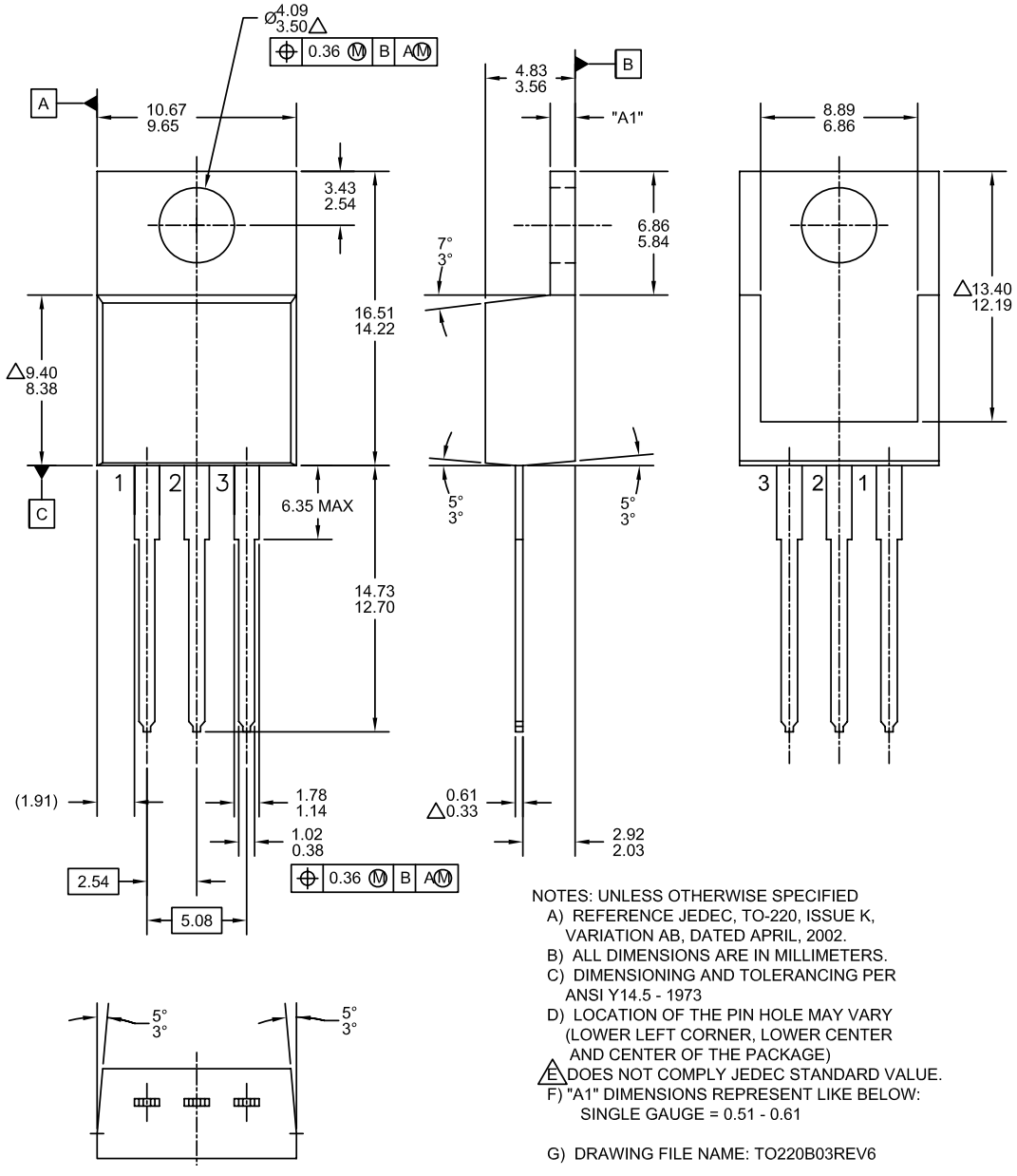


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

TO-220 [SINGLE GAUGE]



NOTES: UNLESS OTHERWISE SPECIFIED

A) REFERENCE JEDEC, TO-220, ISSUE K, VARIATION AB, DATED APRIL, 2002.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1973

D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)

△E DOES NOT COMPLY JEDEC STANDARD VALUE.

F) "A1" DIMENSIONS REPRESENT LIKE BELOW:
SINGLE GAUGE = 0.51 - 0.61

G) DRAWING FILE NAME: TO220B03REV6

Ordering Information

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