Solved by Sipex

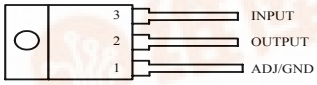
SP1086

1.5A Low Dropout Linear Regulator

Features

- Low Dropout Voltage: Typical 1.3V at 1.5A
- Current Limiting and Thermal Protection
- Output Current: 1.5A
- Current Limit: 2.3A
- Operating Junction Temperature: 0 to 125°C
- Line Regulation: 0.015% (Typical)
- Load Regulation: 0.1% (Typical)
- Available in RoHS Compliant, Lead Free Packaging

TO-220



Applications

- High Efficiency Linear Regulators
- Battery Charger
- Post Regulation for Switching Supply
- Microprocessor Supply
- Motherboard Power Supply
- Cable and ADSL Modem
- DVD-Video Player
- Telecom Equipment
- Set Top Boxes and Web Boxes Modules' Suppl

General Description

The SP1086 is a series of low dropout positive voltage regulators with a maximum dropout of 1.5V at 1.5A of load current. The series features on-chip thermal shutdown. It also includes a bandgap reference and a current limiting circuit. The SP1086 is available in 1.5V, 1.8V, 2.5V, 3V, 3.3V, and 5.0V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version, which can set the output voltage with only two external resistors. The SP1086 series is available in standard packages of TO-263-3, TO-220, and TO-252.

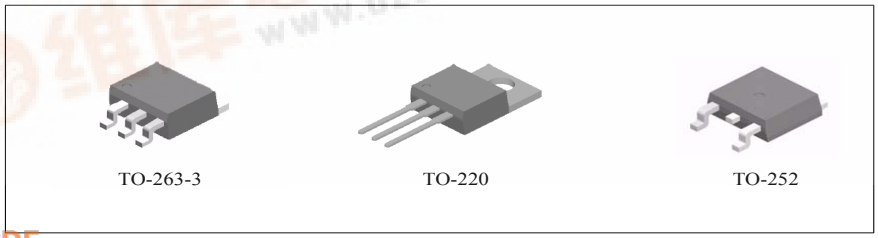


Figure 1. Package Types of SP1086

Pin Configuration

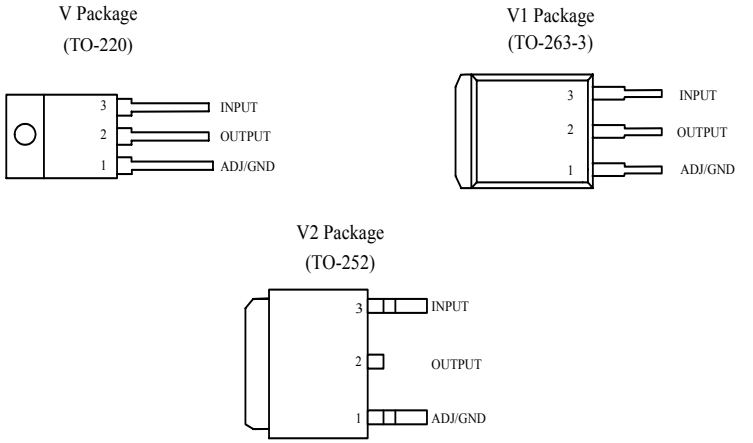


Figure 2. Pin Configuration of SP1086 (Top View)

