TEMPERATURE SENSOR SPECIFICATIONS

● Description

The S-8100B is a high-precision temperature sensor controller, integrated on a single chip with a linear output scale factor of -8.1mV/°C. The S-8100B is a small package alternative for conventional thermal measurement, such as thermistors. It is based on the CMOS process technology, allowing the output to be routed over extended cable lengths. It is composed of a temperature sensor, a constant current circuit, and an operational amplifier. The temperature range is from -40°C to + 100°C. The S-8100B offers a high degree of linearity and can be used for a wide range of temperature control applications.

● Features

- Linear output voltage: -8.1mV/°C
- Linearity: ± 1.0%
- Temperature Range: -40°C to + 100°C
- Repeatability: ± 0.3%
- Ultra low power current consumption: 10μA (25°C) typ.
- Compact 3-pin package SOT-89-3

● Applications

- Remote sensing
- Heater systems
- Medical indicators/monitors
- Air conditioners
- Climate controllers
- Overheating circuitry for computers
- Appliances

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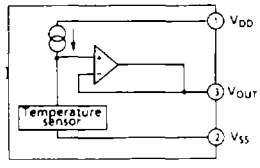
● Pin Assignments

1	V_{DD}
2	V_{SS}
3	V_{OUT}

● Block Diagram

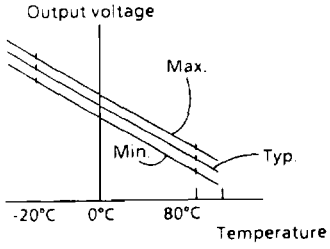


● Electrical Characteristics

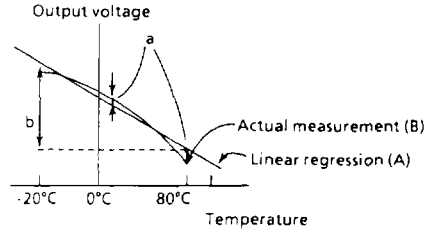
Item	Symbol	Conditions	Min.	Typ.	Max.
Power supply voltage	V_{DD}		3.0V	5.0V	6.0V
Temperature sensitivity	V_{SE}	-20°C ≤ Ta ≤ + 80°C	--	-8.14mV/°C	
Output voltage	V_{OUT}	Ta = -20°C	1.852V	1.900V	1.964V
		Ta = +30°C	1.452V	1.497V	1.564V
		Ta = +80°C	1.039V	1.085V	1.151V
Linearity	ΔNL	from -20°C to +80°C	--	--	± 1.0%
Reproducibility	ΔV_{OUT}		--	--	± 0.3%
Operating temperature	T_{opr}	ΔNL ≤ ± 2.0%	-40°C	--	100°C
Storage temperature	T_{stg}		-55°C		125°C
Current consumption	I_{DD}	Ta = + 25°C	--	10μA	20μA

● Definition of Terms

Deviation of V_{OUT}.
Maximum output voltage difference at -20°C, 30°C, and 80°C

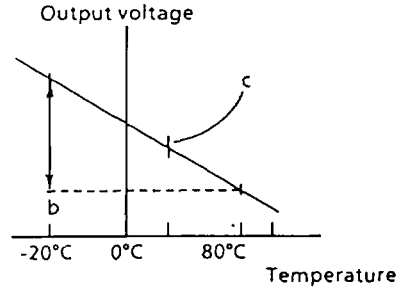


Linearity (ΔNL)
ΔNL = a/b
a: Maximum output voltage difference between (A) and (B)
b: Output voltage: Max. ± 1% in S-8100B

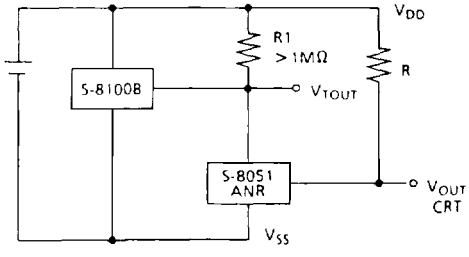


Reproducibility (ΔV_{OUT})

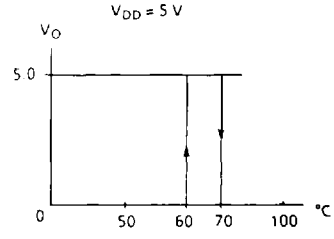
ΔV_{OUT} = c/d
c: Maximum output voltage difference between before and after long-term reliability tests (1000hrs, high temperature and high humidity, etc.)
d: Max. ± 0.3% in S-8100B
(Long-term reliability test at high temperature and under high humidity)



Any desired temperature can be detected by combining the S-8100B with a detector (operating within temperature range of detector).

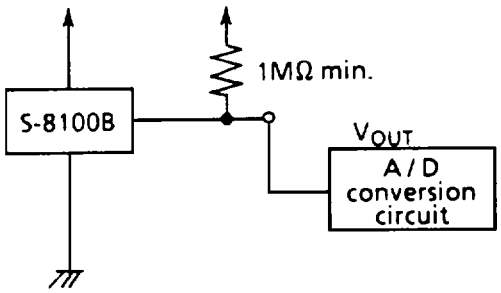


Output Waveform

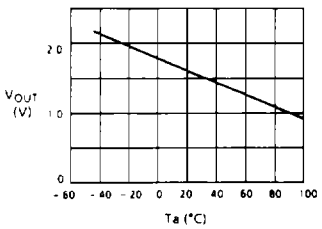


● Typical Operating Characteristics

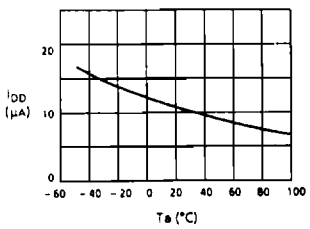
Note: Because the output impedance of the S-8100B CMOS output buffer is high, the output voltage level may fall because of contact with external circuits. If this happens, apply pull-up resistance as shown.



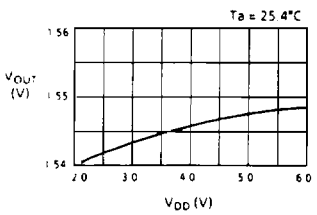
V_{OUT} vs Ta



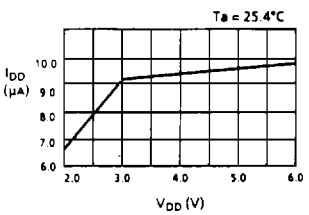
I_{DD} vs Ta



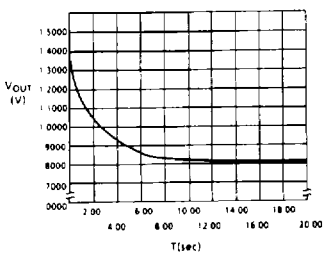
V_{OUT} vs V_{DD}



I_{DD} vs V_{DD}



Heat Response (SIP Type)
V_{OUT} vs Ta



25°C → 100°C

T1 = 8 sec
T2 = 2 sec

T1: Time required for output voltage to reach 95% of attainable voltage when a package is put into 100°C of water from 25°C of air.

T2: Time required for output voltage to reach 65% of attainable voltage when a package is put into 100°C of water from 25°C of air.