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LOW-VOLTAGE C-MOS HIGH-PRECISION TEMPERATURE SENSOR IC

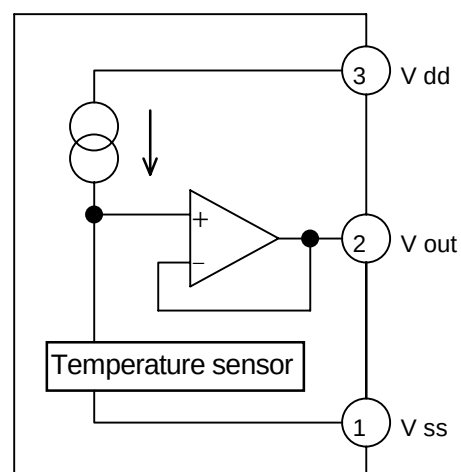
S-8120AMP

The S-8120AMP is a high-precision temperature sensor IC that outputs voltage with a temperature coefficient of $-8.5\text{mV}/^{\circ}\text{C}$ and a temperature accuracy of $\pm 2.5^{\circ}\text{C}$. 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 $+100^{\circ}\text{C}$. 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

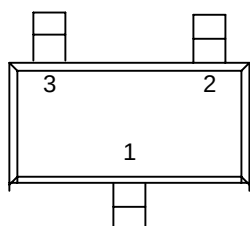
- Temperature accuracy : $\pm 2.5^{\circ}\text{C}$ (-30°C to $+100^{\circ}\text{C}$)
- Linear Output Voltage : $-8.5\text{mV}/^{\circ}\text{C}$
 - Ta = -30°C : 1.823 V typ.
 - Ta = $+30^{\circ}\text{C}$: 1.326 V typ.
 - Ta = $+100^{\circ}\text{C}$: 0.718 V typ.
- Nonlinearity : $\pm 0.5\%$ typ. (-20°C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

■ Block Diagram



■ Pin Assignment

SOT 23 - 3



(Top view)

1. Vss
2. Vout
3. Vdd

Unit : mm

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply voltage (V _{SS} =0.0V)	V _{DD}		2.4	—	6.0	V
Output voltage	V _{OUT}	T _A = - 30°C	1.802	1.823	1.844	V
		T _A = + 30°C	1.305	1.326	1.347	V
		T _A = + 100°C	0.697	0.718	0.739	V
Temperature sensitivity	V _{SE}	- 30 ≤ T _A ≤ + 100°C	- 8.78	- 8.50	- 8.22	mV/°C
Nonlinearity	ΔNL	- 20 ≤ T _A ≤ + 80°C	—	± 0.5	—	%
Operating temperature	T _{OPR}		- 40	—	+ 100	V
Current consumption	I _{DD}	T _A = + 25°C	—	4.5	10.0	μA

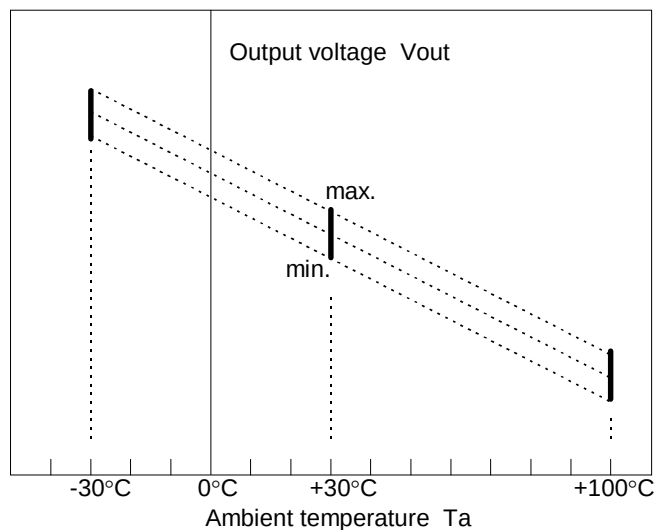
LOW-VOLTAGE C-MOS HIGH-PRECISION TEMPERATURE SENSOR S-8120AMP

■ 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.