Functional Block Diagram

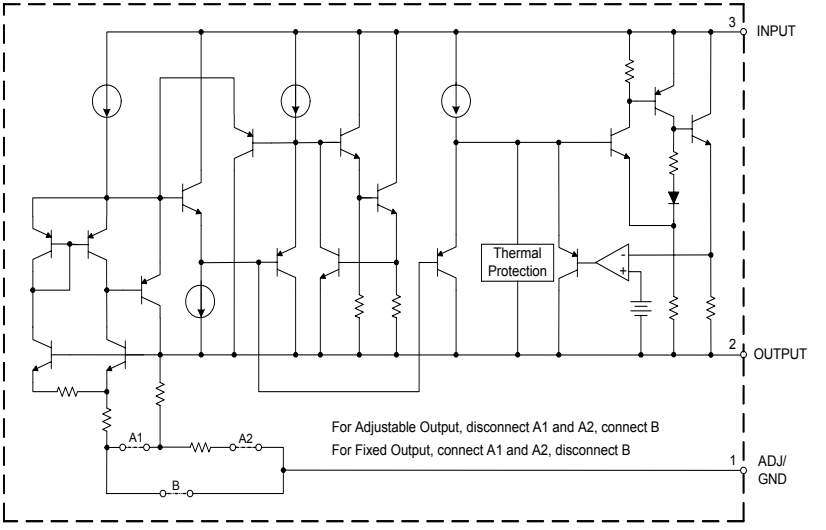


Figure 3. Functional Block Diagram of SP1086

Electrical Characteristics

(Typical and limits apply for T_J=25°C unless otherwise noted.)

Parameter		Test Circuit	Symbol	Conditions		Min	Typ	Max	Unit
Reference Voltage	0.5%	4	V_{REF}	$V_{KA}=V_{REF}$, I_{KA}=10mA		1.234	1.240	1.246	V
	1%					1.228	1.240	1.252	
Deviation of Reference Voltage Over-Temperature		4	ΔV_{REF}	$V_{KA}=V_{REF}$ I_{KA}=10mA	0°C to 70°C		2	10	mV
					-40°C to 85°C		3	10	
Ratio of Change in V_{REF} to the Change in Cathode Voltage		5	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I_{KA}=10mA, ΔV_{KA}:V_{REF} to 16V			-0.5	-1.5	mV/V
Reference Input Current		5	I_{REF}	I_{KA}=10mA, R1=10KΩ, R2=∞			0.15	0.4	μA
Deviation of Reference Current Over Full Temperature Range		5	ΔI_{REF}	I_{KA}=10mA, R1=10KΩ, R2=∞ T_A=-40 to 85°C			0.1	0.4	μA
Minimum Cathode Current for Regulation		4	I_{KA} (MIN)	$V_{KA}=V_{REF}$			55	80	μA
Off-State Cathode Current		6	I_{KA} (OFF)	V_{REF}=0, V_{KA}=18V			0.04	0.10	μA
				V_{KA}=6, V_{REF}=0			0.01	0.05	
Dynamic Impedance		4	Z_{KA}	$V_{KA}=V_{REF}$, I_{KA}=1 to 100mA f ≤ 1.0kHz			0.05	0.15	Ω

Electrical Characteristics

Typicals and limits appearing in normal type apply for $T_J = 25^oC$. Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, 0^oC to 125^oC. ($P_D \leq$ maximum power dissipation, see Note 2.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}	SP1086-ADJ, I_{OUT} = 10mA, $V_{IN} - V_{OUT}$ = 2V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1.5A, 1.4V $\leq V_{IN} - V_{OUT} \leq$ 6V	1.238 **1.225**	1.250 **1.250**	1.262 **1.270**	V
Output Voltage	V_{OUT}	SP1086-1.5, I_{OUT} =10mA, V_{IN} = 3.5V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1.5A, 3V $\leq V_{IN} \leq$ 10V	1.485 **1.47**	1.5 **1.5**	1.515 **1.53**	V
		SP1086-1.8, I_{OUT} = 10mA, V_{IN} = 3.8V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1. 5A, 3.2V $\leq V_{IN} \leq$ 10V	1.782 **1.746**	1.8 **1.8**	1.818 **1.854**	V
		SP1086-2.5, I_{OUT} = 10mA, V_{IN} = 4.5V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1.5A, 3.9V $\leq V_{IN} \leq$ 10V	2.475 **2.45**	2.5 **2.5**	2.525 **2.55**	V
		SP1086-3.0, I_{OUT} = 10mA, V_{IN} = 4.5V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1.5A, 4.9V $\leq V_{IN} \leq$ 10V	2.97 **2.94**	3.0 **3.0**	3.03 **3.06**	V
		SP1086-3.3, I_{OUT} = 10mA, V_{IN} = 5V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1.5A, 4.75V $\leq V_{IN} \leq$ 10V	3.267 **3.235**	3.3 **3.3**	3.333 **3.365**	V
		SP1086-5.0, I_{OUT} = 10mA, V_{IN} = 7V, $T_J = 25^oC$, 10mA $\leq I_{OUT} \leq$ 1.5A, 6.5V $\leq V_{IN} \leq$ 10V	4.95 **4.9**	5 **5**	5.05 **5.1**	V
Line Regulation	ΔV_{OUT}	SP1086-ADJ, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.015 **0.035**	0.2 **0.2**	%
		SP1086-1.5, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.3 **0.6**	6 **6**	mV
		SP1086-1.8, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.3 **0.6**	6 **6**	mV
		SP1086-2.5, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.3 **0.6**	6 **6**	mV
		SP1086-3.0, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.3 **0.6**	6 **6**	mV
		SP1086-3.3, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.5 **1**	10 **10**	mV
		SP1086-5.0, I_{OUT} = 10mA, 1.5V $\leq V_{IN} - V_{OUT} \leq$ 10V		0.5 **1**	10 **10**	mV

