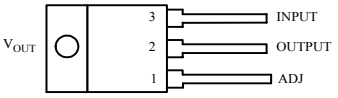
SP317M

3-Terminal 500mA Adjustable Voltage Regulator

Features

- Typical 1% Output Voltage Tolerance
- Typical 0.01%/V Line Regulation
- Typical 0.2% Load Regulation
- Very Low Dropout Voltage: 1.1V at 500mA Output Current
- Trimmed Current Limit
- On-chip Thermal Protection
- Operation Junction Temperature: 0 to 125°C
- Available in Lead Free, RoHS Compliant Packages

TO-220 Package



Applications

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

General Description

The SP317M is an adjustable three-terminal positive voltage regulator with a very low dropout of 1.08V at 500mA output current. Using 2 external resistors, the SP317M can provide an adjustable output voltage down to 1.25V.

The SP317M includes a circuit of trimmed bandgap reference to assure output voltage accuracy to be within 1%. It also provides current limiting and thermal shutdown. The current limit is trimmed to ensure specified output current and controlled short-circuit current. The On-chip thermal limiting provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The SP317M is available in the standard SOT-223, TO-220, TO-252 and SOT-89 power packages.

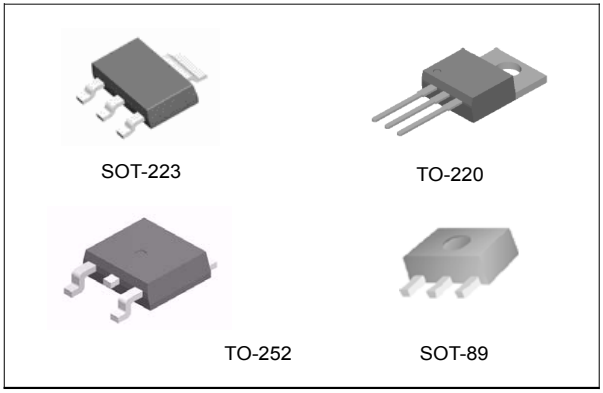


Figure 1. Package Types of SP317M

Pin Configuration

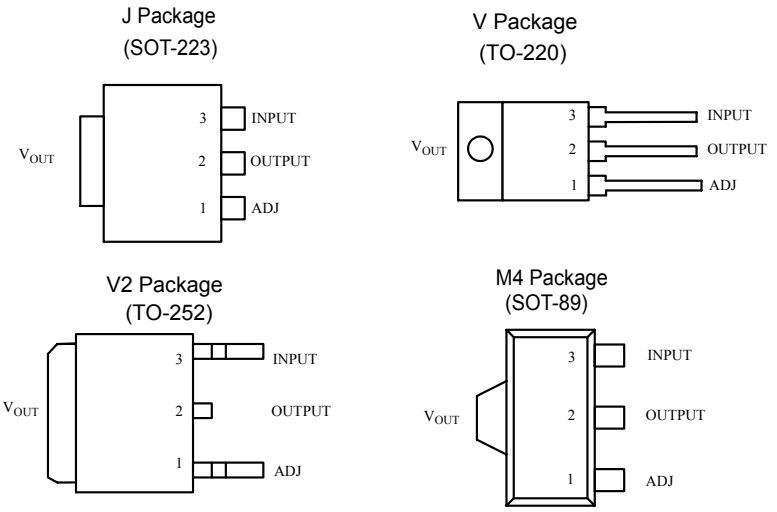


Figure 2. Pin Configuration of SP317M (Top View)

