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LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC

S-8110AMP

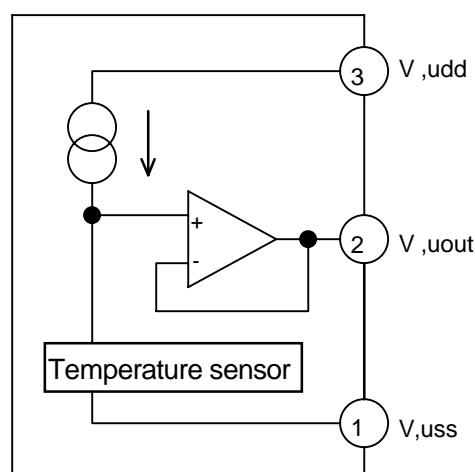
The S-8110AMP is a high-precision temperature sensor IC that outputs voltage with a temperature coefficient of $-8.5\text{mV}/^\circ\text{C}$, and is able to operate at 2.4V.

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-8110AMP 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

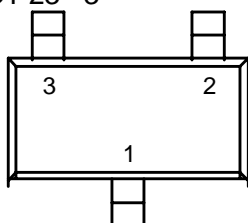
- Linear Output Voltage : $-8.5\text{mV}/^\circ\text{C}$
 - Ta = -30°C : 1.823 V typ.
 - Ta = $+30^\circ\text{C}$: 1.326 V typ.
 - Ta = $+100^\circ\text{C}$: 0.718 V typ.
- Nonlinearity : $\pm 0.5\%$ typ. (-20°C to $+80^\circ\text{C}$)
- Vss standard output
- Low voltage operation : Vdd min. = 2.4 V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

■ Block Diagram



■ Pin Assignment

SOT 23 - 3



(Top view)

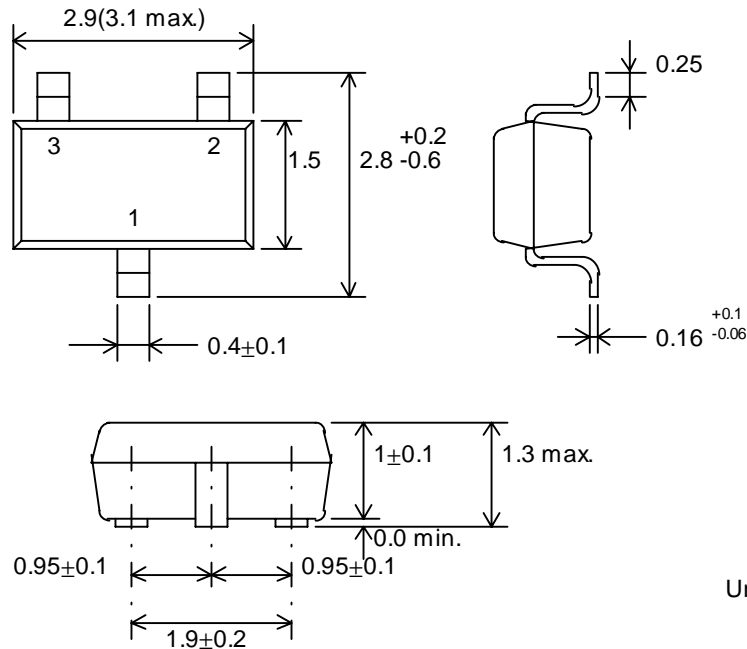
1. Vss
2. Vout
3. Vdd

LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC

S-8110AMP

■ Dimensions

SOT23-3



■ 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}	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