Electrical Characteristics (Continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Load Regulation	ΔV_{OUT}	SP1086-ADJ, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		0.1 **0.2**	0.3 **0.4**	%
		SP1086-1.5, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		3 **6**	12 **20**	mV
		SP1086-1.8, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		3 **6**	12 **20**	mV
		SP1086-2.5, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		3 **6**	12 **20**	mV
		SP1086-3.0, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		3 **7**	15 **20**	mV
		SP1086-3.3, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		3 **7**	15 **20**	mV
		SP1086-5.0, 10mA ≤ I_{OUT} ≤ 1.5A, V_{IN} - V_{OUT} = 2V		5 **10**	20 **35**	mV
Dropout Voltage		I_O = 1.5A, ΔV_{REF} = 1%		1.3	1.5	V
Current Limit	I_{LIMIT}	V_{IN} - V_{OUT} = 2V,	1.5	2.3		A
Minimum Load Current		1.4V ≤ V_{IN} - V_{OUT} ≤ 10V (For ADJ)		**2**	**5**	mA
Quiescent Current		V_{IN} = V_{OUT} + 1.3V		**5**	**10**	mA
Ripple Rejection		f_{RIPPLE} = 120Hz, C_{OUT} = 25µF Tantalum, I_{OUT} = 1.5A, V_{IN} - V_{OUT} = 3V	**60**	**75**		dB
Adjust Pin Current				60	**120**	µA
Adjust Pin Current Change		10mA ≤ I_{OUT} ≤ 1.5A, 1.4V ≤ V_{IN} -V_{OUT} ≤ 10V		**0.2**	**5**	µA
Temperature Stability				**0.5**		%
RMS Noise (% of V_{OUT})		T_A = 25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
Thermal Shutdown		Junction Temperature		165		°C
Thermal Shutdown Hysteresis				30		°C
Thermal Resistance Junction-to-Case	θ_{JC}	TO - 252 TO - 263 TO - 220		4 4 4		°C/W

Note 2: Maximum power dissipation see Figure 5.

