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LOW-VOLTAGE C-MOS

HIGH-PRECISION TEMPERATURE SENSOR IC

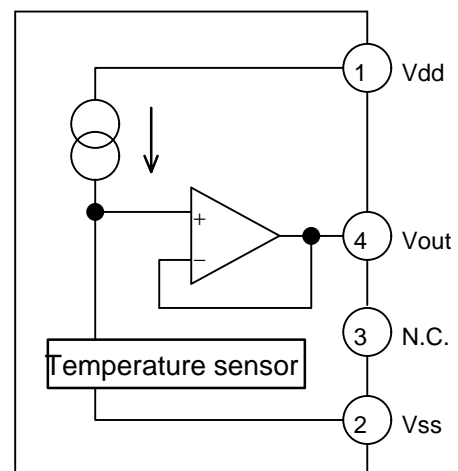
S-8120ANP

The S-8120AMP is a ultra-small packaged 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

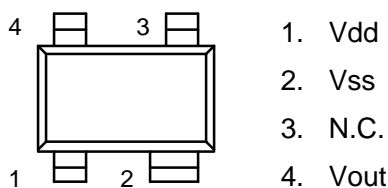
- Temperature accuracy : ±2.5°C (-30°C ~ +100°C)
- Linear Output Voltage : -8.5mV/°C
 Ta = -30°C : 1.823 V typ.
 Ta = +30°C : 1.326 V typ.
 Ta = +100°C : 0.718 V typ.
- Nonlinearity : ±0.5 % typ. (-20°C ~ +80°C)
- Vss standard output
- Low voltage operation : Vdd min. = 2.4 V
- Low current consumption : Idd typ. = 4.5µA (+25°C)
- Ultra-small plastic package (SC-82AB)

■ Block Diagram



■ Pin Assignment

SC-82AB



(Top view)

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

S-8120ANP

■ Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Power supply Voltage (Vss=0.0V)	Vdd	6.5	V
Output voltage	Vout	Vss ~ Vdd	V
Operating temperature	Topr	-40 ~ +100	°C
Storage temperature	Tstg	-55 ~ +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	ΔNL	-20 ≤ Ta ≤ +80°C	—	±0.5	—	%
Operating temperature	Topr		-40	—	+100	V
Current consumption	Idd	Ta = +25°C	—	4.5	10.0	μA

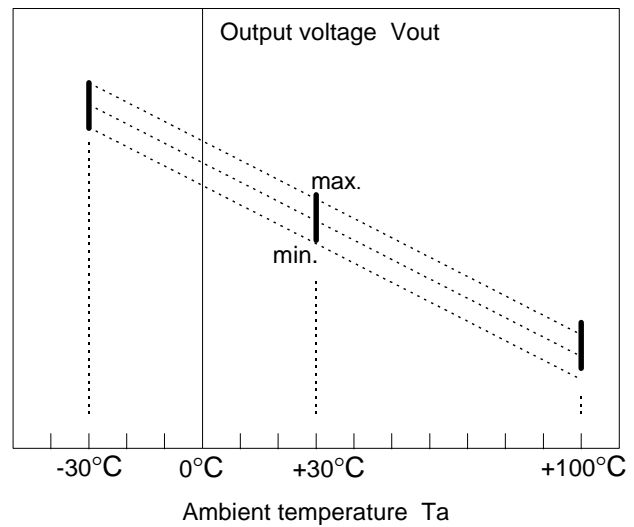
LOW-VOLTAGE C-MOS HIGH-PRECISION TEMPERATURE SENSOR

S-8120ANP

■ Definition of terms

1. Output voltage (V_{out})

Output voltage V_{out} is defined as the voltage between measured pin-4 and V_{ss} .
 V_{out} is linearly proportional to ambient temperature.
 S-8120ANP is tested for V_{out} at -30°C , $+30^{\circ}\text{C}$ and $+100^{\circ}\text{C}$.



