



AS300

Shunt Temperature Sensor

Features

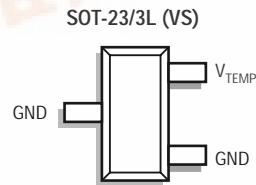
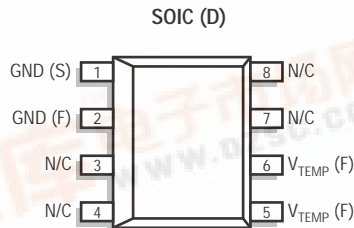
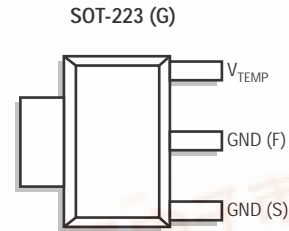
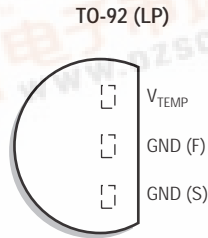
- Calibrated directly in Kelvin
- Linear 10 mV/°C scale factor
- 1°C typical accuracy at 27°C (300 K)
- Fully rated for -40 to 125°C (233 to 398 K)
- Suitable for remote applications
- Low-impedance output, 0.3 Ω for a 1 mA load
- Now available in the SOT-223 for improved substrate temperature sensing

Description

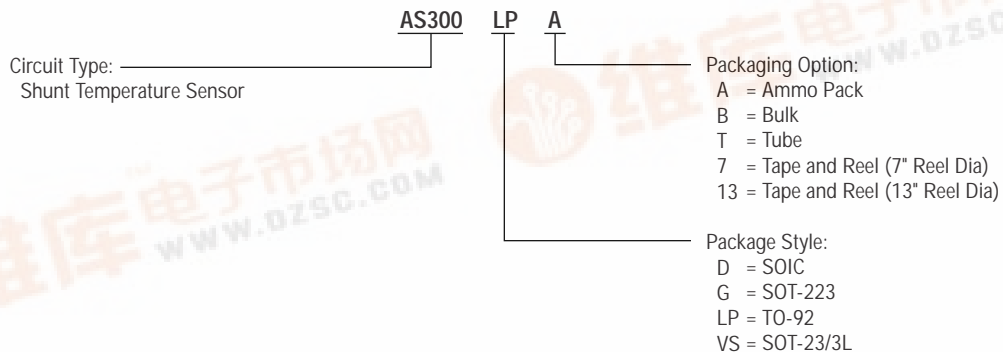
The AS300 is a two-terminal integrated circuit temperature sensor. It is a precision-trimmed shunt type regulator that emulates a zener diode in function. Its output voltage is linearly proportional to temperature in Kelvin. The output voltage is calibrated for 3.000 V at 27°C (300 K) and increases by 10 mV/°C.

The AS300 is available in four packages. The SOT-223 offers a large heat-sink for transferring heat to the die for fast and accurate thermal sensing. The SOT-223 is especially effective at sensing the temperature of hybrid and MCM substrates. The SOT-23 is best-suited for applications requiring a small footprint or precision force/sense metering.

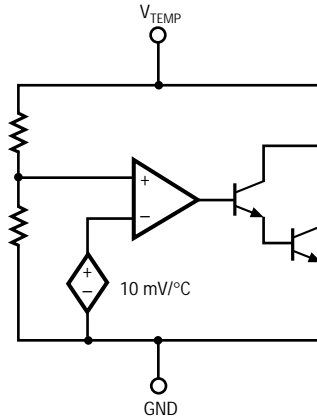
Pin Configuration — Top view



Ordering Information



Functional Block Diagram



Pin Function Description

Pin Number		Function	Description
TO, SOT	SOIC		
1	1	GND (S)	Optional sense pin ground, otherwise tie to substrate pin GND (F).
2	2	GND (F)	Signal ground and circuit substrate.
3	6	V_{TEMP} (F)	Output voltage proportional to temperature. V_{TEMP} is nominally 3.00 V at 27°C (300 K) and increases at 10 mV/°C.
–	5	V_{TEMP} (S)	Optional sense pin for V_{TEMP} . Available on the 8L SOIC package only. Tie pin to V_{TEMP} (F) if not using force/sense metering.