Typical Performance Characteristics

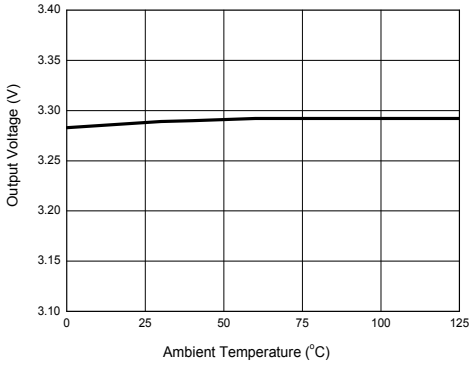


Figure 4. Output Voltage vs. Temperature

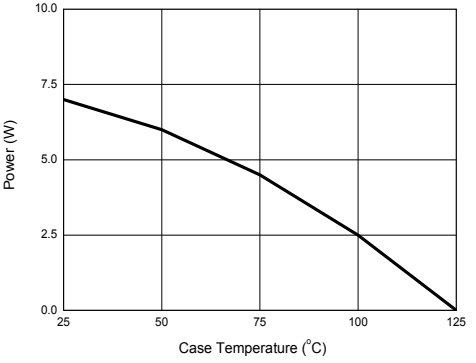


Figure 5. Maximum Power Dissipation

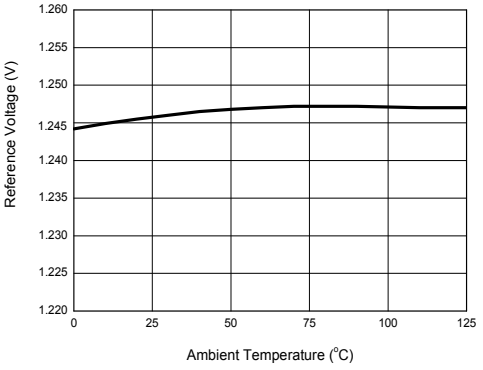


Figure 6. Reference Voltage vs. Temperature

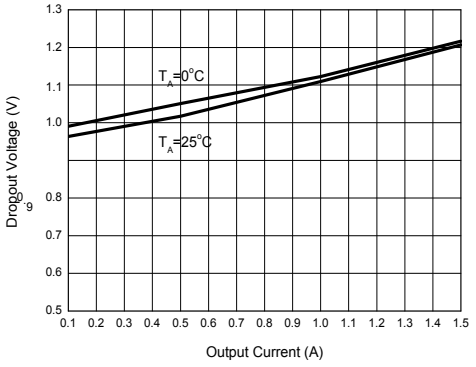


Figure 7. Dropout Voltage vs. Output Current

Typical Performance Characteristics (Continued)