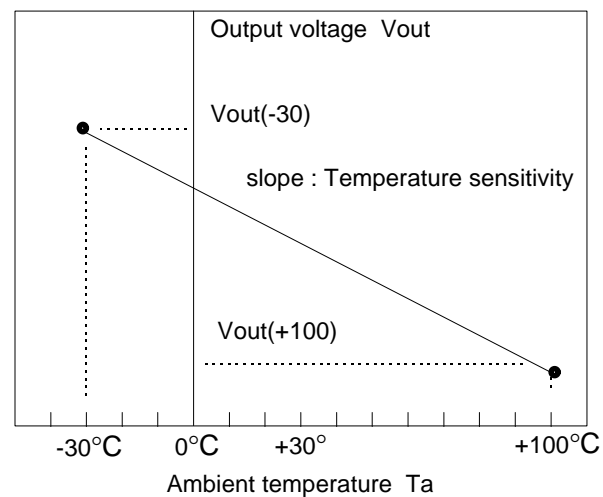
2. Temperature sensitivity (V_{se})

Temperature sensitivity V_{se} is defined as the average slope of the V_{out} versus T_a curve using the following formula.

$$V_{se} = \frac{\{V_{out}(+100) - V_{out}(-30)\}}{130}$$

$V_{out}(+100)$: Output voltage at $T_a=+100^{\circ}\text{C}$

$V_{out}(-30)$: Output voltage at $T_a=-30^{\circ}\text{C}$



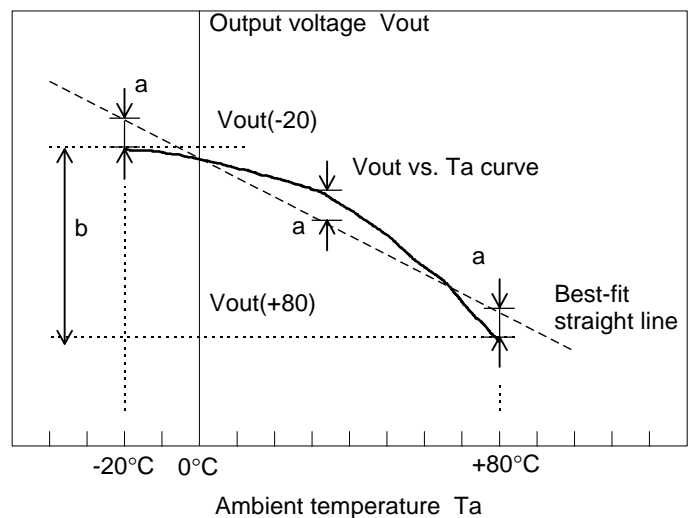
3. Nonlinearity ΔNL

Nonlinearity ΔNL is defined as the deviation of the V_{out} versus T_a curve from the best-fit straight line over the device's rated temperature range.

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

a : The maximum deviation of the V_{out} vs. T_a curve from the best-fit straight line between -20°C and $+80^{\circ}\text{C}$.

b : The difference of the output voltage between -20°C and $+80^{\circ}\text{C}$.



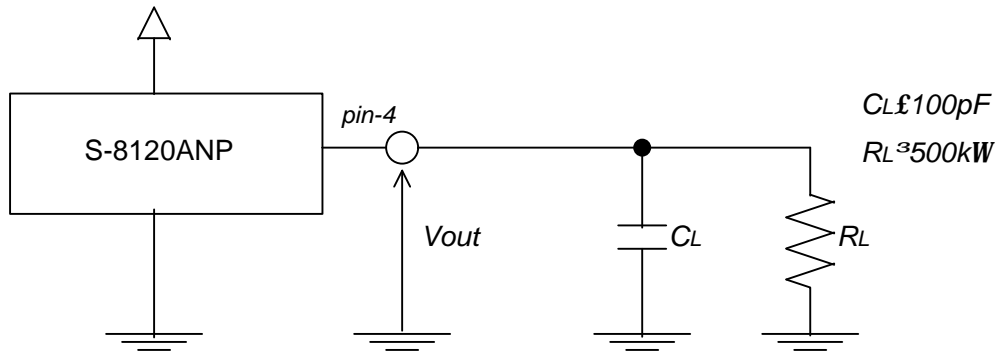
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■ Load conditions