Functional Block Diagram

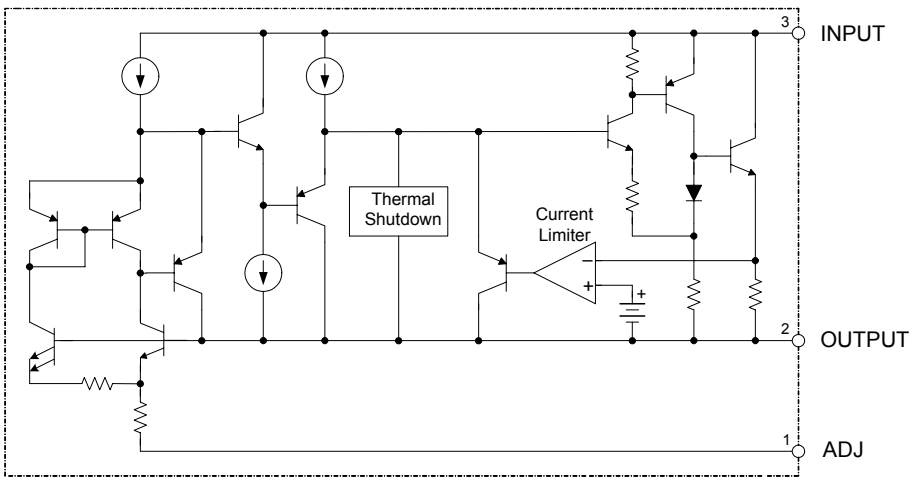


Figure 3. Functional Block Diagram of SP317M

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}		20	V
Maximum Junction Temperature	T_J		150	^oC
Storage Temperature	T_S	-65	150	^oC
Lead Temperature (Soldering, 10sec)	T_{LEAD}		300	^oC
ESD (Human Body Model)	ESD		4000	V

Note1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}	V_{OUT}+2	15	V
Operating Junction Temperature Range	T_J	0	125	^oC

Electrical Characteristics

(Typicals and limits apply for T_J =25°C, P≤ Maximum Power Dissipation unless otherwise specified.)(Note 2)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}	10mA≤I_{OUT}≤500mA, 3V≤ (V_{IN}-V_{OUT}) ≤10V	1.20	1.25	1.30	V
Line Regulation	S_V	I_{OUT} ≤ 20mA, 3V≤V_{IN}-V_{OUT}≤10V		0.01	0.04	%/V
Load Regulation	Si	V_{IN} -V_{OUT} = 2V, 10mA≤I_{OUT}≤500mA		0.2	0.4	%
Thermal Regulation		20ms Pulse		0.04	0.07	%/W
Dropout Voltage	ΔV	I_{OUT} = 500mA		1.1	1.2	V
Current Limit	I_{LIMIT}	(V_{IN}-V_{OUT}) = 2V		800	1800	mA
Adjust Pin Current				50	100	µA
Adjust Pin Current Change		1.4V≤(V_{IN}-V_{OUT}) ≤ 10V, 10mA ≤I_{OUT} ≤500mA		0.2	5	µA
Minimum Load Current		3V≤ (V_{IN}-V_{OUT}) ≤ 15V		3.5	10	mA
Ripple Rejection		f =120Hz, C_{OUT} =1µF Tantalum, (V_{IN}-V_{OUT}) = 3V, I_{OUT} =500mA	60	75		dB
Temperature Stability				1		%
Long -Term Stability		T_A=125°C, 1000hrs		0.3		%
RMS Output Noise(% of V_{OUT})		T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
Thermal Resistance, Junction to Case		SOT-223 TO-252 TO-220 SOT-89		15 10 4.5 25		°C/W
Thermal Shutdown		Junction Temperature		150		°C
Thermal Shutdown Hysteresis				25		°C

Note 2: Maximum Power Dissipation is Package Type and Case Temperature dependent. Please see Figure 11.