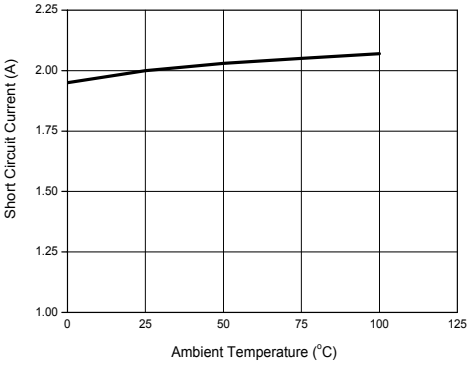


Figure 8. Short Circuit Current vs. Temperature

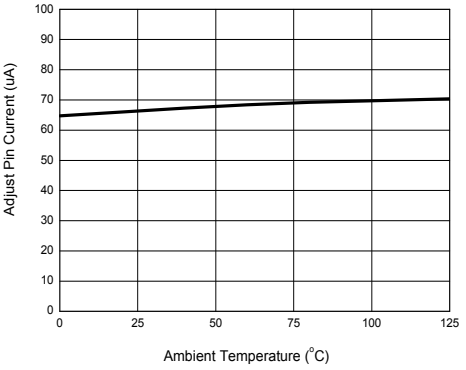


Figure 9. Adjust Pin Current vs. Temperature

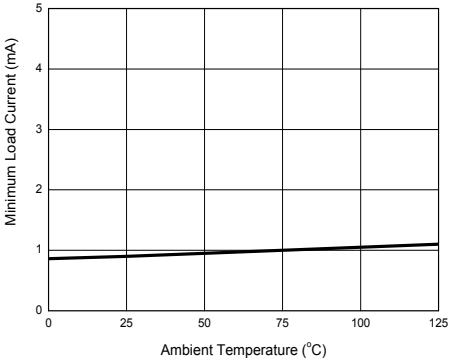


Figure 10. Minimum Load Current vs. Temperature

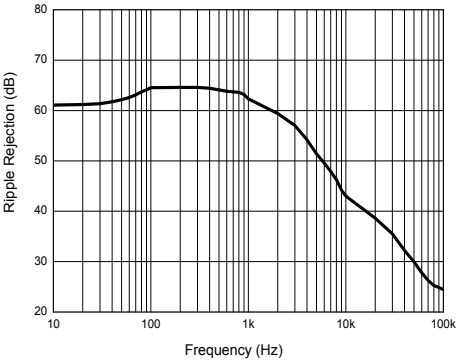
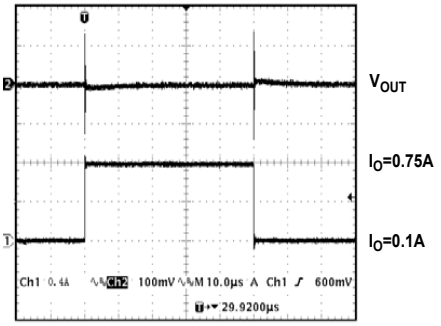


Figure 11. Ripple Rejection vs. Frequency

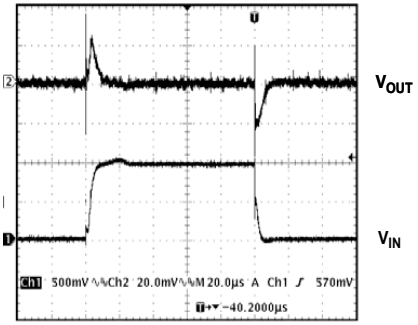
Typical Performance Characteristics (Continued)



SP1086V Load transient response

V_{IN}=4.8V, V_{OUT}=3.3V, I_O=0.1A to 0.75A, C_{IN}=C_{OUT}=10µ (tan)

Figure 12. Load Transient Response



SP1086V Line transient response

V_{IN}=4.8V, V_{OUT}=3.3V, I_O=0.1A, C_{IN}=1µ (tan), C_{OUT}=10µ (tan)