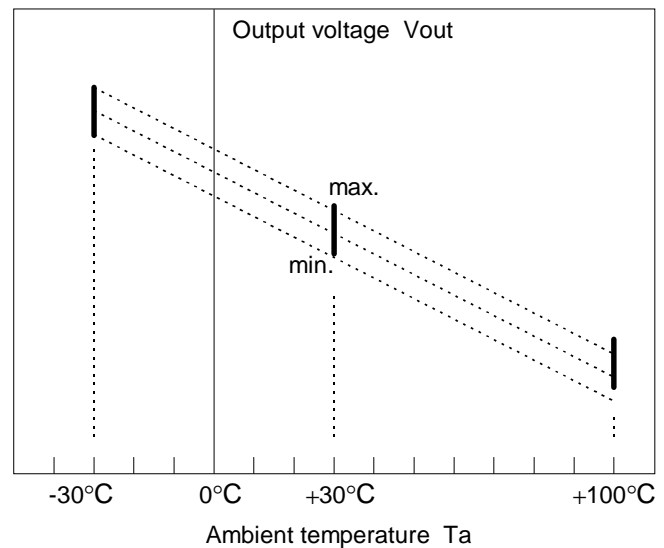
LOW VOLTAGE C-MOS TEMPERATURE SENSOR IC

S-8110AMP

■ Definition of terms

1. Output voltage (V_{out})

Output voltage V_{out} is defined as the voltage between measured pin-2 and Gnd. V_{out} is linearly proportional to ambient temperature. S-8110AMP is tested for V_{out} at -30°C , $+30^{\circ}\text{C}$ and $+100^{\circ}\text{C}$.



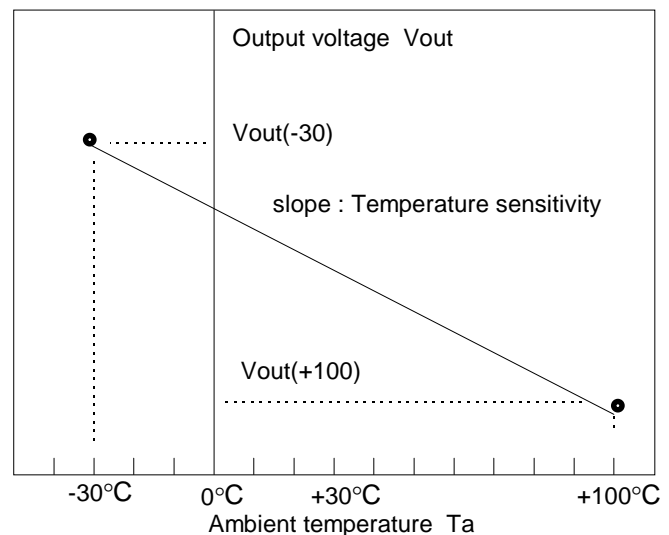
2. Temperature sensitivity (V_{se})

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 $T_a = -30^{\circ}\text{C}$



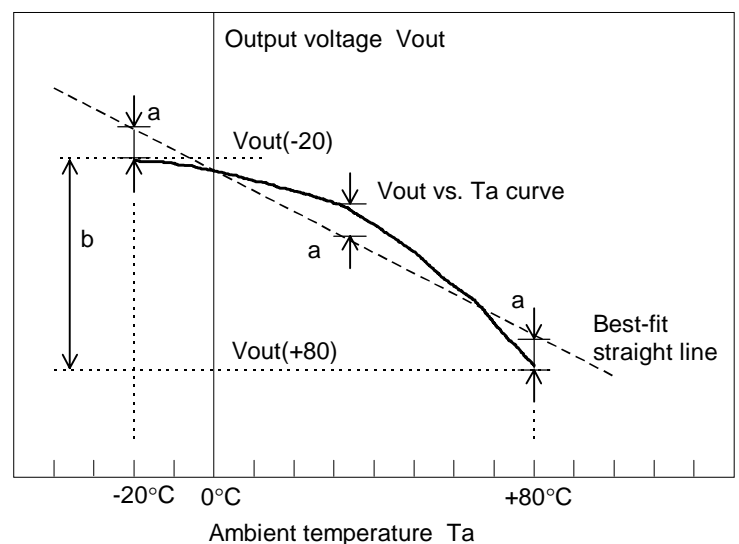
3. Nonlinearity ΔNL

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.

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

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 $+80^{\circ}\text{C}$.



