aTS50

LOW-VOLTAGE SOT-23 TEMPERATURE SENSOR

PRODUCT SPECIFICATION

New Release Specification

Product Description

The aTS50 is a high-precision CMOS temperature sensor that provides a cost-effective solution for applications requiring high-accuracy low-power temperature monitoring. The aTS50 output voltage ramp is extremely linear and has a slope of 10mV/°C. It is typically accurate to ±1°C over a temperature range of –40°C to 125°C and has a typical room temperature accuracy of ±0.5°C. The output voltage characteristic for the aTS50 is illustrated in Figure 1.

The aTS50 does not require external calibration. Calibration of the aTS50 is performed at the factory, and is permanently set for the part.

The aTS50 is available in 3-pin SOT-23 surface mount packages.

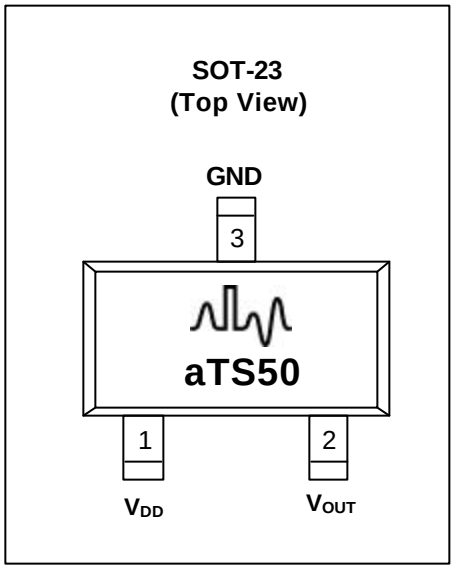
Features

Precision Calibrated to ±1°C (Typical)
Temperature Range: -40°C to 125°C
Extremely Linear Output Ramp (10mV/°C)
Output Ramp is Calibrated to Degrees Celsius
Low Operating Current (< 130µA)
Low Self Heating (0.2°C Max in Still Air)
Operating Voltage Range: +2.7V to +6V
Uses a Single Positive Supply
Non-linearity ≤ 0.8°C

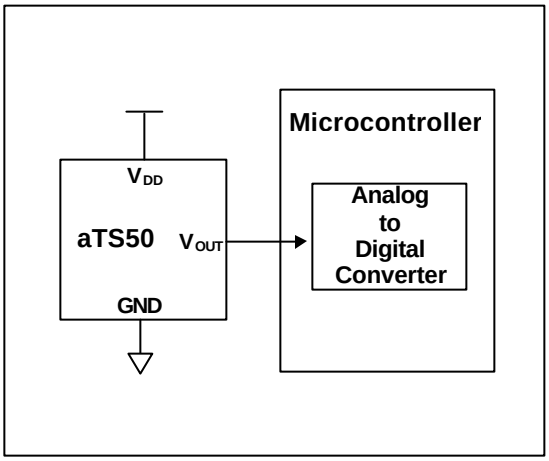
Applications

Mobile Phones
Mobile Communications Terminals
Computers
Battery Management
FAX Machines/Printers/Copiers
Portable Medical Instruments
HVAC
Power Supply Modules
Disk Drives
Automotive Control Circuits

Pin Configuration



Application Diagram



Ordering Information

Part Number	Package	Temperature Range	How Supplied
aTS50S3	3-Pin SOT-23	-40℃ to +125℃	3000 units on tape and reel

Absolute Maximum Ratings[1]

Parameter		Rating
Supply Voltage		+7V
Output Voltage		V_{DD} + 0.5V
Output Current		-25/+50 µA
Storage Temperature Range		-60°C to +150°C
Lead Soldering Temperature		220°C
ESD[2]	Human Body Model	2000V
	Machine Model	250V

Notes:
1. Absolute maximum ratings are limits beyond which operation may cause permanent damage to the device. These are stress ratings only; functional operation at or above these limits is not implied.
2. Human Body Model: 100pF capacitor discharged through a 1.5kΩ resistor into each pin. Machine Model: 200pF capacitor discharged directly into each pin.