Typical Performance Characteristics

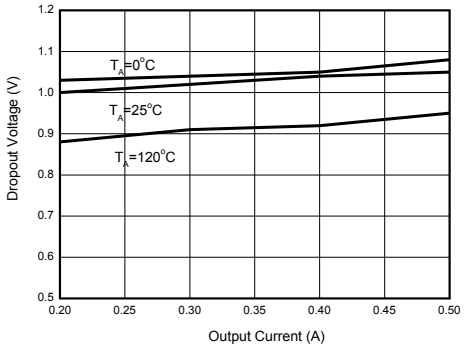


Figure 5. Dropout Voltage vs. Output Current

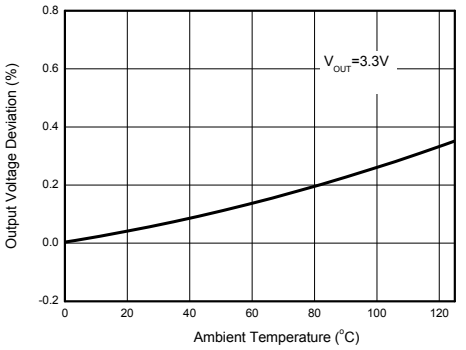


Figure 6. Load Regulation vs. Temperature

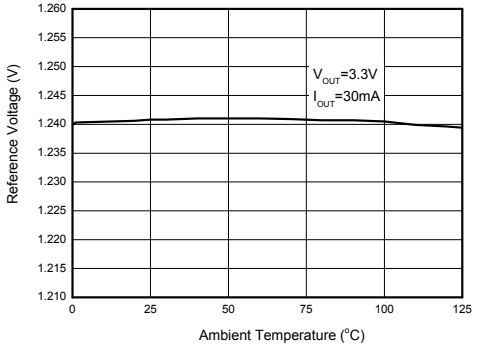


Figure 7. Reference Voltage vs. Temperature

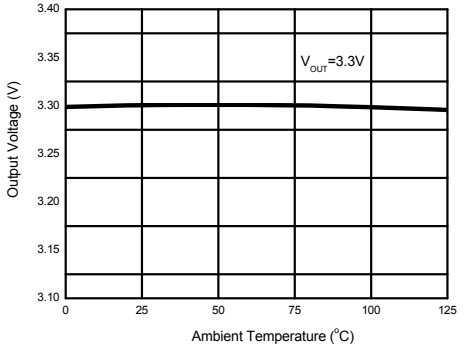


Figure 8. Output Voltage vs. Temperature

Typical Performance Characteristics (Continued)

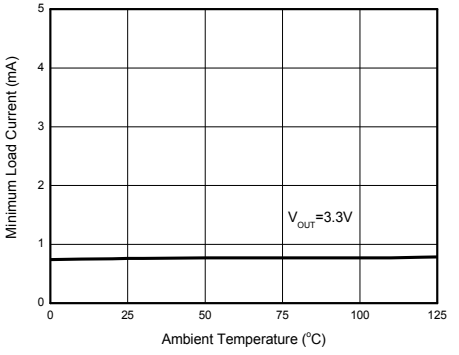


Figure 9. Minimum Load Current vs. Temperature

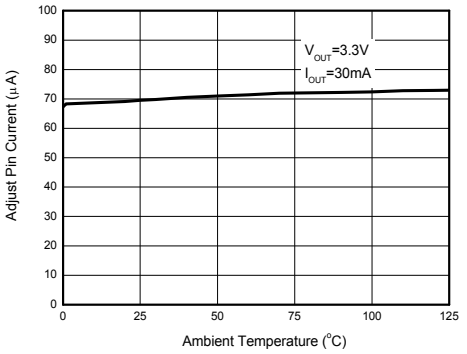


Figure 10. Adjust Pin Current vs. Temperature

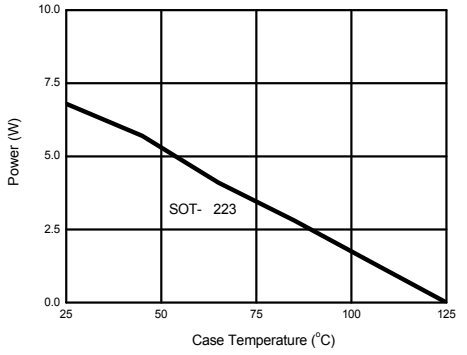


Figure 11. Maximum Power Dissipation

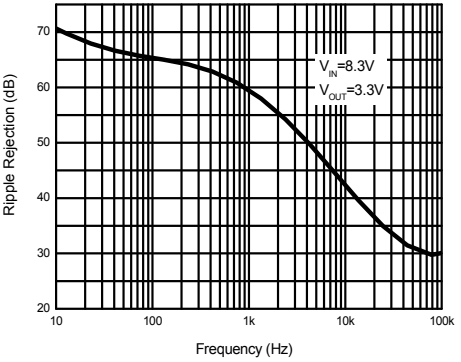


Figure 12. Ripple Rejection vs. Frequency

Typical Performance Characteristics (Continued)