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply Current	I_{REF}	20	mA
Continuous Power Dissipation at 25°C	P_D		
TO-92		775	mW
SOT-223		1250	mW
8L SOIC		750	mW
SOT-23/3L		200	mW
Junction Temperature	T_J	150	°C
Operating Temperature		–40 to 125	°C
Storage Temperature	T_{STG}	–65 to 150	°C
Lead Temp, Soldering 10 Seconds	T_L	300	°C

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Typical Thermal Resistances

Package	θ_{JA}	θ_{JC}	Typical Derating
TO-92	160°C/W	80°C/W	6.3 mW/°C
SOT-223	115°C/W	8°C/W	8.7 mW/°C
8L SOIC	175°C/W	45°C/W	5.7 mW/°C
SOT-23/3L	575°C/W	150°C/W	1.7 mW/°C

Electrical Characteristics

Electrical Characteristics are guaranteed over the full junction temperature range (–40 to 125°C). Ambient temperature must be derated based upon power dissipation and package thermal characteristics.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Voltage	V_{TEMP}	$I_K = 2 \text{ mA}$, $T_J = 27^\circ\text{C}$ (300 K)	2.970	3.000	3.030	V
	V_{TEMP}	$I_K = 2 \text{ mA}$, $T_J = 100^\circ\text{C}$ (373 K)	3.690	3.730	3.770	V
Temperature Coefficient Error		$I_K = 2 \text{ mA}$, deviation from 10 mV/°C		40		$\mu\text{V}/^\circ\text{C}$
Minimum Operating Current	$I_{K(\text{min})}$				0.6	mA
Output Impedance	Z_{KA}	$I_K = 0.6 \text{ to } 5.5 \text{ mA}$		0.3	2	Ω