Recommended Operating Ratings

Symbol	Parameter	Min	Max	Units
V_{DD}	Supply Voltage	+2.7	+6	V
V_{OUT}	Output Voltage	0	V_{DD}	V
T_A	Operating Temperature Range	-40	+125	°C

Electrical Characteristics[3]

Limits apply for -40°C≤T_A≤+125°C and V_{DD}=+5.0V unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Accuracy[4]		T_A=+25°C	-1	±0.5	+1	°C
		T_A=-40°C (T_{MIN})	-3	±1	+3	°C
		T_A=+125°C (T_{MAX})	-3	±1	+3	°C
Non-linearity[5]			-0.8	—	+0.8	°C
Supply Current	I_S	Output floating				
		T_A=+25°C	—	—	130	µA
Output Sink Capability[6]	I_{OL}	+2.7V < V_{DD} < +6V	—	50	—	µA
Output Source Capability[6]	I_{OH}	+2.7V < V_{DD} < +6V	—	25	—	µA
Average Output Slope (Sensor Gain)	A_{OUT}		9.2	10	10.2	mV/°C
Room Temperature Output Voltage	V_{OUT25}	T_A=+25°C	740	—	760	mV

Notes:
3. These specifications are guaranteed only for the test conditions listed.
4. Accuracy (expressed in °C) = Difference between calculated output voltage and measured output voltage. Calculated output voltage = 10mV/°C multiplied by device's case temperature at specified conditions of temperature, voltage and power supply.
5. Non-linearity is defined as the deviation of the output-voltage-versus-temperature curve from the best-fit straight line, over the device's rated temperature range.
6. Lowest output current should be targeted; higher currents result in more self-heating of the device.

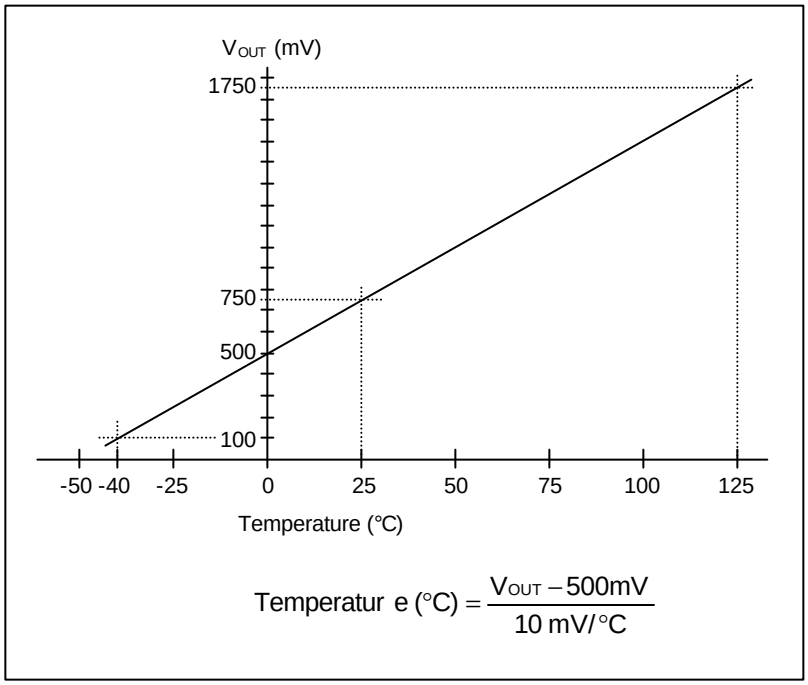


Figure 1. aTS50 Output Voltage vs. Temperature

Mounting

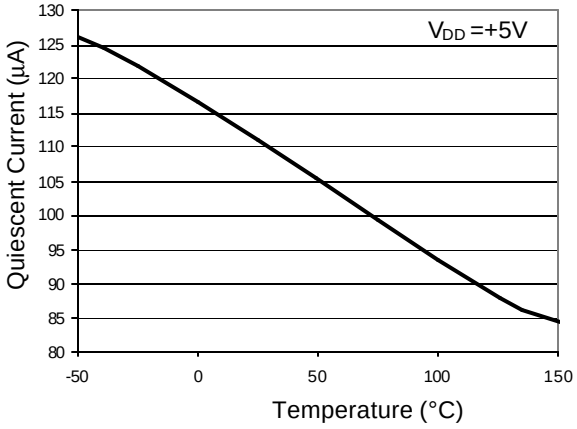
The aTS50 can be easily mounted by gluing or cementing it to a surface. In this case, its temperature will be within about 0.2°C of the temperature of the surface it is attached to if the ambient air temperature is almost the same as the surface temperature. If the air temperature is much higher or lower than the surface temperature, the actual temperature of the aTS50 die will be at an intermediate temperature between the surface temperature and the air temperature.

To ensure good thermal conductivity, the backside of the aTS50 die is directly attached to the GND pin. The lands and traces to the aTS50 will, of course, be part of the printed circuit board, which is the object whose temperature is being measured. These printed circuit board lands and traces will not cause the aTS50's temperature to deviate from the desired temperature.