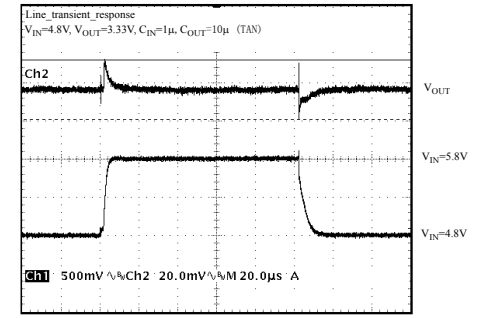


Figure 13. Line Transient Response

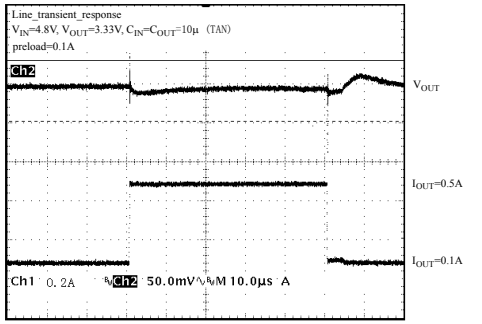


Figure 14. Load Transient Response

Typical Application

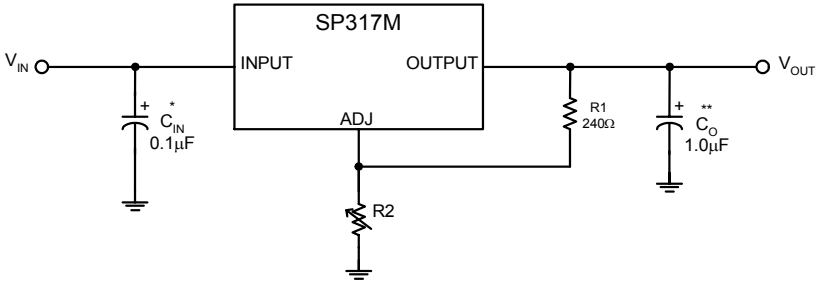


Figure 4. Typical Application of SP317M

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

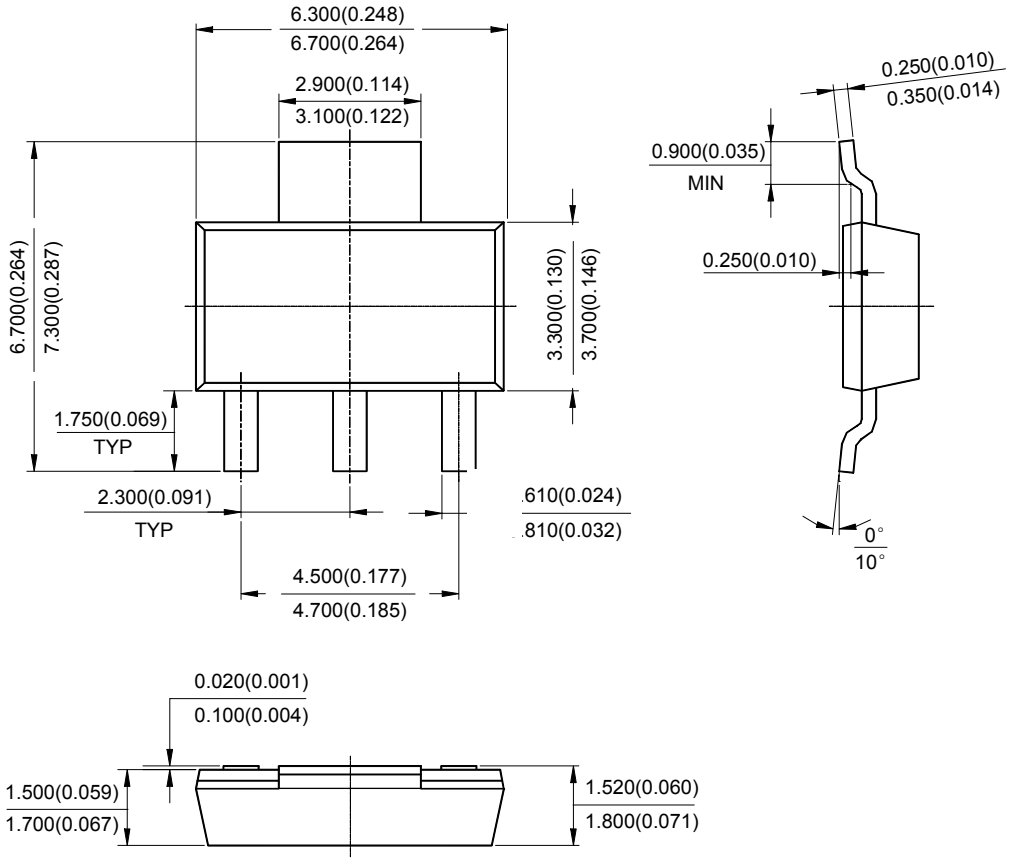
**= C_O is needed for stability and it improves transient response.