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

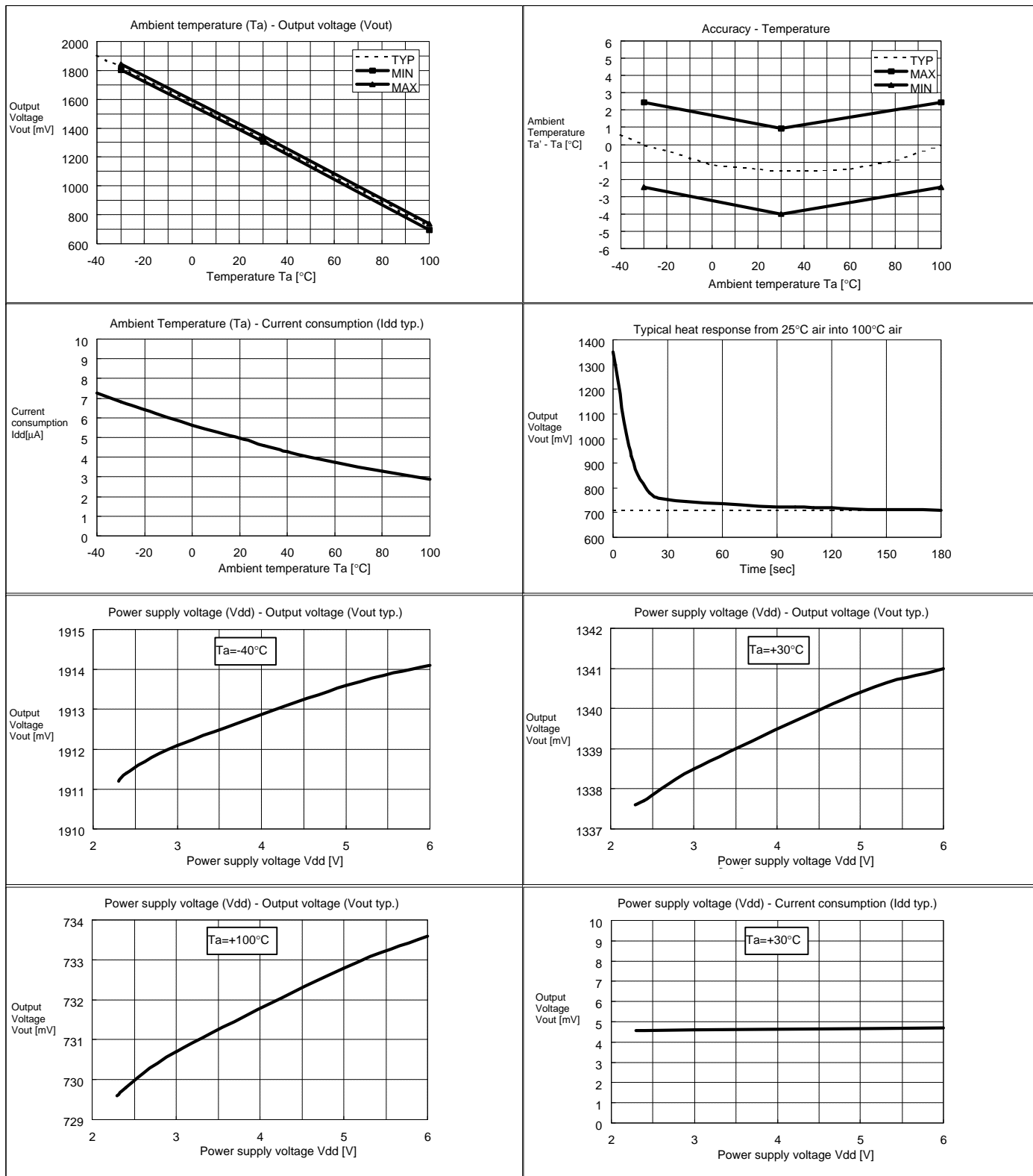
Load resistance : $R_L \geq 500\text{k}\Omega$

