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LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC

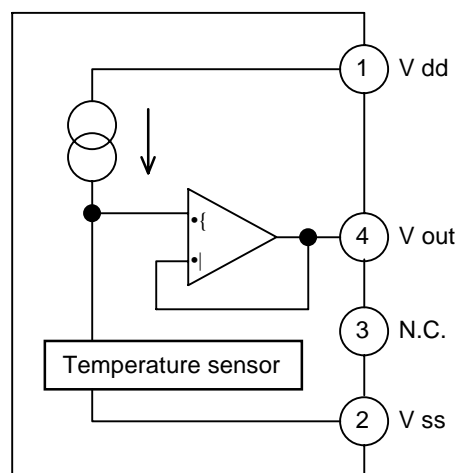
S-8110ANP

The S-8110ANP is a ultra-small packaged high-precision temperature sensor IC that outputs voltage with a temperature coefficient of $-8.5\text{mV}/^\circ\text{C}$, and is able to operate at 2.4V . A temperature sensor, a constant current circuit and an operational amplifier are integrated on a single chip. The operating temperature ranges from -40°C to $+100^\circ\text{C}$. The S-8110ANP 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

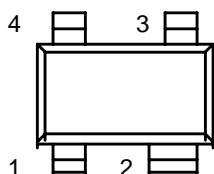
- Linear Output Voltage : $-8.5\text{mV}/^\circ\text{C}$
 - Ta = -30°C : 1.823 V typ.
 - Ta = $+30^\circ\text{C}$: 1.326 V typ.
 - Ta = $+100^\circ\text{C}$: 0.718 V typ.
- Nonlinearity : $\pm 0.5\%$ typ. (-20°C to $+80^\circ\text{C}$)
- Vss standard output
- Low voltage operation : Vdd min. = 2.4 V
- Low current consumption : Idd typ. = $4.5\mu\text{A}$ ($+25^\circ\text{C}$)
- Ultra-small plastic package (SC-82AB)

■ Block Diagram



■ Pin Assignment

SC-82AB



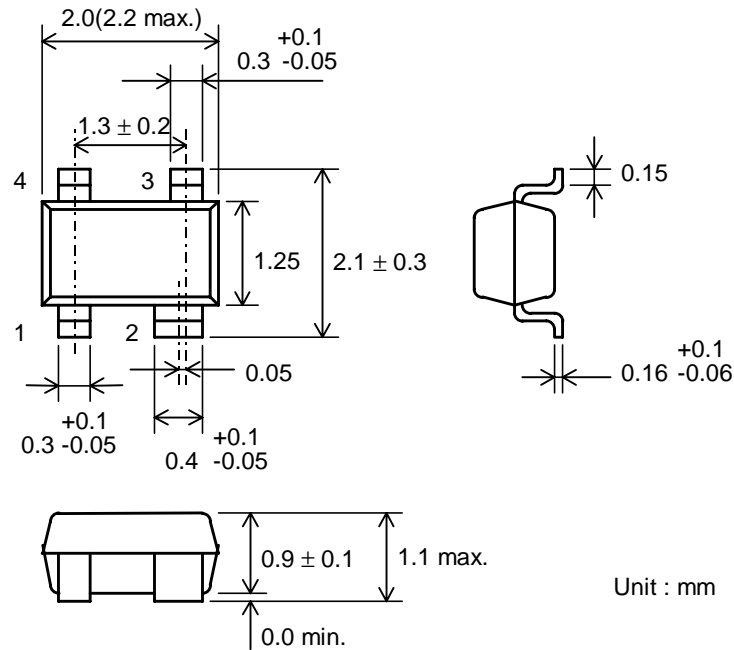
1. Vdd
2. Vss
3. N.C.
4. Vout

(Top view)

LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC S-8110ANP

■ Dimensions

SC-82AB



■ Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Power supply voltage(V _{SS} =0.0V)	V _{DD}	6.5	V
Output voltage	V _{OUT}	V _{SS} to V _{DD}	V
Operating temperature	T _{OPR}	-40 to +100	°C
Storage temperature	T _{STG}	-55 to +125	°C

■ Electrical characteristics

(- 40°C ≤ T_a ≤ +100°C, V_{DD}=5V)

