Contents

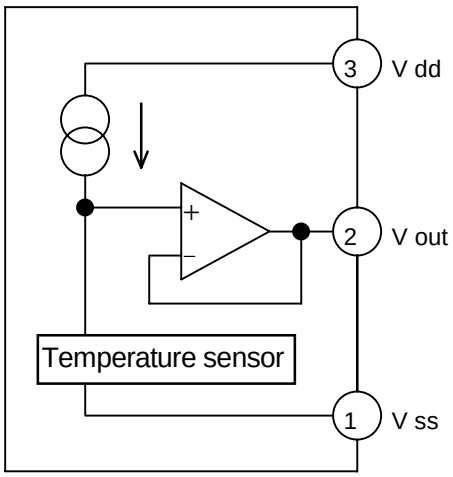
LOW-VOLTAGE C-MOS HIGH-PRECISION TEMPERATURE SENSOR IC S-8120AMP

The S-8120AMP is a high-precision temperature sensor IC that outputs voltage with a temperature coefficient of -8.5mV/°C and a temperature accuracy of ± 2.5°C. A temperature sensor, a constant current circuit and an operational amplifier are integrated on a single chip to be able to operate at 2.4V. The operating temperature ranges from -40°C to +100°C. The S-8120AMP is superior in linearity over conventional temperature sensors like thermistors. It can be applied to an ever expanding wide range of applications that call for high-precision thermal control.

■ Features

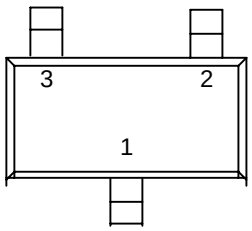
- Temperature accuracy : ± 2.5°C (-30°C to +100°C)
- Linear Output Voltage : -8.5mV/°C
  - Ta = - 30°C : 1.823 V typ.
  - Ta = +30°C : 1.326 V typ.
  - Ta = + 100°C : 0.718 V typ.
- Nonlinearity : ± 0.5 % typ. (-20°C to +80°C)
- Vss standard output
- Low voltage operation : Vdd min. = 2.4 V
- Low current consumption : Idd typ. = 4.5µA (+25°C)
- Small plastic package (SOT23-3)

■ Block Diagram



■ Pin Assignment

SOT 23 - 3



1. Vss
2. Vout
3. Vdd

(Top view)

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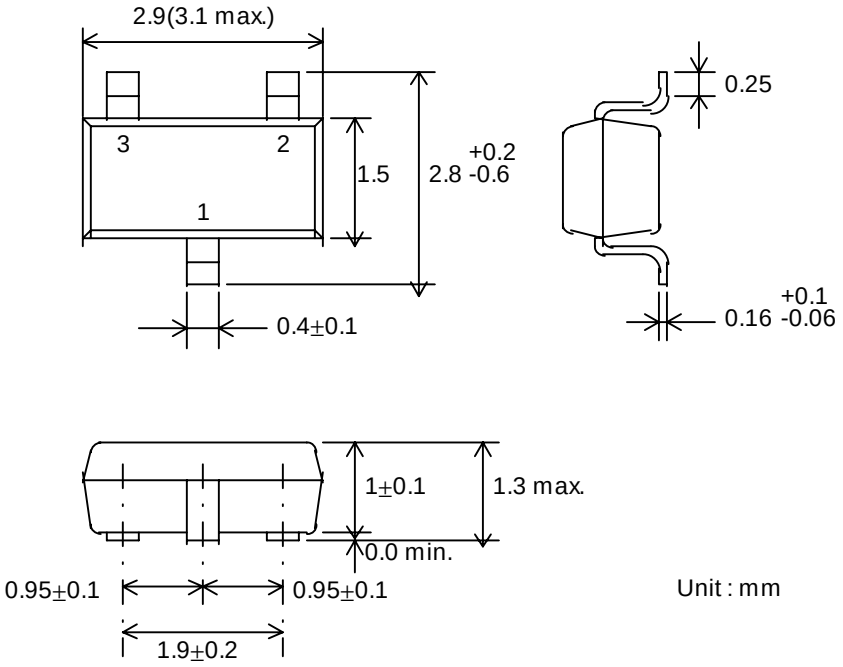
■ Dimensions