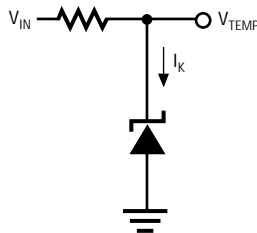
Test Circuit

Figure 1

Typical Performance Curves

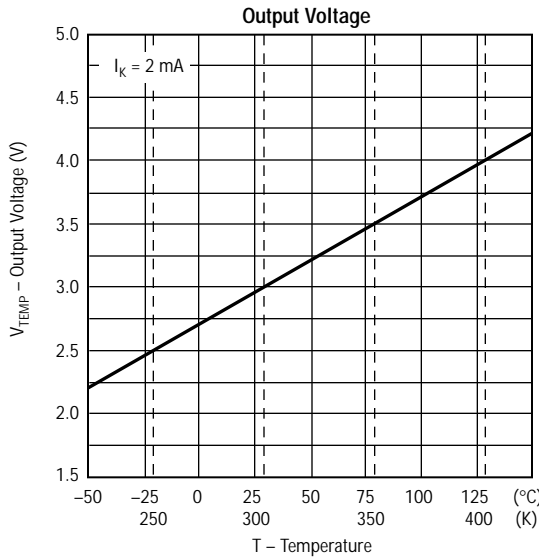


Figure 2

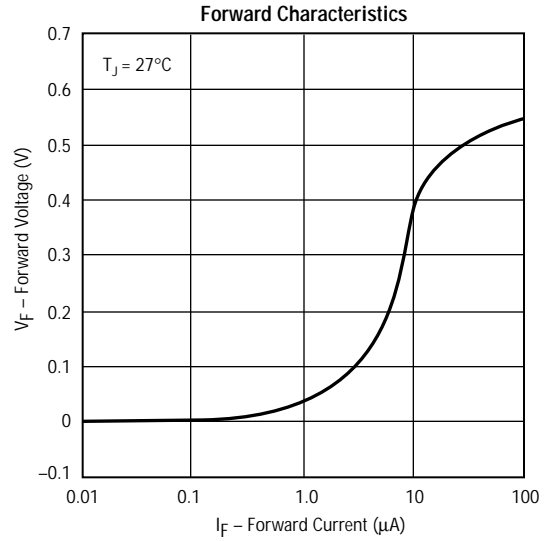


Figure 3

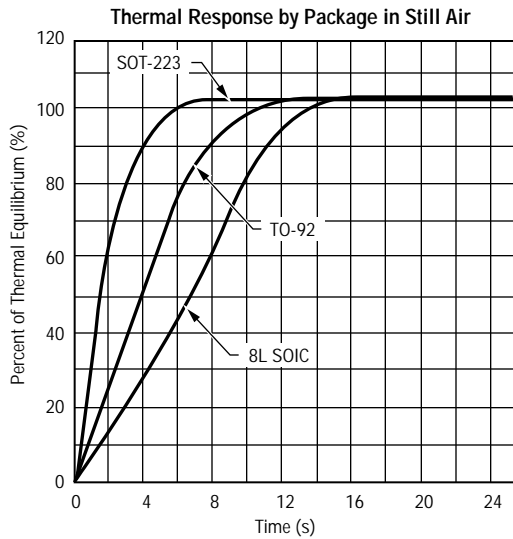


Figure 4

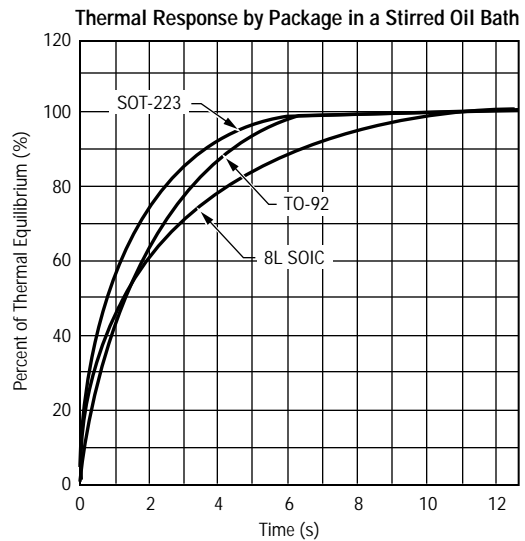


Figure 5

Typical Performance Curves

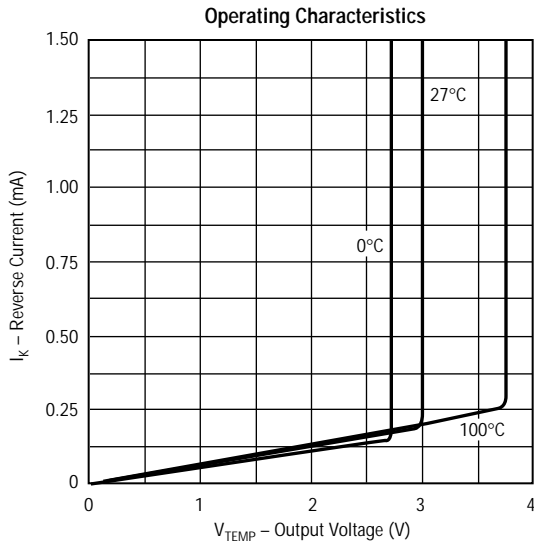


Figure 6

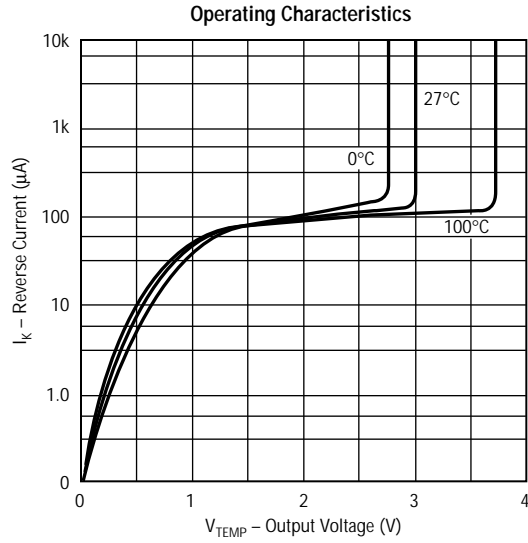


