
Low-Power Linear Active Thermistor ICs

Features

- Tiny Analog Temperature Sensor
- Available Packages:
 - SC70-5, SOT-23-3, TO-92-3 (not available with the **MCP9700B**)
- Wide Temperature Measurement Range:
 - -40°C to $+125^{\circ}\text{C}$ (Extended Temperature)
 - -40°C to $+150^{\circ}\text{C}$ (High Temperature) (**MCP9700** and **MCP9700B**, SOT-23-3 and SC70-5 only)
- Accuracy:
 - $\pm 1^{\circ}\text{C}$ (max.), $+20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ (**MCP9700B**)
 - $\pm 2^{\circ}\text{C}$ (max.), 0°C to $+70^{\circ}\text{C}$ (**MCP9700A/9701A**)
 - $\pm 4^{\circ}\text{C}$ (max.), 0°C to $+70^{\circ}\text{C}$ (**MCP9700/9701**)
- Optimized for Analog-to-Digital Converters (ADCs):
 - $10.0\text{ mV}/^{\circ}\text{C}$ (typical) (**MCP9700/9700A/9700B**)
 - $19.5\text{ mV}/^{\circ}\text{C}$ (typical) (**MCP9701/9701A**)
- Wide Operating Voltage Range:
 - $V_{\text{DD}} = 2.3\text{V}$ to 5.5V (**MCP9700/9700A/9700B**)
 - $V_{\text{DD}} = 3.1\text{V}$ to 5.5V (**MCP9701/9701A**)
- Low Operating Current: $6\text{ }\mu\text{A}$ (typical)
- Optimized to Drive Large Capacitive Loads
- Automotive Qualified Options Available

Typical Applications

- Automotive
- Hard Disk Drives and Other PC Peripherals
- Entertainment Systems
- Home Appliance
- Office Equipment
- Battery Packs and Portable Equipment
- General Purpose Temperature Monitoring

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-34970699
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General Description

MCP9700/9700A/9700B and MCP9701/9701A sensors with Linear Active Thermistor Integrated Circuit (IC) comprise a family of analog temperature sensors that convert temperature to analog voltage.

The low-cost, low-power sensors feature an accuracy of $\pm 1^{\circ}\text{C}$ from $+20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ (MCP9700B), $\pm 2^{\circ}\text{C}$ from 0°C to $+70^{\circ}\text{C}$ (MCP9700A/9701A) and $\pm 4^{\circ}\text{C}$ from 0°C to $+70^{\circ}\text{C}$ (MCP9700/9701) while consuming $6\text{ }\mu\text{A}$ (typical) of operating current.

Unlike resistive sensors, e.g., thermistors, the Linear Active Thermistor IC does not require an additional signal-conditioning circuit. Therefore, the biasing circuit development overhead for thermistor solutions can be avoided by implementing a sensor from these low-cost devices. The Voltage Output pin (V_{OUT}) can be directly connected to the ADC input of a microcontroller. The MCP9700/9700A/9700B and MCP9701/9701A temperature coefficients are scaled to provide a $1^{\circ}\text{C}/\text{bit}$ resolution for an 8-bit ADC with a reference voltage of 2.5V and 5V , respectively. The MCP9700/9700A/9700B output $0.1^{\circ}\text{C}/\text{bit}$ for a 12-bit ADC with 4.096V reference.

The MCP9700/9700A/9700B and MCP9701/9701A provide a low-cost solution for applications that require measurement of a relative change of temperature. When measuring relative change in temperature from $+25^{\circ}\text{C}$, an accuracy of $\pm 1^{\circ}\text{C}$ (typical) can be realized from 0°C to $+70^{\circ}\text{C}$. This accuracy can also be achieved by applying system calibration at $+25^{\circ}\text{C}$. The MCP9700B can measure temperature with $\pm 1^{\circ}\text{C}$ from $+20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ without any system calibration.

In addition, this family of devices is immune to the effects of parasitic capacitance and can drive large capacitive loads. This provides printed circuit board (PCB) layout design flexibility by enabling the device to be remotely located from the microcontroller. Adding some capacitance at the output also helps the output transient response by reducing overshoots or undershoots. However, capacitive load is not required for the stability of sensor output.