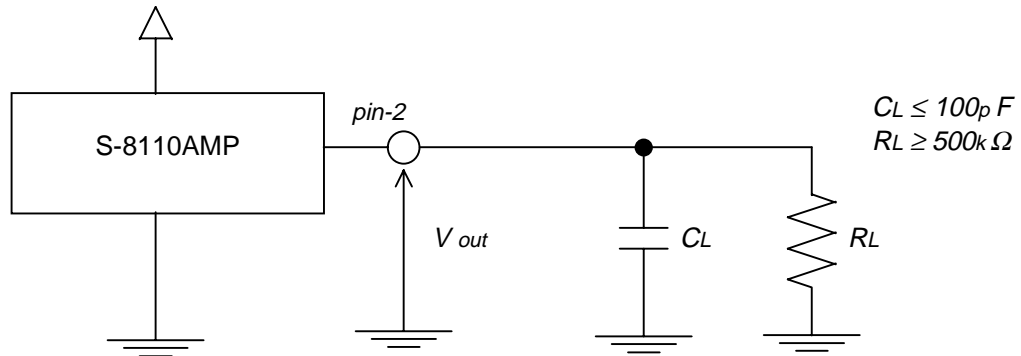
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■ Load conditions

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

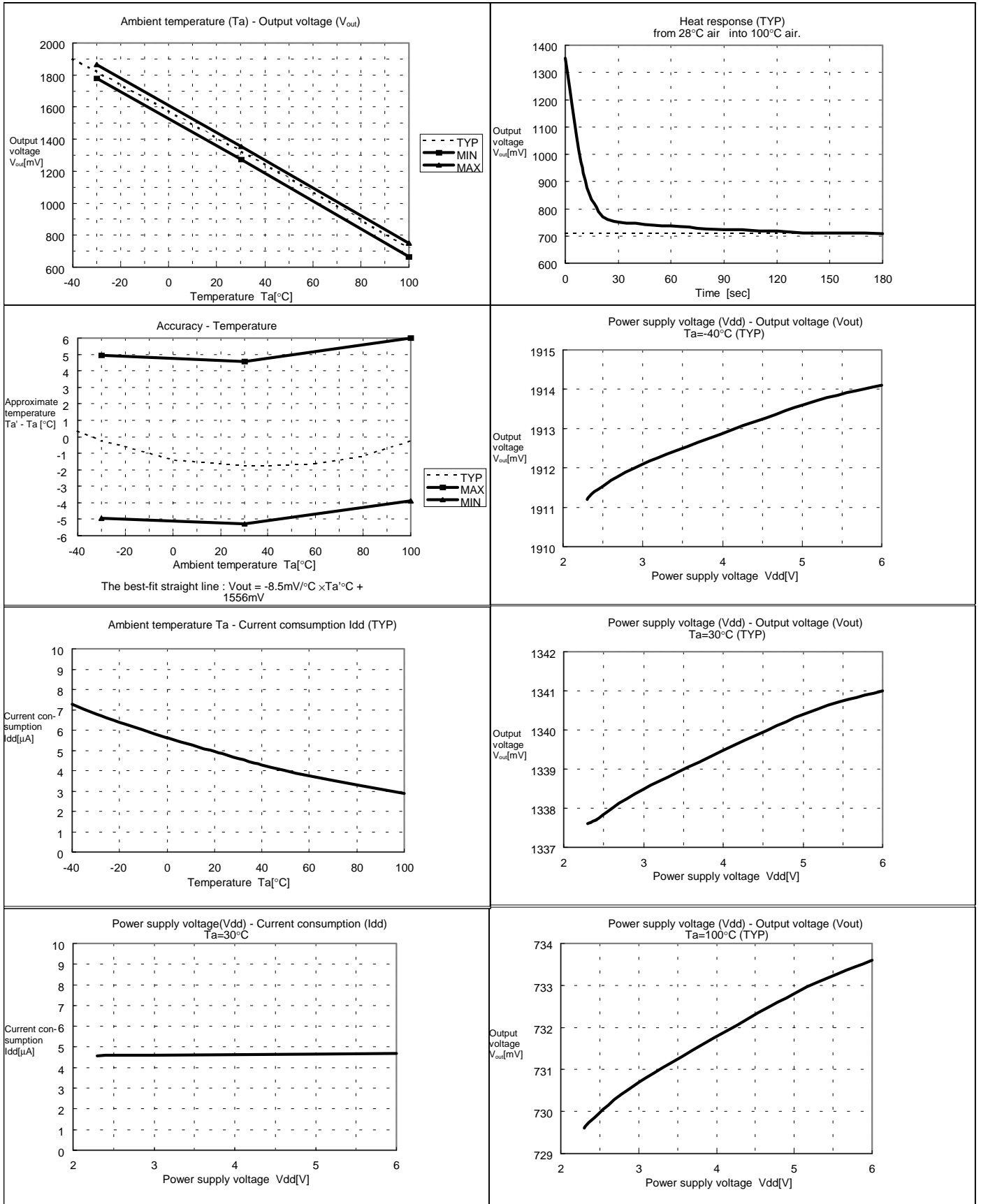
Load resistance : $R_L \geq 500\text{k } \Omega$