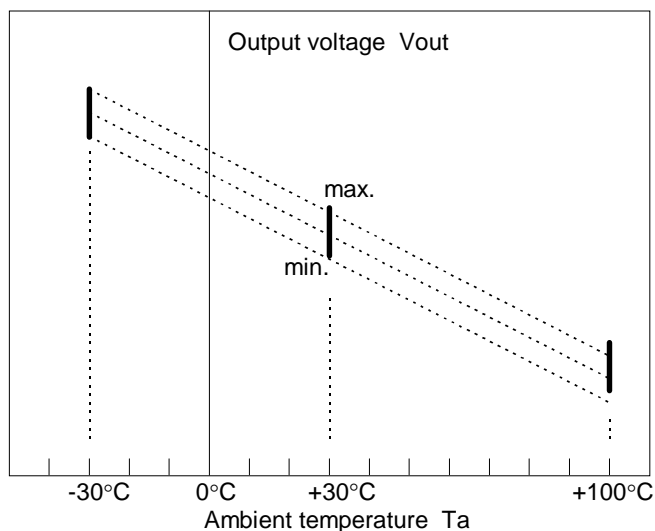
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply voltage(V _{SS} =0.0V)	V _{DD}		2.4	—	6.0	V
Output voltage	V _{OUT}	T _a = - 30°C	1.779	1.823	1.863	V
		T _a = + 30°C	1.272	1.326	1.356	V
		T _a = + 100°C	0.665	0.718	0.749	V
Temperature sensitivity	V _{SE}	- 30 ≤ T _a ≤ + 100°C	- 8.84	- 8.50	- 8.18	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 TEMPERATURE SENSOR IC S-8110ANP

■ Definition of terms

1. Output voltage (Vout)

Output voltage Vout is defined as the voltage between measured pin-4 and Vss. Vout is linearly proportional to ambient temperature. S-8110ANP is tested for Vout at -30°C,+30°C and +100°C.



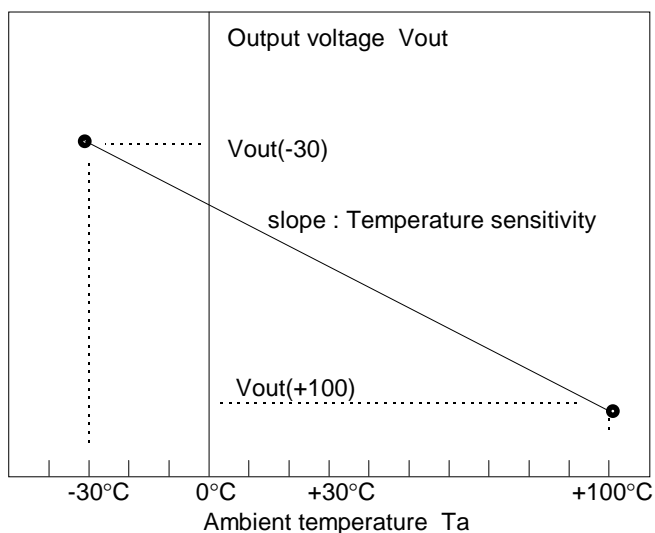
2. Temperature sensitivity (Vse)