Figure 13. Line Transient Response

Typical Application

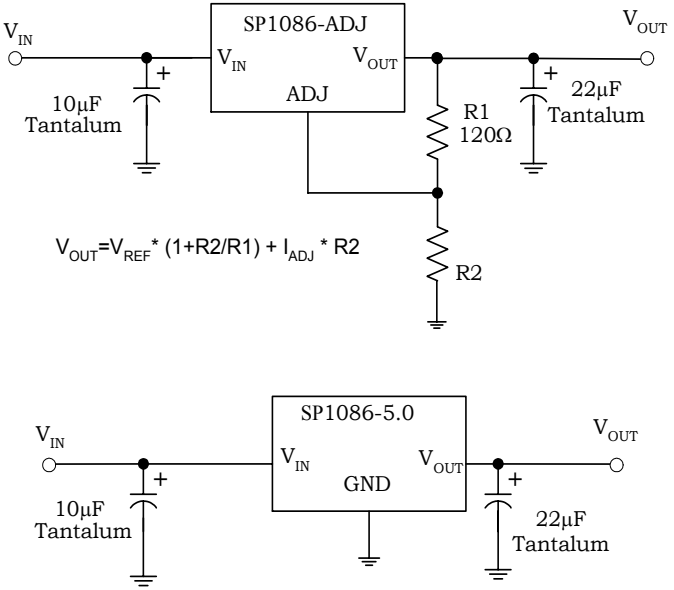
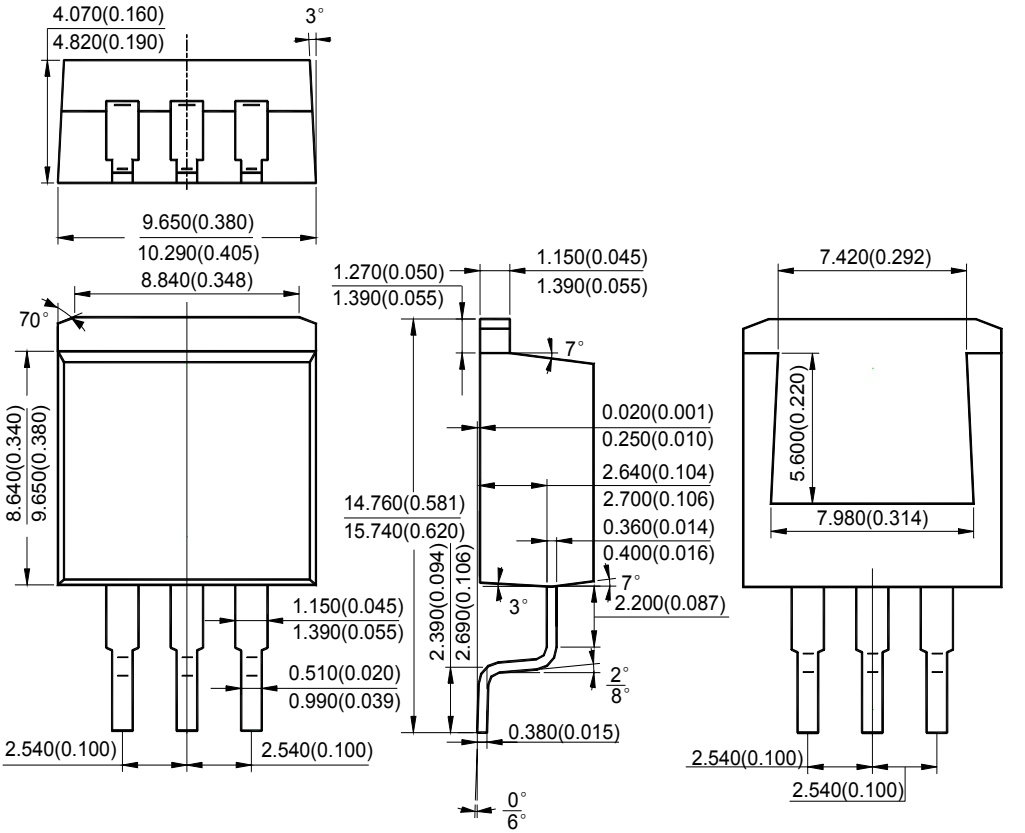