SOT23-3



■ Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Power supply voltage (Vss=0.0V)	Vdd	6.5	V
Output voltage	Vout	Vss to Vdd	V
Operating temperature	Topr	-40 to +100	°C
Storage temperature	Tstg	-55 to +125	°C

■ Electrical characteristics

(- 40°C ≤ Ta ≤ +100°C, Vdd=5V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply voltage (Vss=0.0V)	Vdd		2.4	—	6.0	V
Output voltage	Vout	Ta = - 30°C	1.802	1.823	1.844	V
		Ta = + 30°C	1.305	1.326	1.347	V
		Ta = + 100°C	0.697	0.718	0.739	V
Temperature sensitivity	Vse	- 30 ≤ Ta ≤ + 100°C	- 8.78	- 8.50	- 8.22	mV/°C
Nonlinearity	△NL	- 20 ≤ Ta ≤ + 80°C	—	± 0.5	—	%
Operating temperature	Topr		- 40	—	+ 100	V
Current consumption	Idd	Ta = + 25°C	—	4.5	10.0	µA

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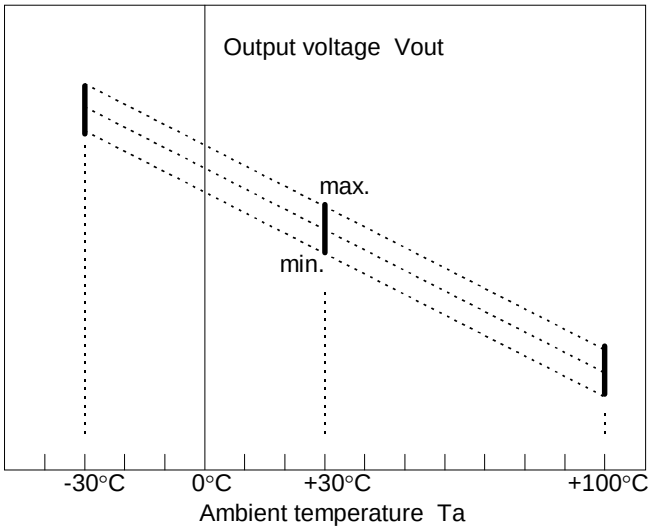
■ Definition of terms

1. Output voltage (Vout)

Output voltage Vout is defined as the voltage between measured pin-2 and Vss.
Vout is linearly proportional to ambient temperature.
S-8120AMP is tested for Vout at -30°C,+30°C and +100°C.

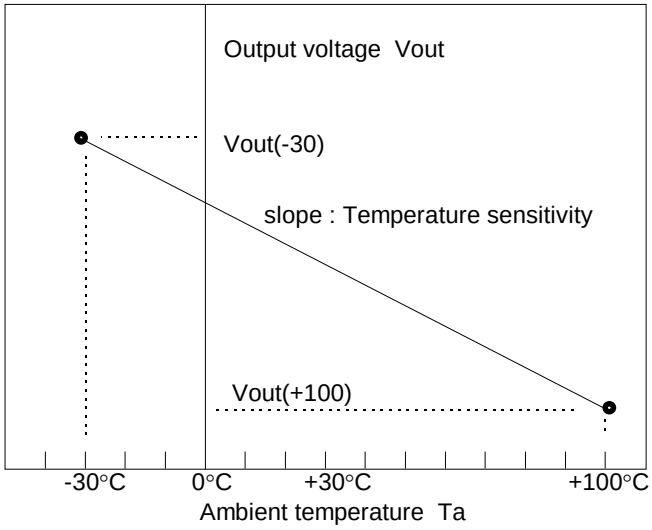


2. Temperature sensitivity (Vse)

Temperature sensitivity Vse is defined as the average slope of the Vout versus Ta curve using
the following formula.