Figure 7

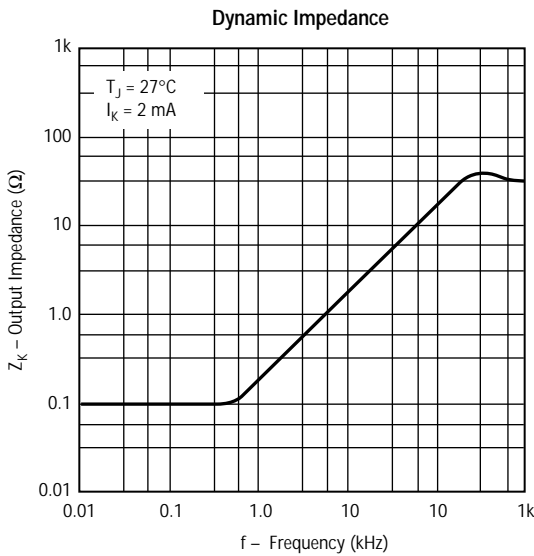


Figure 8

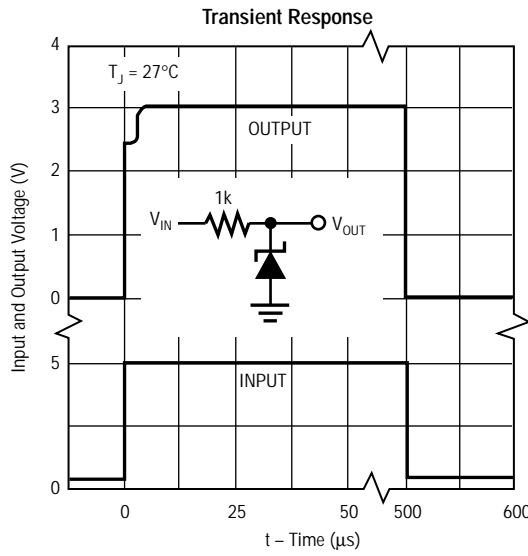


Figure 9

Typical Applications

Linear Fan Controller

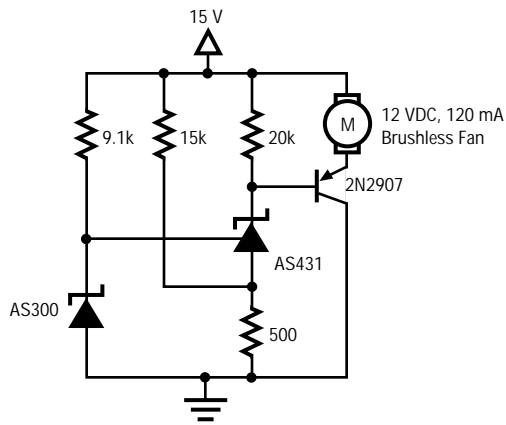


Figure 10

Fahrenheit Thermometer

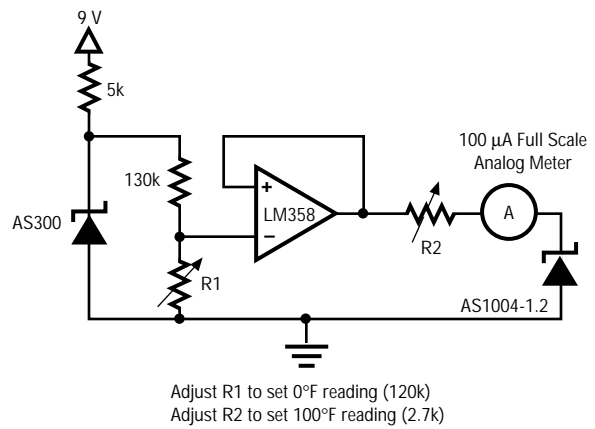


Figure 11

Linear Fan Controller

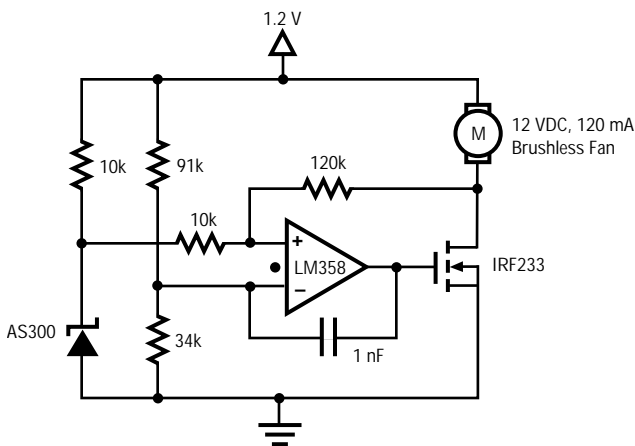


Figure 12

Thermostat

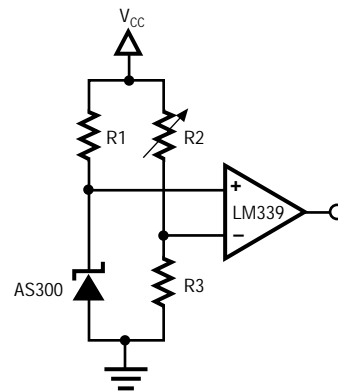


Figure 13