Figure 14. Typical Applications of SP1086

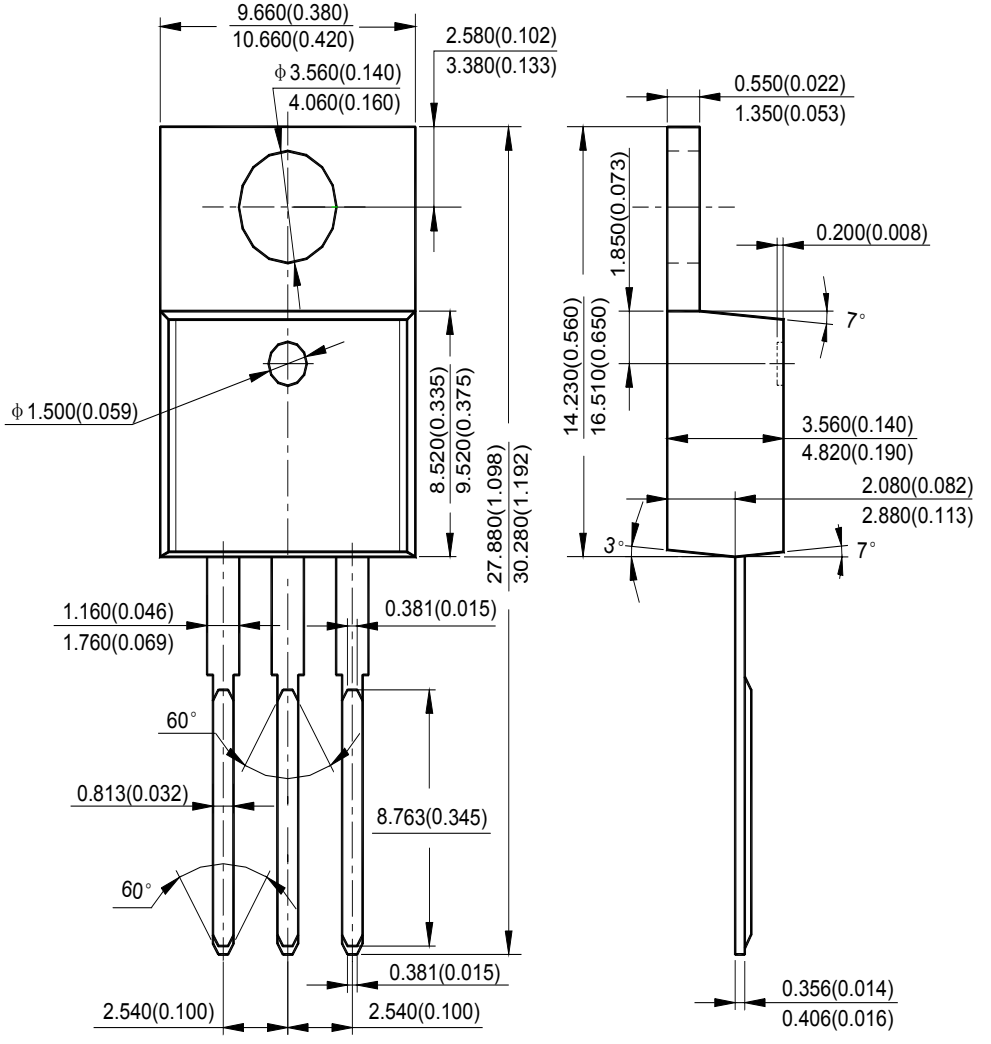
Mechanical Dimensions

TO-263-3 **Unit: mm(inch)**



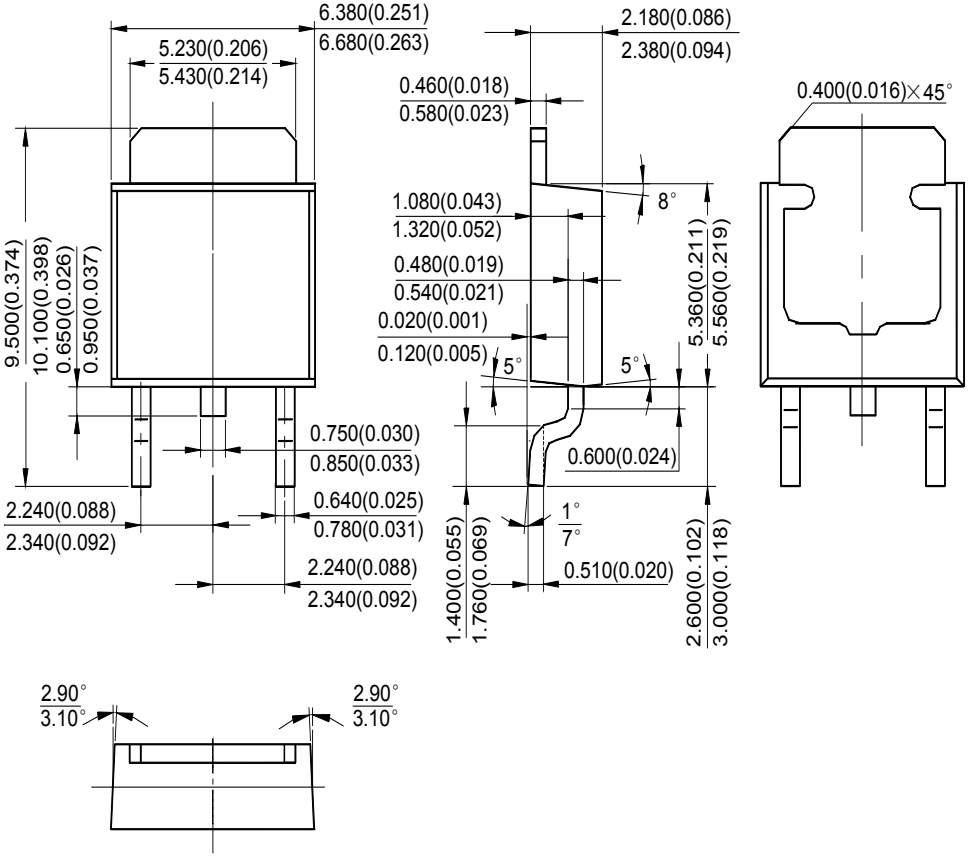
Mechanical Dimensions (Continued)