$$Vse = \frac{\{Vout(+100) - Vout(-30)\}}{130}$$

Vout(+100) : Output voltage at Ta=+100°C
Vout(- 30) : Output voltage at Ta= - 30°C

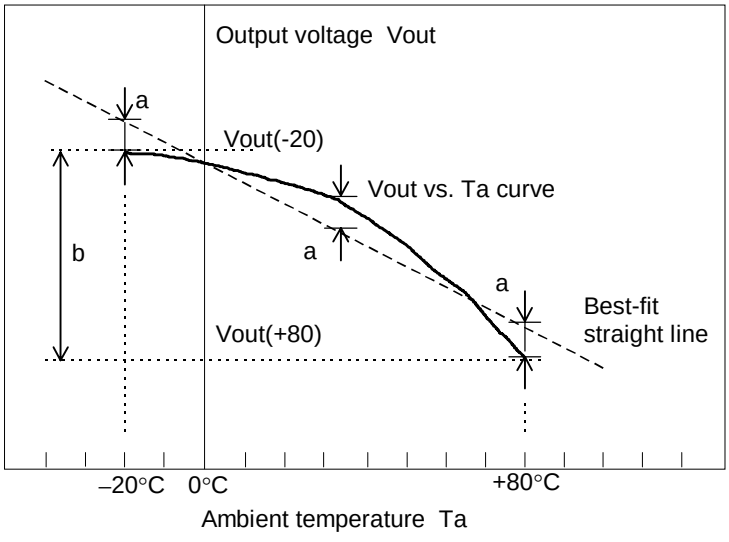


3. Nonlinearity△ NL

Nonlinearity△ NL is defined as the deviation of the Vout versus Ta curve from the best-fit straight line over the device's rated temperature range.

$$\triangle NL = \frac{a}{b} \times 100$$

a : The maximum deviation of the Vout vs. Ta curve from the best-fit straight line between - 20°C and +80°C.
b : The difference of the output voltage between - 20°C and +80°C.



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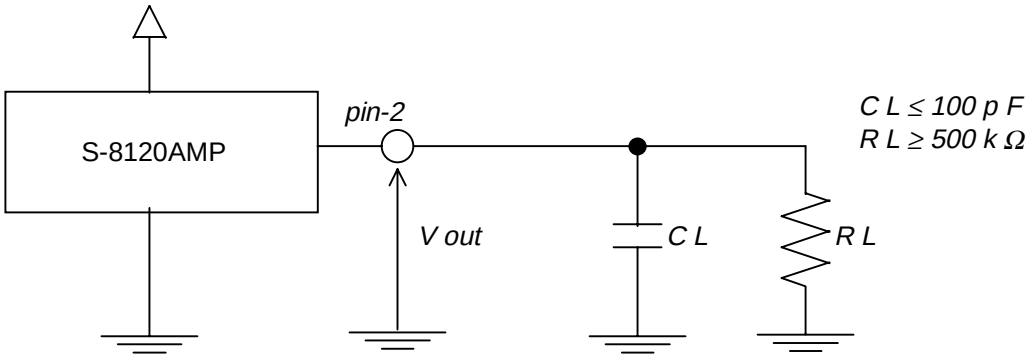
■ Load conditions

Load capacitance : $C_L \leq 100p$ F
Load resistance : $R_L \geq 500k\ \Omega$
(Note : Do NOT connect a pull-up resistor to Vout pin.)