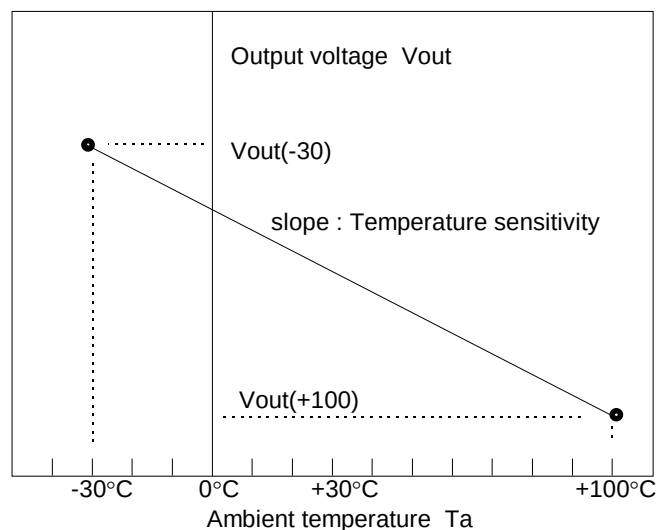
2. Temperature sensitivity (Vse)

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 Δ NL

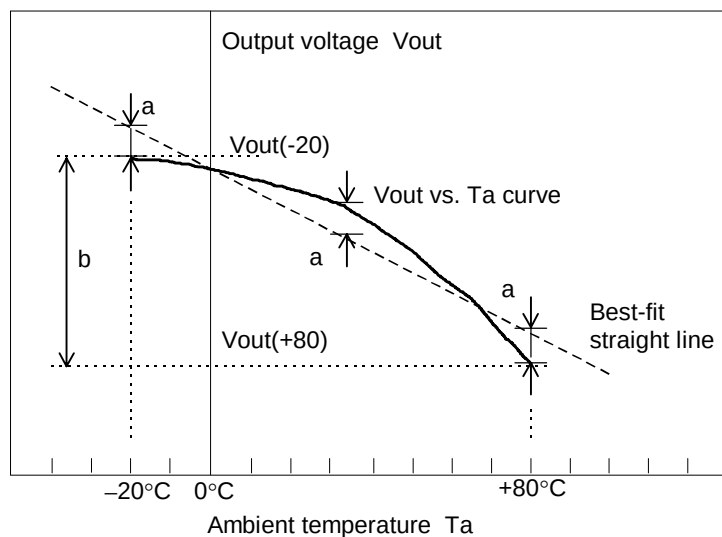
Nonlinearity Δ NL is defined as the deviation of the Vout versus Ta curve from the best-fit straight line over the device's rated temperature range.

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

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.