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



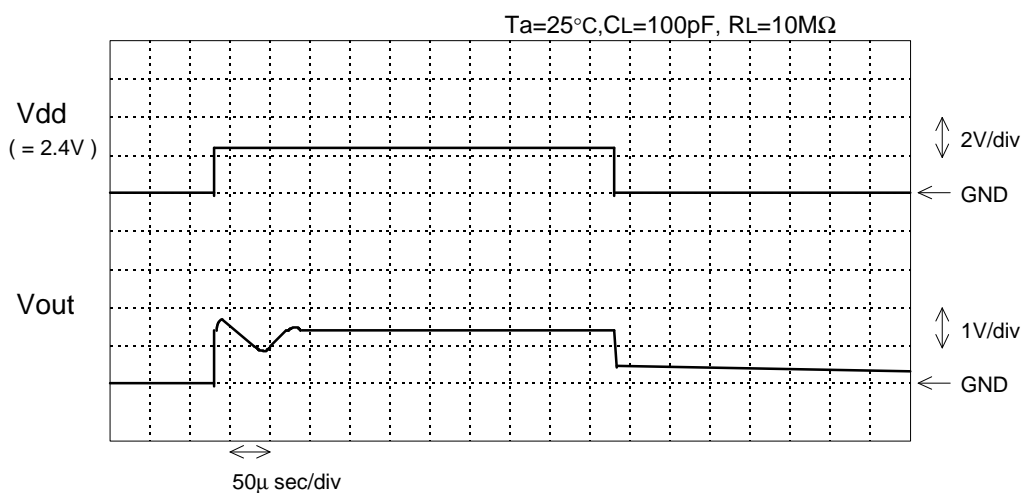
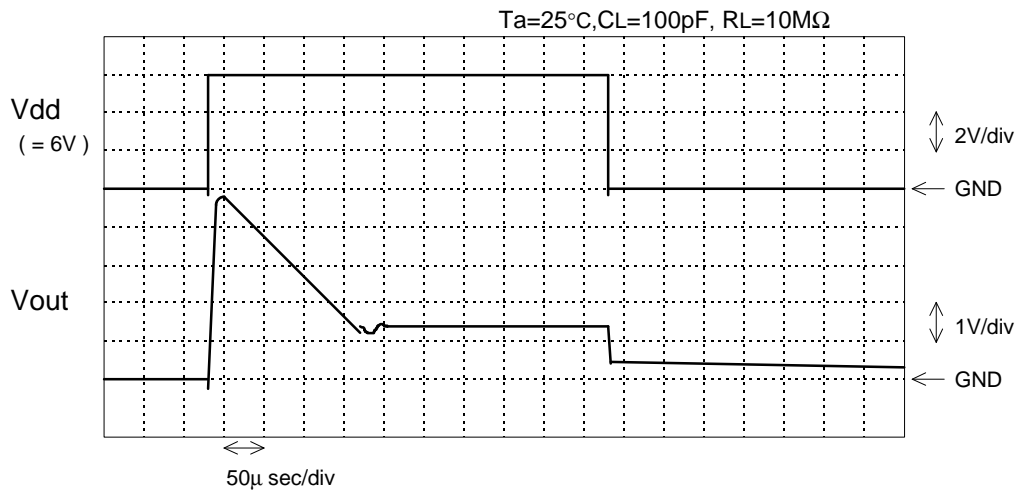
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■ Typical performance characteristics