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

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

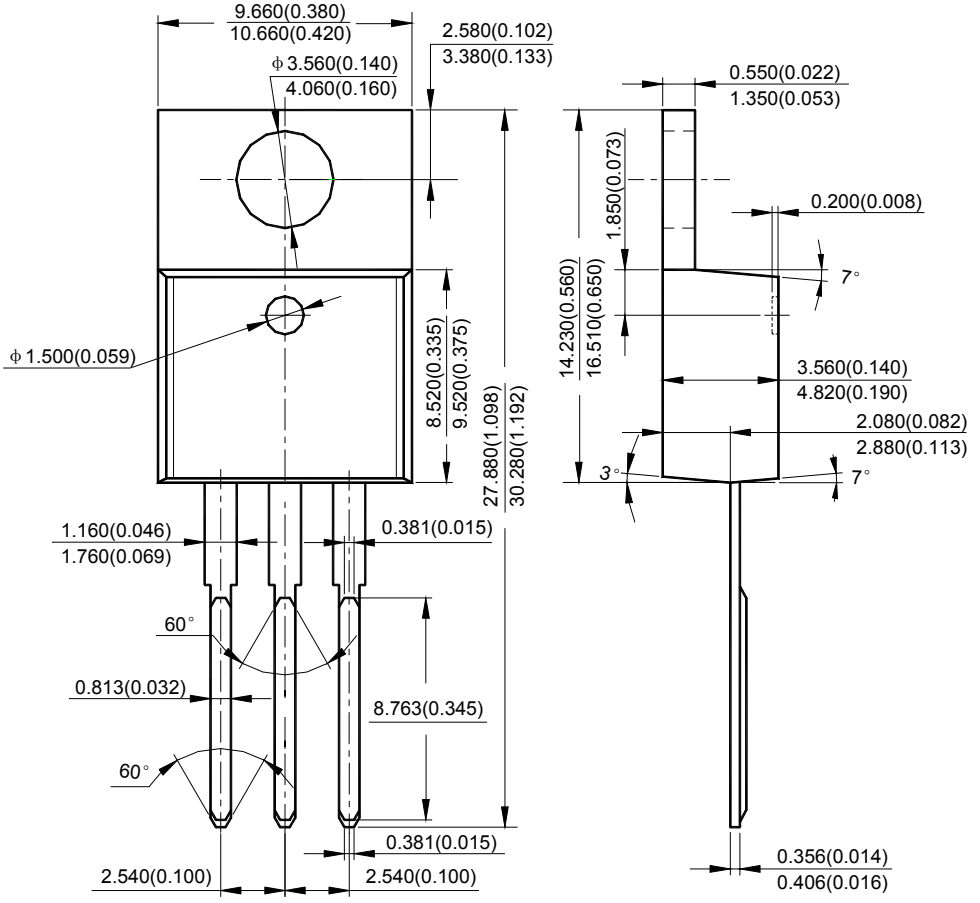
Mechanical Dimensions

SOT-223 **Unit: mm(inch)**



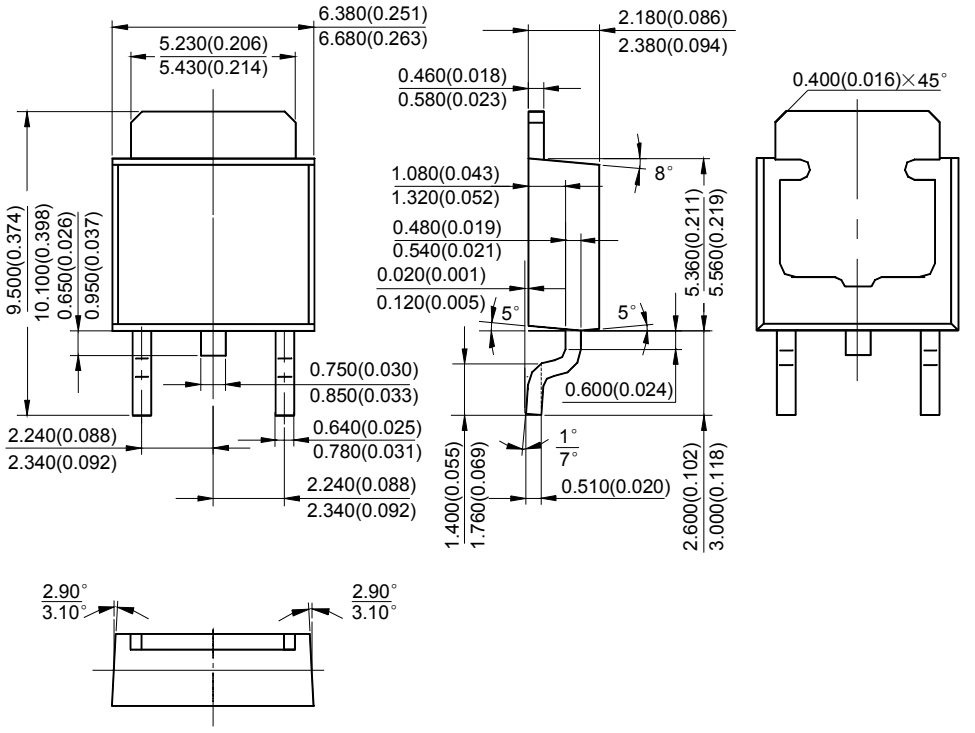
Mechanical Dimensions (Continued)