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



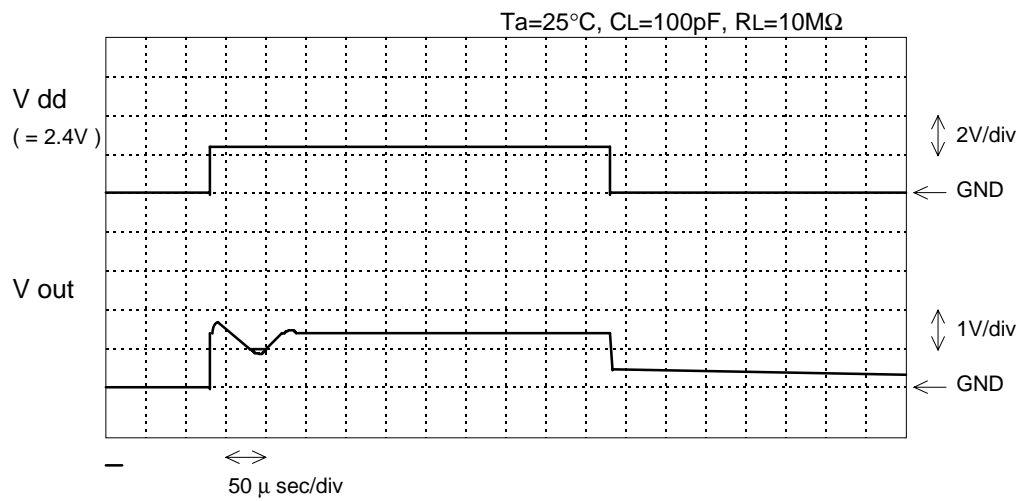
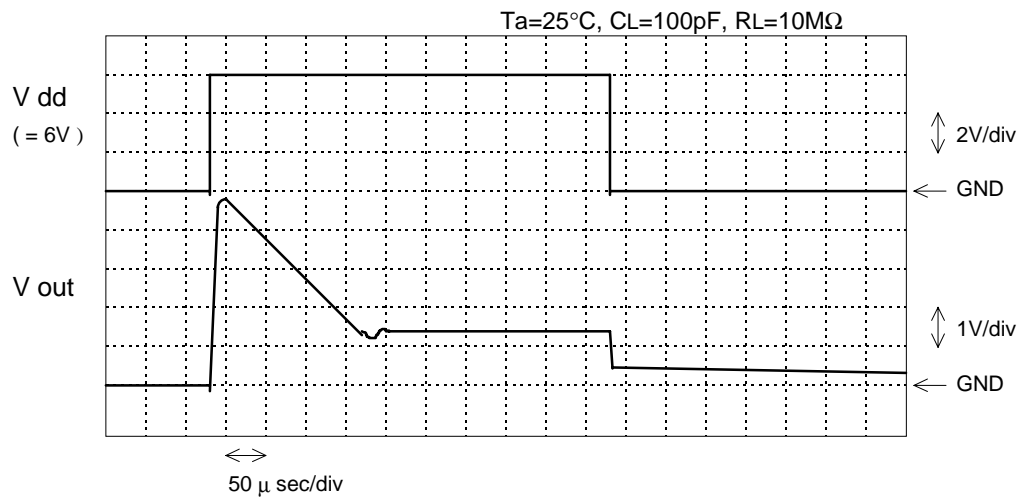
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■ Typical performance characteristics



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

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