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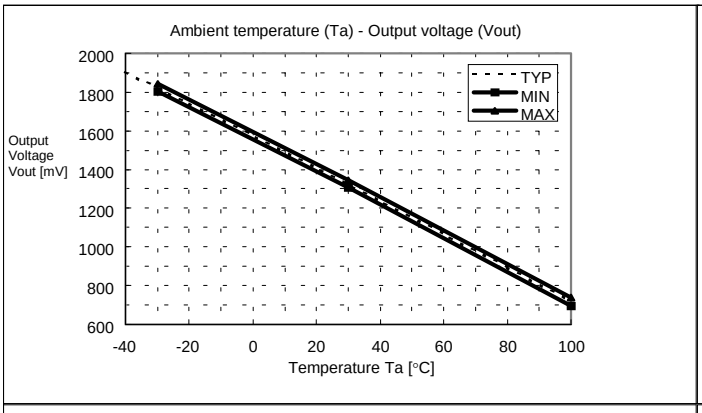
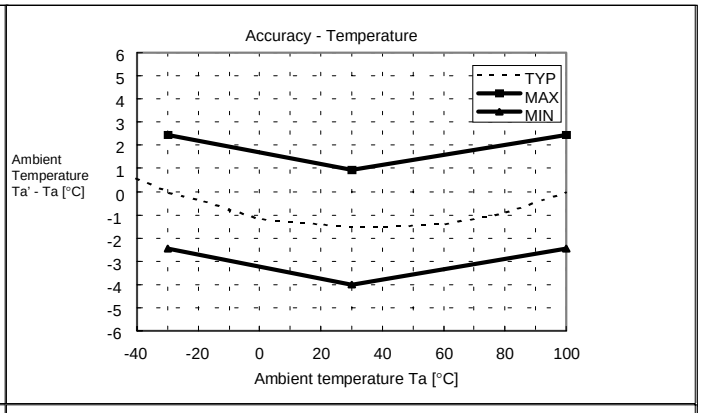
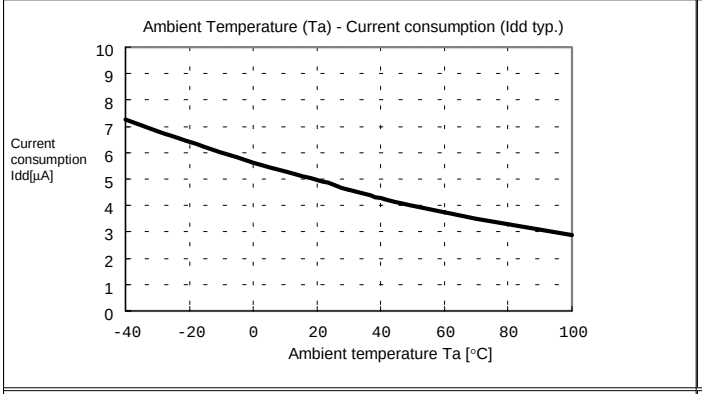
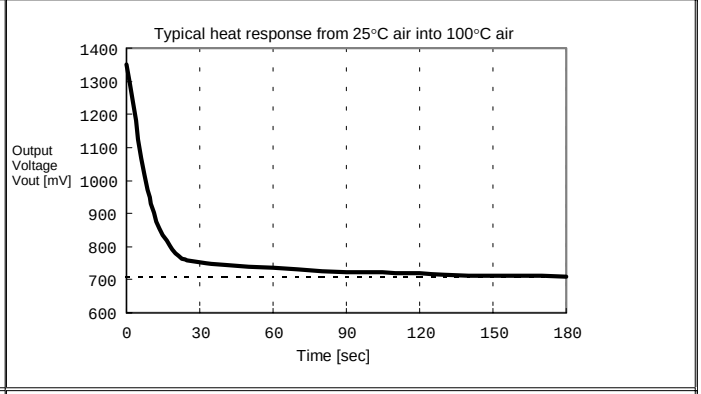
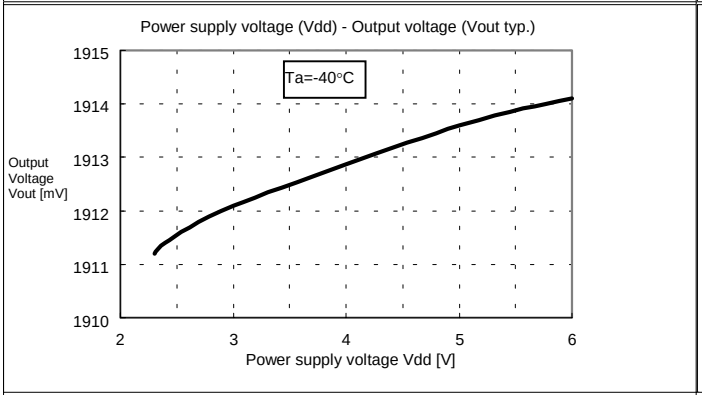
■ Typical performance characteristics