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

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

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

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



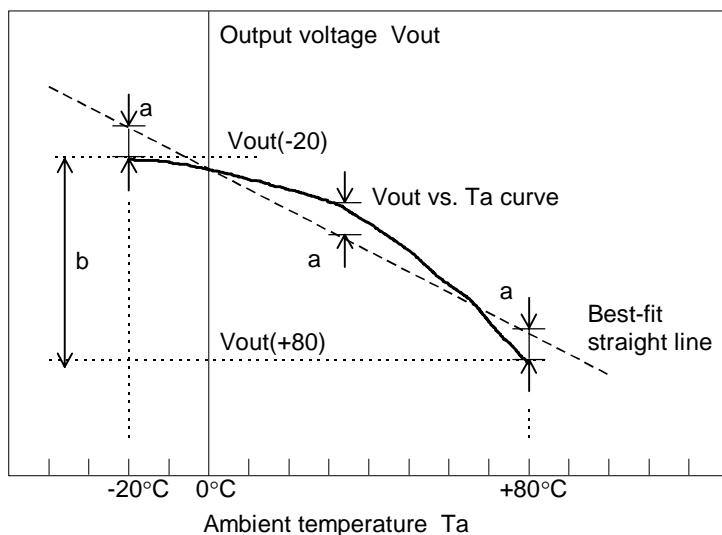
3. Nonlinearity Δ NL

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 TEMPERATURE SENSOR IC

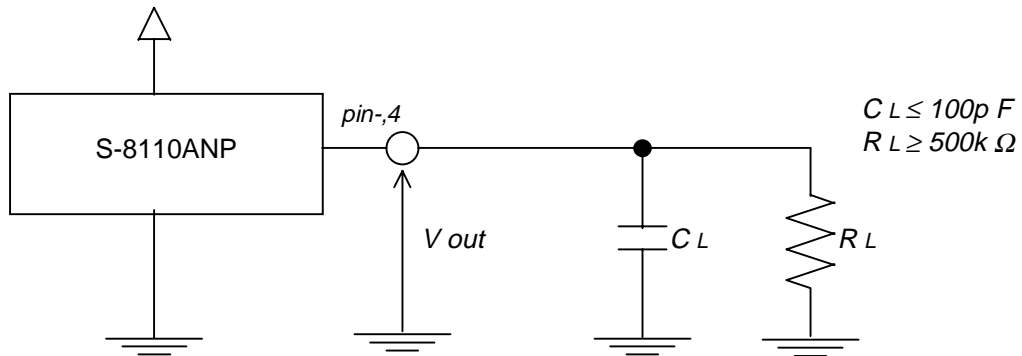
S-8110ANP

■ Load conditions

Load capacitance : $C_L \leq 100\text{p F}$

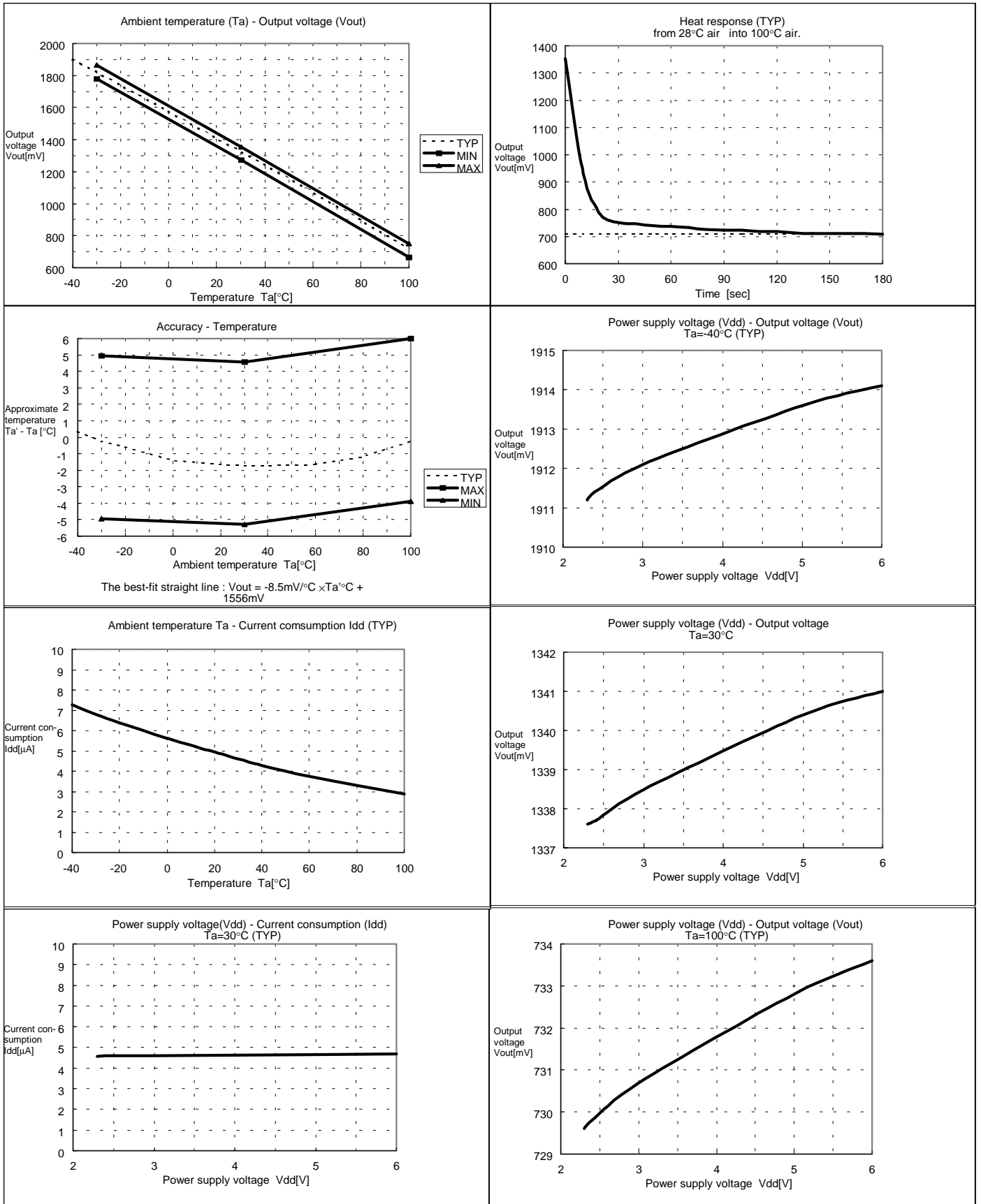
Load resistance : $R_L \geq 500\text{k } \Omega$