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

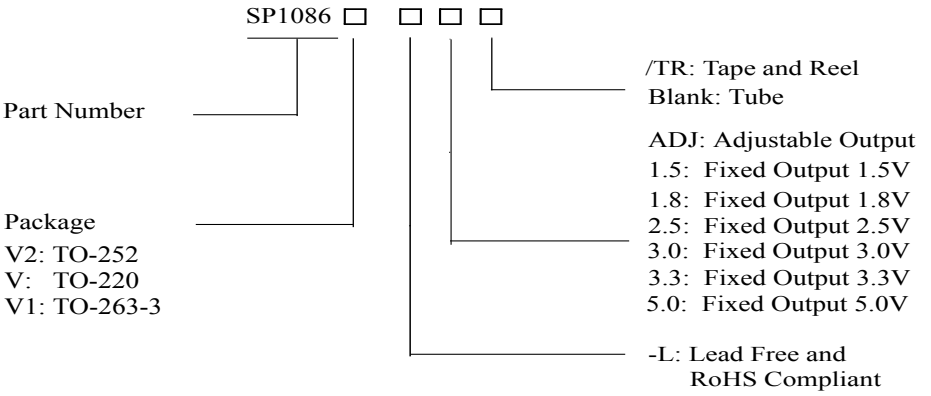


Mechanical Dimensions (Continued)

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



ORDERING INFORMATION



Part Number	Voltage Range	Temperature Range	Package	Pin Count	Pack Qty
SP1086V2-L/TR	Adj	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V2-L-1-5/TR	1.5V	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V2-L-1-8/TR	1.8V	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V2-L-2-5/TR	2.5V	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V2-L-3-0/TR	3V	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V2-L-3-3/TR	3.3V	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V2-L-5-0/TR	5V	0ºC to +125ºC	TO-252	3	2,500/TR
SP1086V1-L/TR	Adj	0ºC to +125ºC	TO-263	3	800/TR
SP1086V1-L-1-5/TR	1.5V	0ºC to +125ºC	TO-263	3	800/TR
SP1086V1-L-1-8/TR	1.8V	0ºC to +125ºC	TO-263	3	800/TR
SP1086V1-L-2-5/TR	2.5V	0ºC to +125ºC	TO-263	3	800/TR
SP1086V1-L-3-0/TR	3V	0ºC to +125ºC	TO-263	3	800/TR
SP1086V1-L-3-3/TR	3.3V	0ºC to +125ºC	TO-263	3	800/TR
SP1086V1-L-5-0T/R	5V	0ºC to +125ºC	TO-263	3	800/TR
SP1086V-L	Adj	0ºC to +125ºC	TO-220	3	50/TUBE
SP1086V-L-1-5	1.5V	0ºC to +125ºC	TO-220	3	50/TUBE
SP1086V-L-1-8	1.8V	0ºC to +125ºC	TO-220	3	50/TUBE
SP1086V-L-2-5	2.5V	0ºC to +125ºC	TO-220	3	50/TUBE
SP1086V-L-3-0	3V	0ºC to +125ºC	TO-220	3	50/TUBE
SP1086V-L-3-3	3.3V	0ºC to +125ºC	TO-220	3	50/TUBE
SP1086V-L-5-0	5V	0ºC to +125ºC	TO-220	3	50/TUBE

Solved by Sipex

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