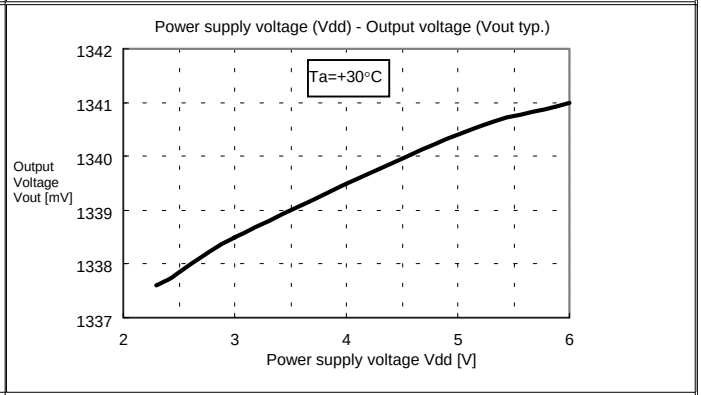


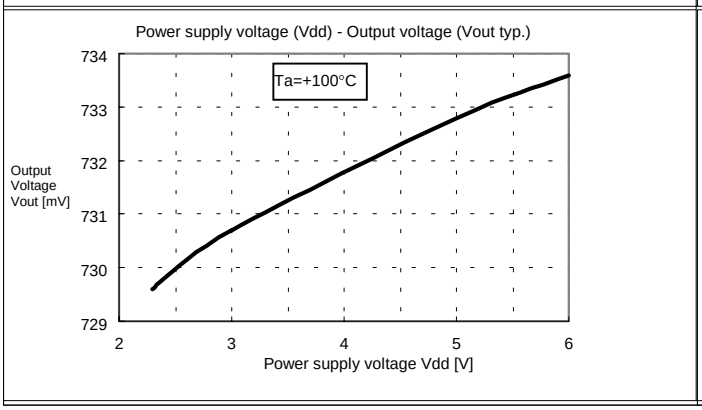


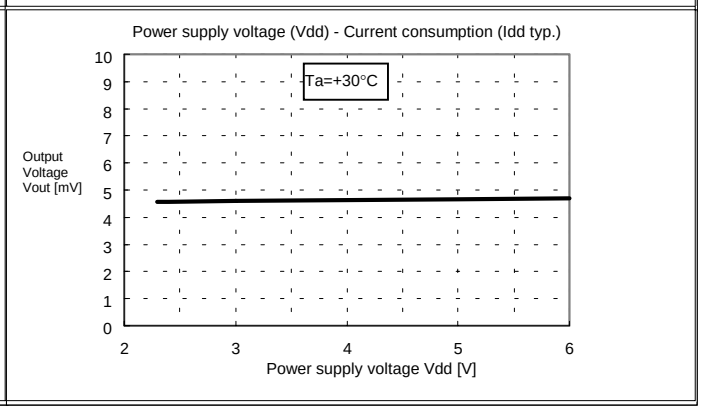












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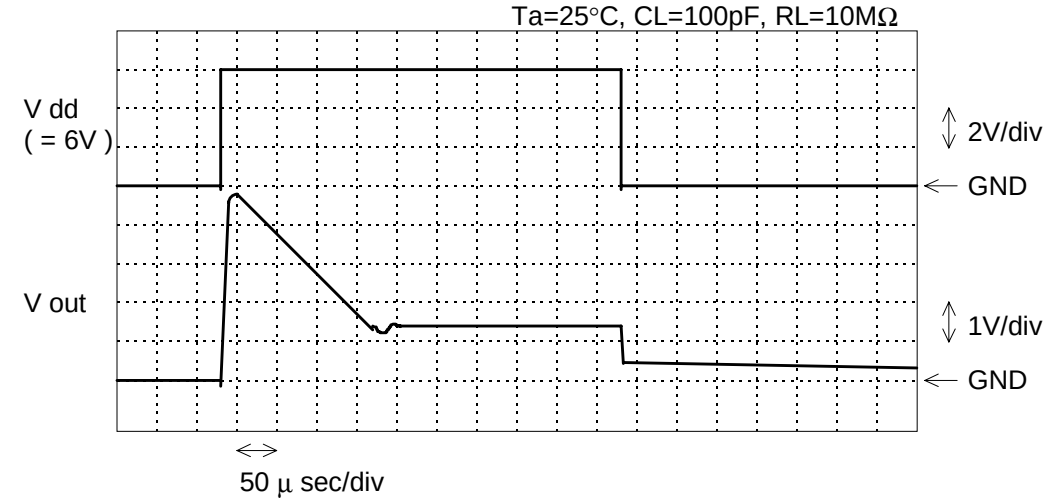
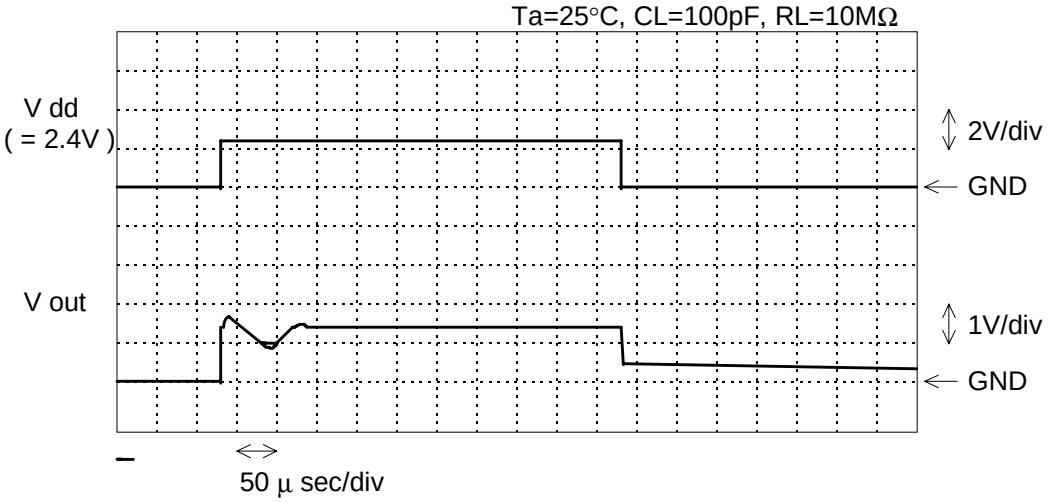
Start up response





Collection of Product FAQs

Author: Shirai Masaaki Date: 99/05/18 (Tuesday) 16:37 (modified: 99/05/18)

<Information level>

A: Public (Printing O.K.)

Index: B: Technical

<Product>

Division name: 01 IC

Product group: 18 sensor

Category 2: 1. Temperature Sensor

Cal No.: Overall

Related documents:

Question:

What happens to the sensor output if the operating temperature range is exceeded?

Answer:

We have not yet evaluated this condition. However, we do not believe that the output would change rapidly when the operating temperature is exceeded. The output is assumed to enter a proportional or saturated state. Since exceeding the operating temperature voids our guarantee, we are not responsible for the output under such a condition.

<Remarks>

FAQ No.: 18S81x001