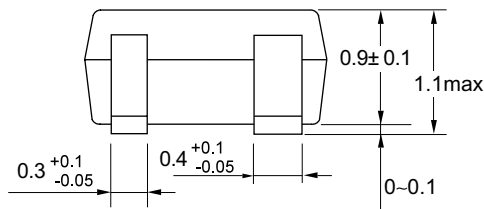
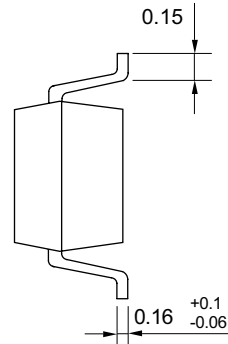
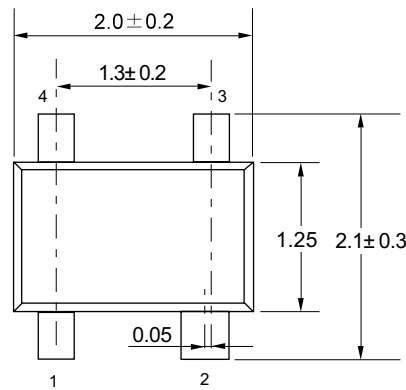
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Start up response



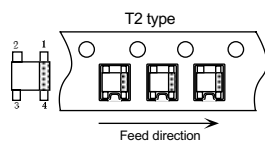
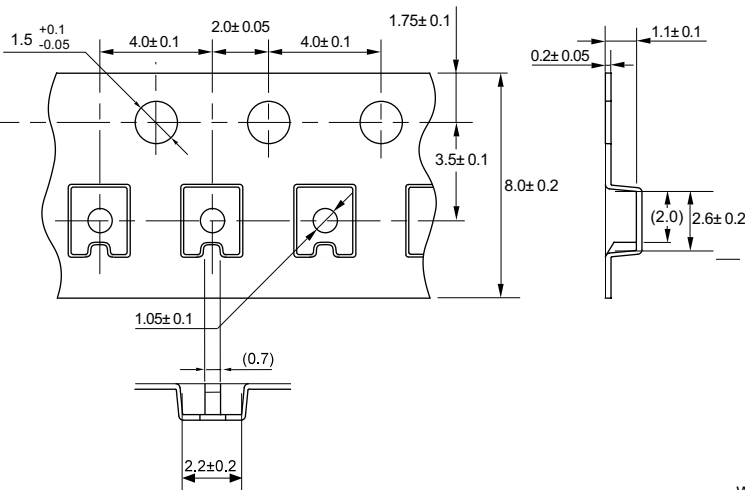
Unit:mm

●Dimensions



No. : NP004-A-P-SD-1.0

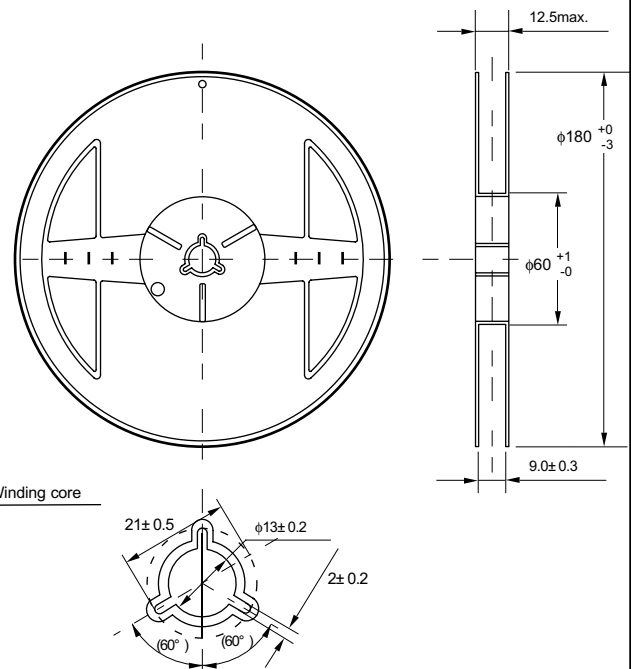
●Taping Specifications



No. : NP004-A-C-SD-1.0

●Reel Specifications

1 reel holds 3000 ICs.



No. : NP004-A-R-SD-1.0

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