

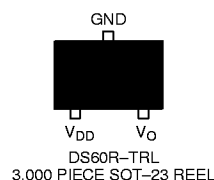
**DALLAS**  
SEMICONDUCTOR

## DS60 Micro-Centigrade Temperature Sensor

### FEATURES

- Factory calibrated for sensitivity of  $+6.25\text{mV}/^\circ\text{C}$  and accuracy of  $\pm 2.0^\circ\text{C}$
- Measurement range of  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Ultra-low supply current
- Compact SOT-23 package
- Wide power supply range ( $2.7\text{V} \leq V_{\text{DD}} \leq 5.5\text{V}$ )
- Functionally-compatible with LM60
- Applications include monitoring battery packs, disk drives, printers, office equipment or any space and power sensitive and temperature sensitive environments.

### PIN ASSIGNMENT



### PIN DESCRIPTION

$V_{\text{DD}}$	Power Supply Voltage (2.7V to 5.5V)
$V_{\text{O}}$	Sensor Output
GND	Ground

### DESCRIPTION

The DS60 is a factory-calibrated voltage output Centigrade temperature sensor. The thermometer output has a typical sensitivity of  $+6.25\text{mV}/^\circ\text{C}$  and a DC offset of  $+424\text{ mV}$ . The measurement range is  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ , corresponding to a typical output range of  $+174\text{ mV}$  to  $+1205\text{ mV}$ . Because the output voltage is positive for the entire temperature range, there is no need for a negative power supply. The accuracy of the analog output, taking into account amplifier nonlinearity, gain variations, and temperature sensor variations is  $\pm 2.0^\circ\text{C}$  from  $0^\circ\text{C}$  to  $85^\circ\text{C}$  and within  $\pm 3.0^\circ\text{C}$  over the full voltage and temperature range.

The power supply range of the DS60 is 2.7V to 5.5V. Its low current requirement of  $125\ \mu\text{A}$  and wide supply range make it ideal in battery-powered applications. To further reduce power dissipation, the DS60 can be switched to a zero power standby state by logic gate outputs capable of sourcing current of this magnitude.

The small size of the SOT-23 package, wide power supply range, and ultra-low power dissipation allow the DS60 to be used in thermal management applications that are currently limited to nonlinear thermistors. These include battery packs, LCD displays, disk drives, power supplies, and appliances.

**ABSOLUTE MAXIMUM RATINGS\***

Voltage on $V_{DD}$	GND -0.3V to +6.5V
Output Current	5.0 mA
Operating Temperature	-40°C to +125°C
Storage Temperature	-55°C to +150°C
ESD Susceptibility (Human Body Model)	2kV
Soldering Temperature (Note 2)	215°C for 60 seconds (Vapor Phase) 220°C for 15 seconds (IR)

\* This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

The Dallas Semiconductor DS60 is built to the highest quality standards and manufactured for long term reliability. All Dallas Semiconductor devices are made using the same quality materials and manufacturing methods. However, the DS60 is not exposed to environmental stresses, such as burnin, that some industrial applications require. For specific reliability information on this product, please contact the factory in Dallas at (972) 371-4448.

**RECOMMENDED DC OPERATING CONDITIONS** (-40°C to +125°C;  $2.7V \leq V_{DD} \leq 5.5V$ )

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS	NOTES
Supply Voltage	$V_{DD}$		2.7		5.5	V	1

**DC ELECTRICAL CHARACTERISTICS:****Power Supply (Note 3)**(-40°C to +125°C;  $2.7V \leq V_{DD} \leq 5.5V$ )

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS	NOTES
Supply Current	$I_{DD}$			80	125	$\mu A$	

**DC ELECTRICAL CHARACTERISTICS:****Temperature Sensor and Voltage Output (Note 3)**(-40°C to +125°C;  $2.7V \leq V_{DD} \leq 5.5V$ )

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS	NOTES
Thermometer Error	$T_{ERR}$	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$			$\pm 3$	$^{\circ}C$	4
		$0^{\circ}C \leq T_A \leq 85^{\circ}C$			$\pm 2$		
$V_O$ DC Offset		$T = 0^{\circ}C$		424		mV	1
Sensor Gain	$\Delta V/\Delta T$		60	6.25	6.5	mV/ $^{\circ}C$	
Nonlinearity					$\pm 0.8$	$^{\circ}C$	5
Power Supply Regulation		$2.7V \leq V_{DD} \leq 3.3V$			$\pm 2.0$	mV	
		$3.0V \leq V_{DD} \leq 5.5V$			$\pm 0.25$	mV/V	
Sensor Drift				$\pm 0.25$		$^{\circ}C$	6
Output Impedance					800	$\Omega$	

**NOTES:**

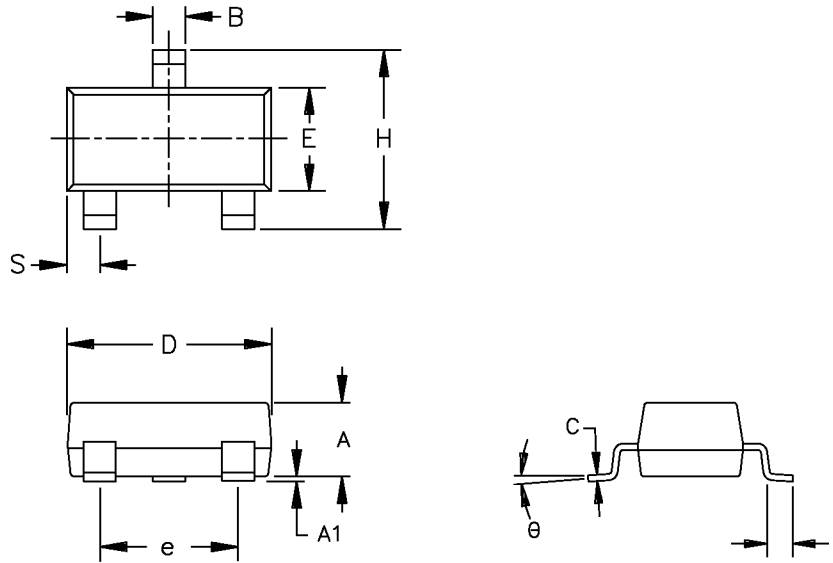
1. All voltages are referenced to ground, unless otherwise specified.
2. Solder according to IPC standards.
3. Specified for  $V_O$  sourcing  $1.0 \mu\text{A}$  (max).
4. Thermometer error (expressed in  $^{\circ}\text{C}$ ) is the difference between  $[V_O(T) - 424]/6.25$  and the DS60 case temperature at  $V_{DD} = 3.0\text{V}$ , thus taking into account sensor error, DC offset error, sensor amplifier gain variations, and amplifier nonlinearity.
5. Nonlinearity is the maximum deviation of an ideal linear slope for a given DS60.
6. This is the typical drift following 3 consecutive passes through a vapor phase.

**TYPICAL DS60 THERMOMETER ERROR** Figure 1

**T B D**



**DS60 PHYSICAL DIMENSIONS**



LTR	INCHES	
	MIN	MAX
A	0.030	0.040
A1	0.001	0.006
B	0.015	0.022
C	0.003	0.008
D	0.100	0.120
E	0.040	0.060
e	0.070	0.085
H	0.080	0.100
I	0.005	0.015
S	0.015	0.025
θ	0°	8°

- NOTES:  
 1. PACKAGE OUTLINE EXCLUSIVE OF ANY MOLD FLASHES DIMENSION.  
 2. PACKAGE OUTLINE EXCLUSIVE OF BURR DIMENSION.

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