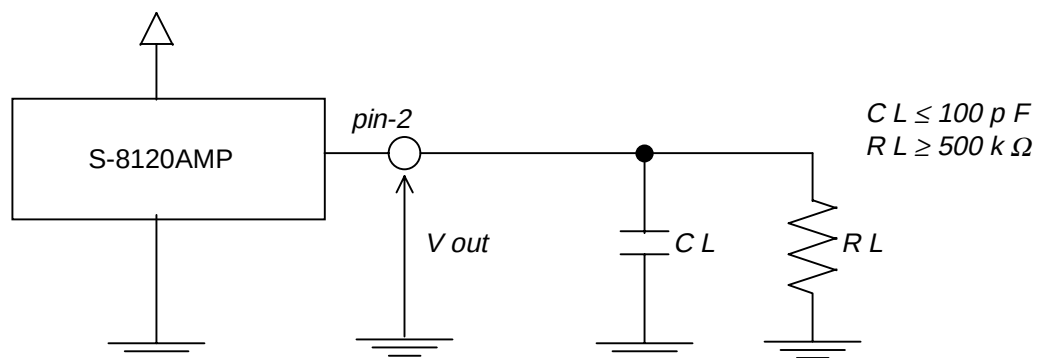
LOW-VOLTAGE C-MOS HIGH-PRECISION TEMPERATURE SENSOR S-8120AMP

■ Load conditions

Load capacitance : $C_L \leq 100\text{ pF}$

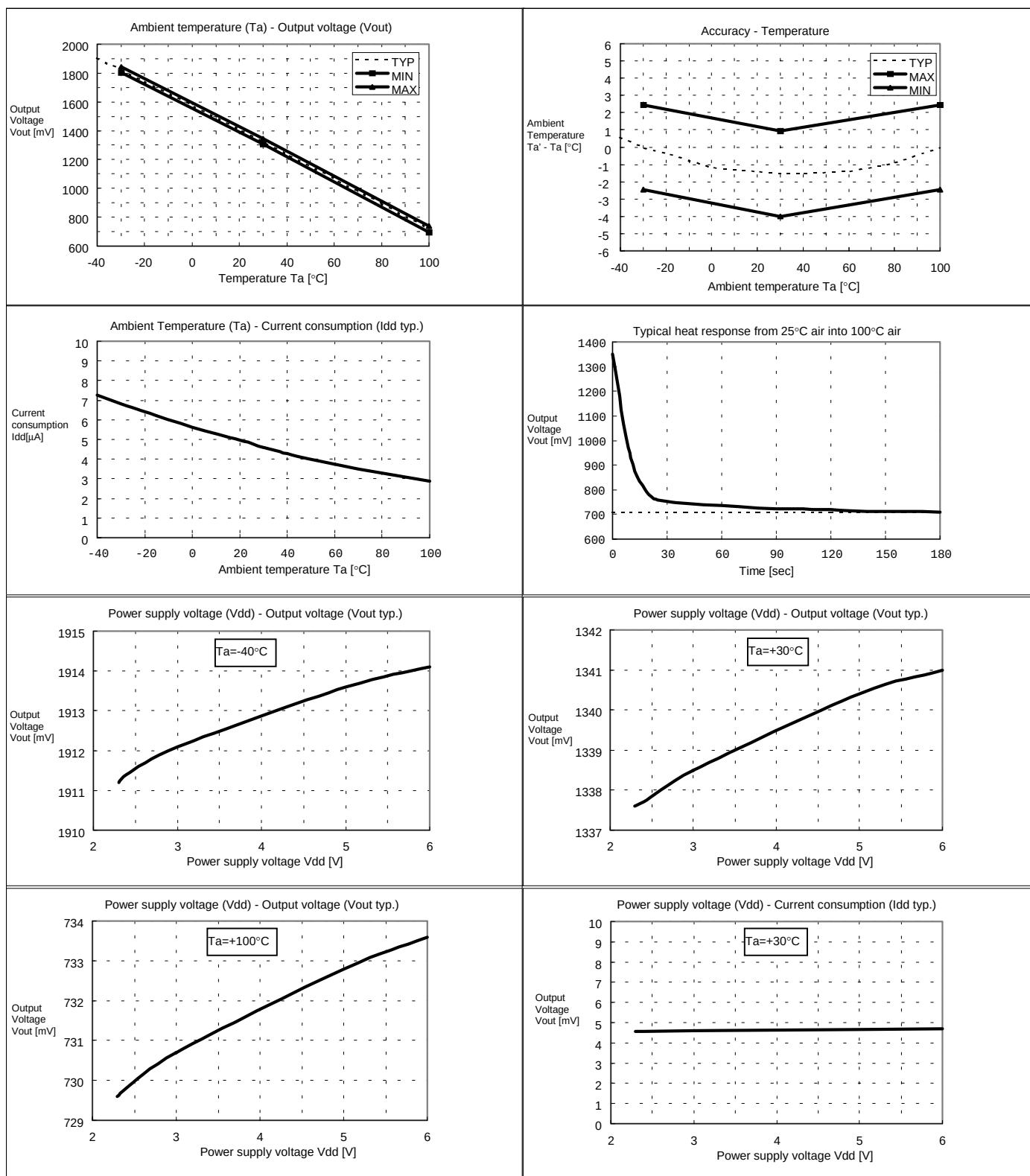
Load resistance : $R_L \geq 500\text{ k}\Omega$

(Note : Do NOT connect a pull-up resistor to Vout pin.)