TO-220 **Unit: mm(inch)**



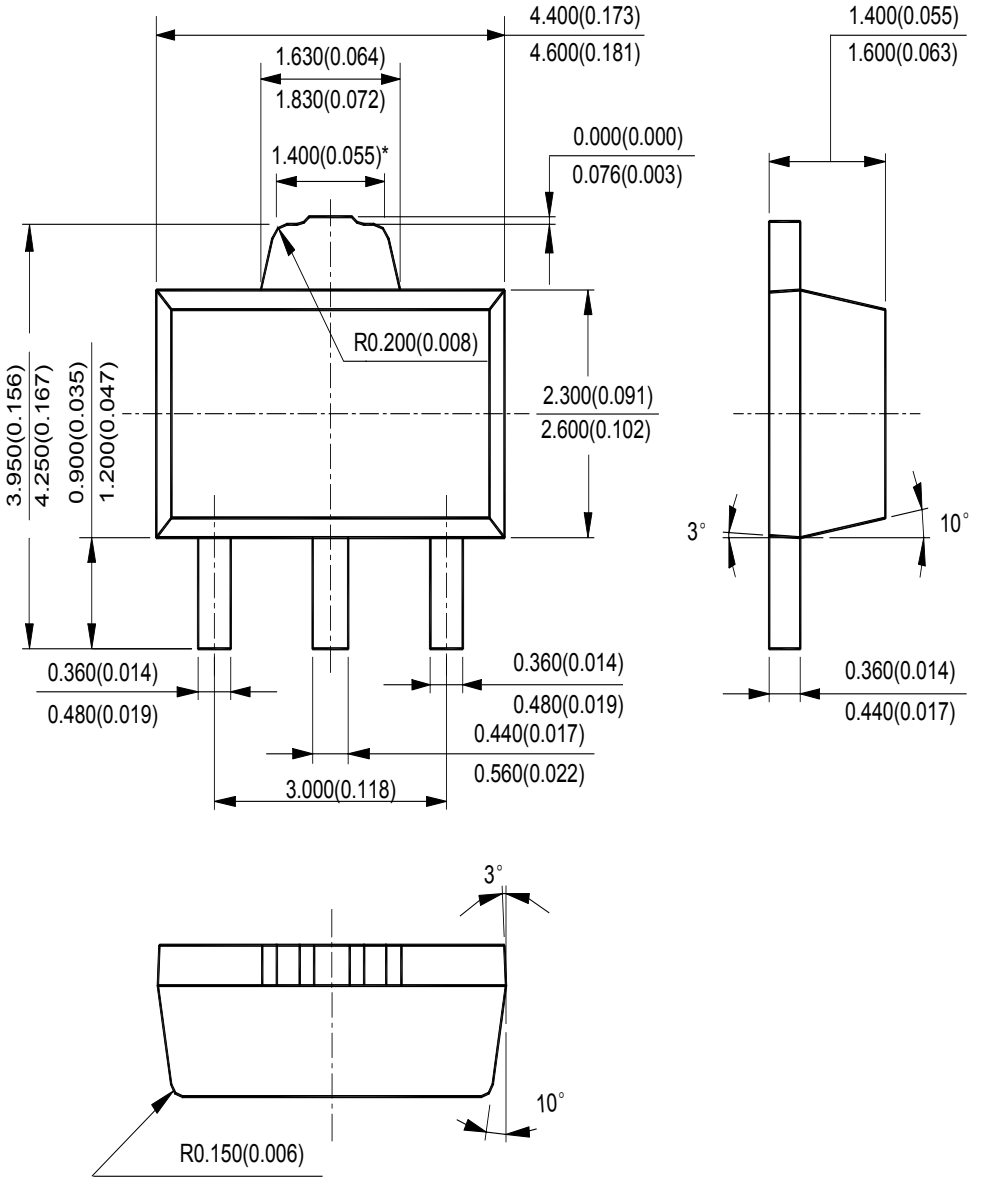
Mechanical Dimensions (Continued)

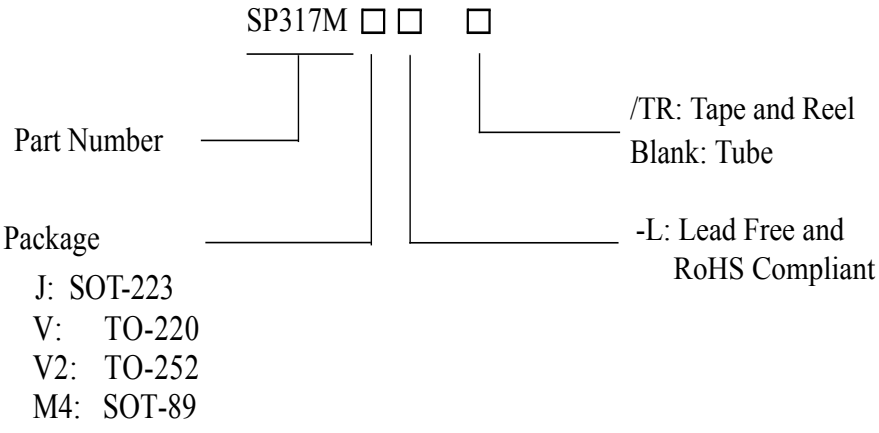
TO-252 **Unit: mm(inch)**



Mechanical Dimensions (Continued)

SOT-89 **Unit: mm(inch)**





Part Number	Temperature Range	Voltage Tolerance	Output Voltage	Package	Pin Count	Packing Type
SP317MJ-L/TR	0ºC to +125ºC	1.0%	Adj	SOT-223	3	2,500/TR
SP317MM4-L/TR	0ºC to +125ºC	1.0%	Adj	SOT-89	3	1,000/TR
SP317MV-L	0ºC to +125ºC	1.0%	Adj	TO-220	3	50/TUBE
SP317MV2-L/TR	0ºC to +125ºC	1.0%	Adj	TO-252	3	2,500/TR
SP317MV2-L	0ºC to +125ºC	1.0%	Adj	TO-252	3	80/TUBE

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