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



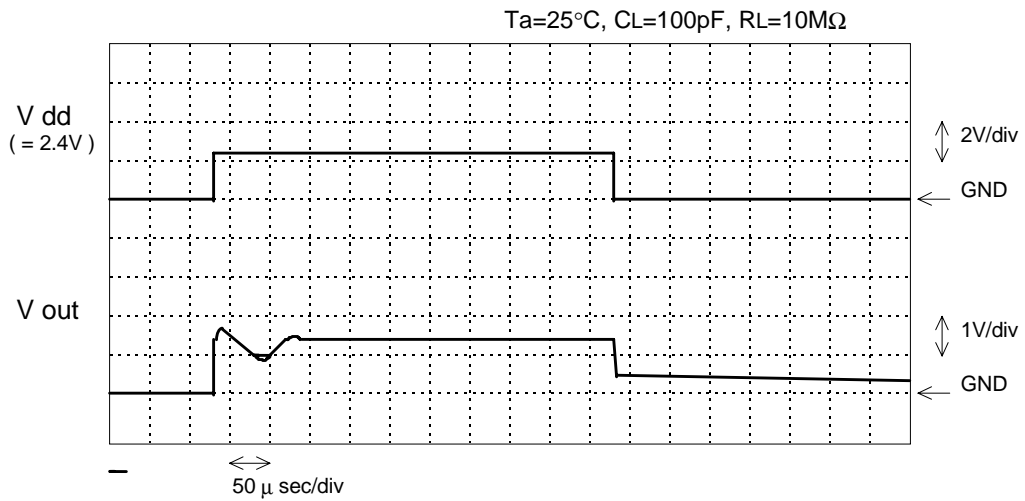
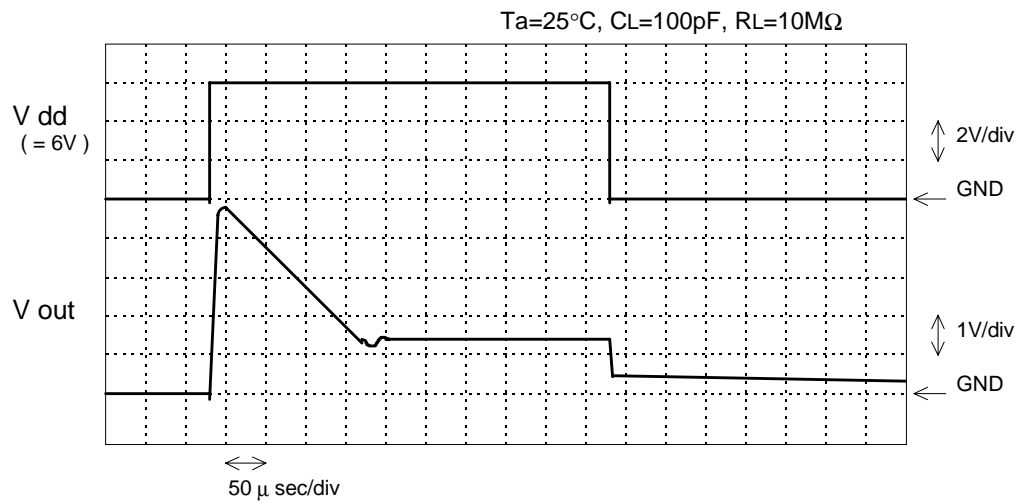
LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC S-8110ANP

■ Typical performance characteristics



LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC S-8110ANP

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