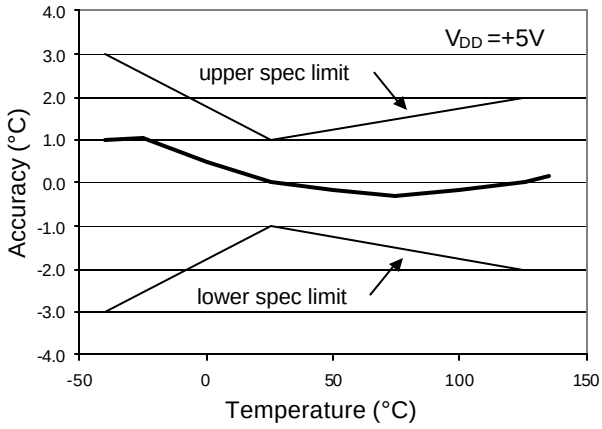
Alternatively, the aTS50 can be mounted inside a sealed-end metal tube, and can then be dipped into a bath or screwed into a threaded hole in a tank. As with any IC, the aTS50 and accompanying wiring and circuits must be kept insulated and dry to avoid leakage and corrosion. This is especially true if the circuit may operate at cold temperatures where condensation can occur. Printed-circuit coatings and varnishes such as Humiseal and epoxy paint or dips can be used to ensure that moisture cannot corrode the aTS50 or its connections.

Typical Performance Characteristics

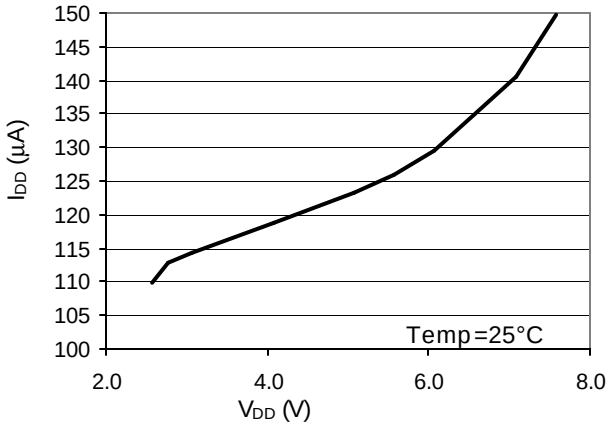
Quiescent Current vs. Temperature



Accuracy vs. Temperature



Quiescent Current vs. Supply Voltage



Typical Applications

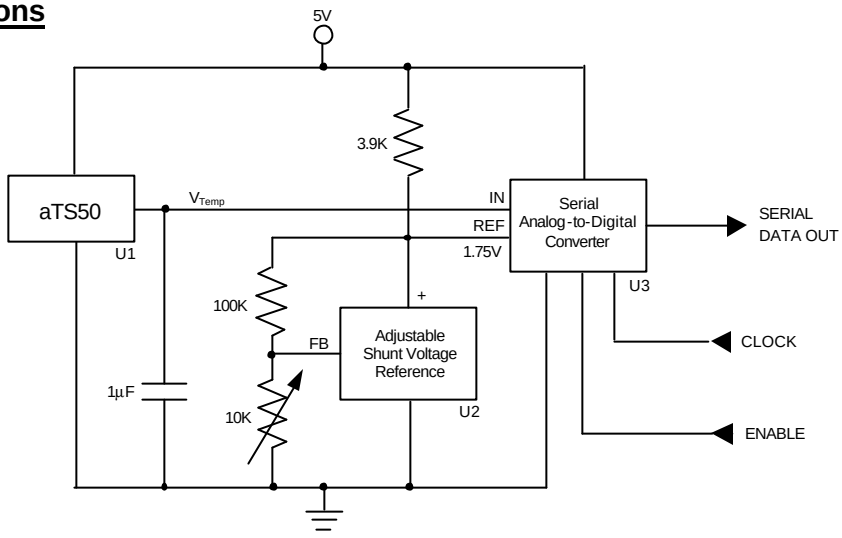


Figure 2. Serial Output Temperature to Digital Converter (Full Scale = +125°C)

Typical Applications (cont'd)