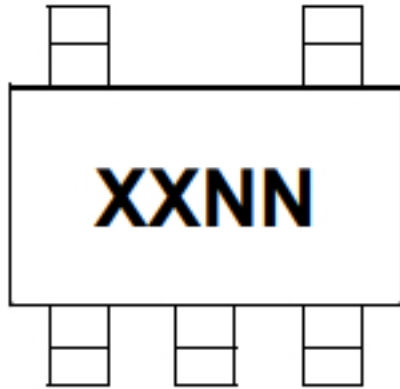
MCP970X

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5.0 PACKAGING INFORMATION

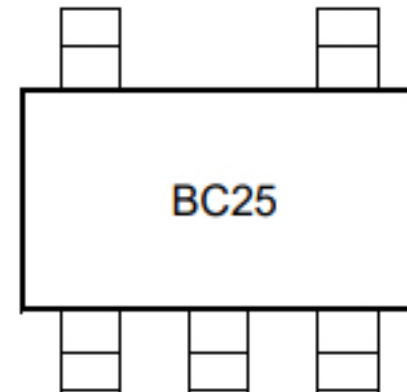
5.1 Package Marking Information

5-Lead SC70

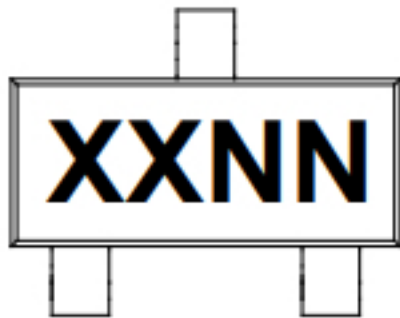


Device	Code
MCP9700T-E/LT	AUNN
MCP9700T-E/LTVAO	AUNN
MCP9700AT-E/LT	AXNN
MCP9700T-H/LT	BCNN
MCP9700T-H/LTVAO	BCNN
MCP9701T-E/LT	AVNN
MCP9701AT-E/LT	AYNN
MCP9701AT-E/LTVAO	AYNN
MCP9700BT-E/LT	KANN
MCP9700BT-H/LT	BONN
MCP9700BT-E/LTVAO	KANN
MCP9700BT-H/LTVAO	BONN

Example



3-Lead SOT-23



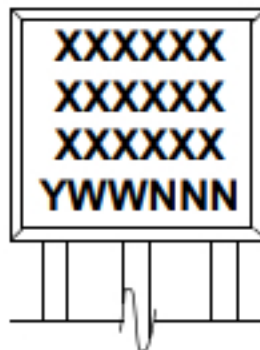
Note: Applies to 5-Lead SC70.

Device	Code
MCP9700T-E/TT	AENN
MCP9700T-E/TTVAO	AENN
MCP9700AT-E/TT	AFNN
MCP9700T-H/TT	AGNN
MCP9700T-H/TTVAO	AGNN
MCP9701T-E/TT	AMNN
MCP9701AT-E/TT	APNN
MCP9701AT-E/TTVAO	APNN
MCP9700BT-E/TT	KBNN
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MCP9700BT-H/TTVAO	KCNN
MCP9700BT-E/TTVAO	KBNN

Example



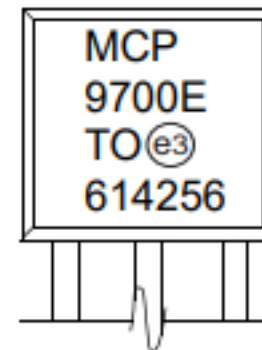
3-Lead TO-92



Note: Applies to 3-Lead SOT-23.

Device
MCP9700-E/TO
MCP9700A-E/TO
MCP9701-E/TO
MCP9701A-E/TO

Example



Legend:

- XX...X Customer-specific information
- Y Year code (last digit of calendar year)
- YY Year code (last 2 digits of calendar year)
- WW Week code (week of January 1 is week '01')
- NNN Alphanumeric traceability code
- (e3) Pb-free JEDEC® designator for Matte Tin (Sn)
- * This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.