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

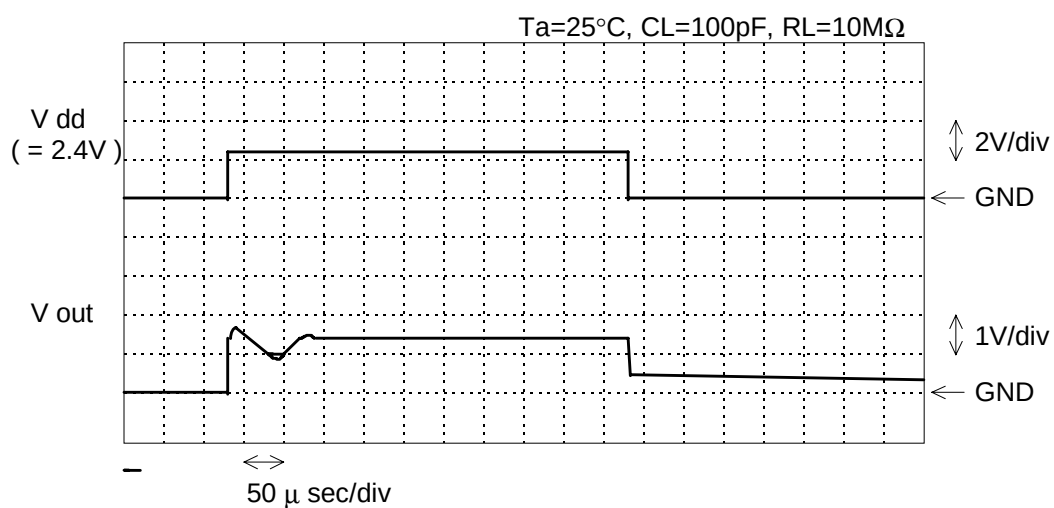
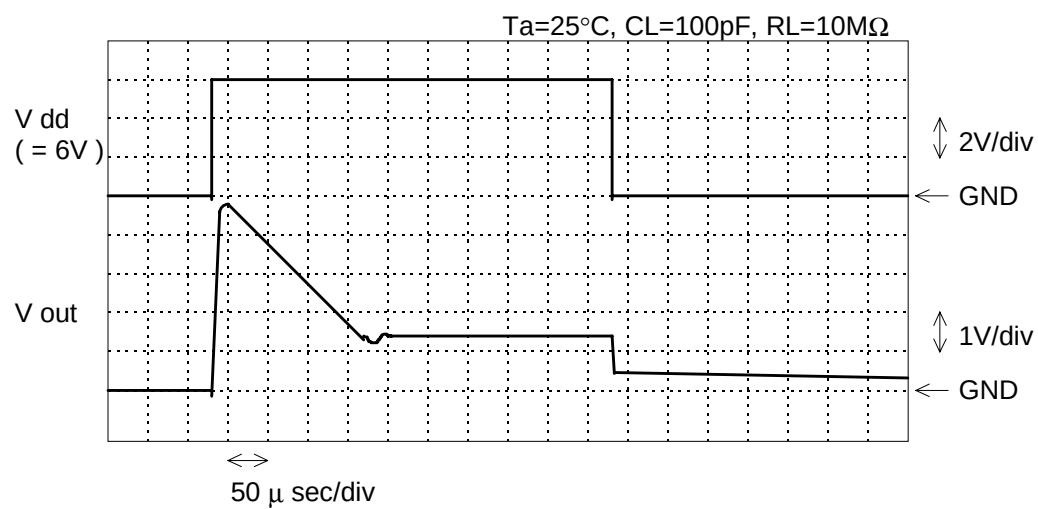
■ Typical performance characteristics



LOW-VOLTAGE C-MOS HIGH-PRECISION TEMPERATURE SENSOR

S-8120AMP

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