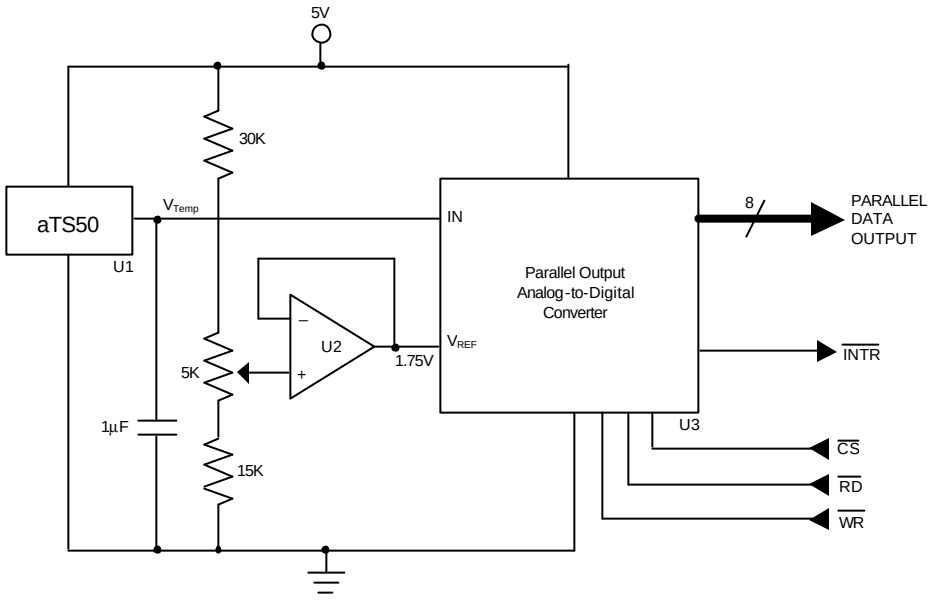


Figure 3. Parallel Output Temperature to Digital Converter (Full Scale = +125°C)

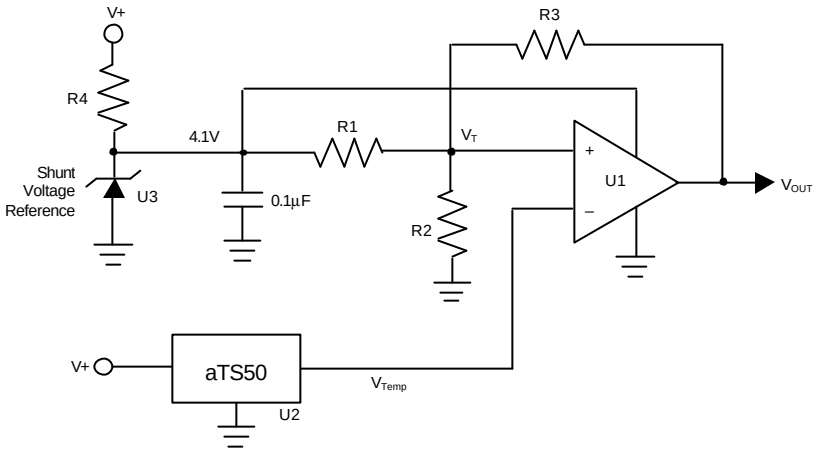
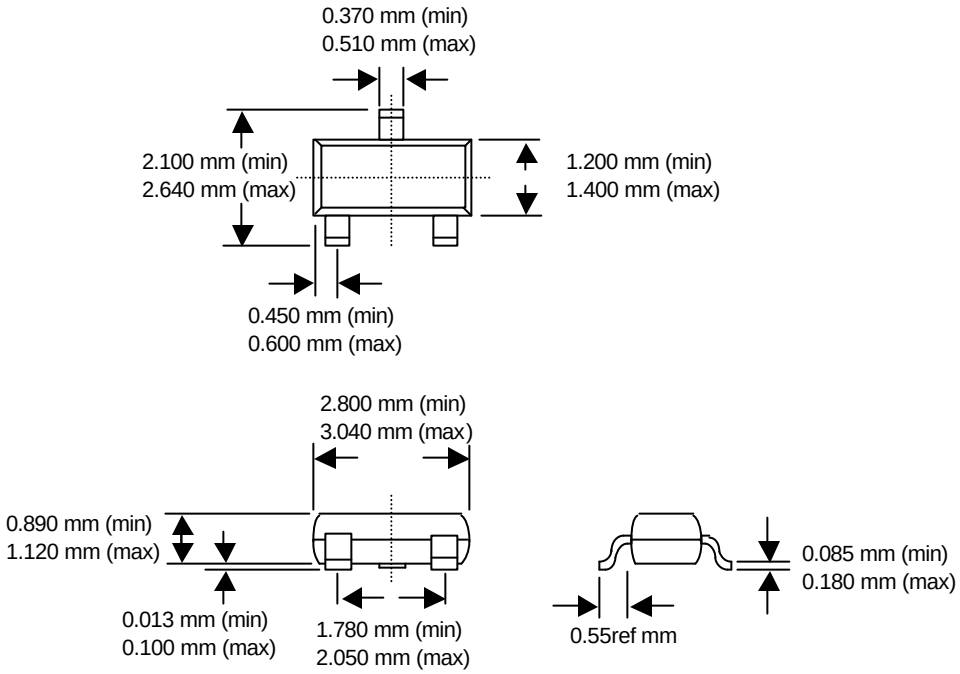


Figure 4. Thermostat/Fan Controller

-S3 Package - SOT-23 Package Dimensions



Data Sheet Classifications

Preliminary Specification

This classification is shown on the heading of each page of a specification for products that are either under development(design and qualification), or in the formative planning stages. Andigilog reserves the right to change or discontinue these products without notice.

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