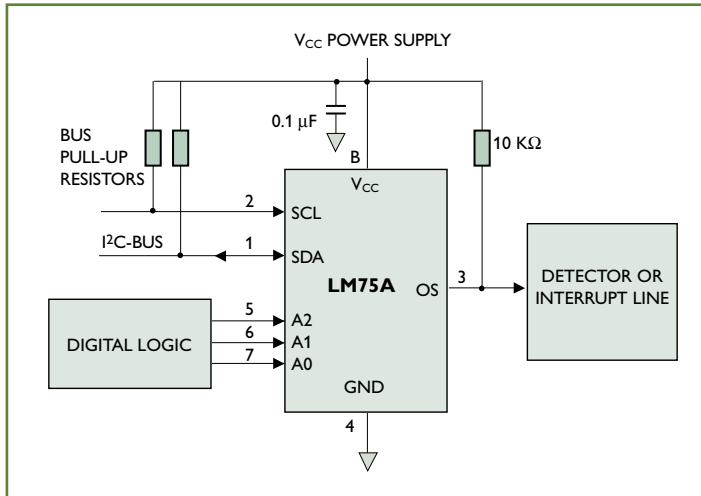


LM75A

Digital temperature sensor with $\pm 2\text{ }^{\circ}\text{C}$ accuracy and thermal watchdog™

This drop-in replacement of the industry-standard LM75 temperature sensor provides improved temperature resolution ($0.125\text{ }^{\circ}\text{C}$) over an extended power supply range of 2.8V to 5.5V. The device also operates as a thermostat with over-temp protection.



The LM75A is a drop-in replacement for the industry-standard LM75 temperature sensor that provides improved temperature resolution ($0.125\text{ }^{\circ}\text{C}$) over an extended power supply range (2.8V to 5.5V). The very high temperature resolution is particularly useful in applications that require precise measuring of thermal drift or runaway. The LM75A also operates as a thermal detector, providing over-temp detection (watchdog) output.

As a temperature sensor, the LM75A uses an on-chip band-gap sensor and sigma-delta A-to-D conversion techniques. An 11-bit A-to-D converter (ADC) always stores a 2's complement for the temperature register, thus producing the very high temperature resolution. To maintain complete software compatibility with the LM75, the LM75A retains the same nine most significant bits.

As part of its thermal detector function, the LM75A can be programmed to activate a warning light or fan when the ambient temperature exceeds a specified limit, or can interrupt the master controller with an open-drain output (OS). The OS can operate in either of two selectable modes, OS comparator or OS interrupt.

Communications with a master controller take place over a simple, easy-to-use two-wire serial I²C-bus interface operating at up to 400 kHz. Three selectable hardware address pins support connection of up to eight devices on the same bus without address conflict.

There are three data registers. The Configuration register (Conf) stores device settings such as device operation mode, OS operation mode, OS polarity, and OS fault queue. The Temperature register (Temp) stores the internal digital temp reading. The Set-point registers (Tos and Thyst) store programmable over-temp shutdown and hysteresis limits.

The device can be configured to operate in two modes. In normal mode, the device periodically monitors the ambient temperature. In shutdown mode, the device saves power by using a supply current of only 3.5 μA.

The fault queue, which defines the number of consecutive faults required to activate the OS output, and the set points limits are programmable. The active state can be selected as High or Low.

Features

- Thermal detector (watchdog) function with over-temp detection output
- 400 kHz I²C-bus interface
 - Up to 8 devices on same bus
- Temperature range: $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
- Temperature accuracy: $\pm 2\text{ }^{\circ}\text{C}$ from $-25\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$ and $\pm 3\text{ }^{\circ}\text{C}$ from $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
- Enhanced pin-for-pin replacement of industry-standard LM75 temperature sensor
 - Improved temperature resolution ($0.125\text{ }^{\circ}\text{C}$) via 11-bit ADC
 - Extended power supply range (2.8V to 5.5V)
 - Fully software compatible
- Programmable temperature threshold and hysteresis set points
- Power saving shut-down mode with supply current of only 3.5 μA
- Standalone operation as thermostat at power-up
- Small, 8-pin SO and TSSOP (MSOP) package options
 - SO8 in tube (D) or tape-and-reel (D-T)
 - TSSOP8 in tape-and-reel (DP-T)

Applications

- System thermal management
- Personal computers
- Electronics equipment
- Industrial control

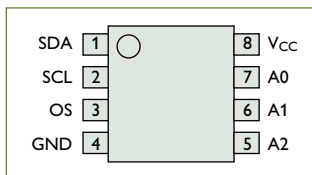
The Philips logo, consisting of the word "PHILIPS" in a bold, blue, sans-serif font.

LM75A

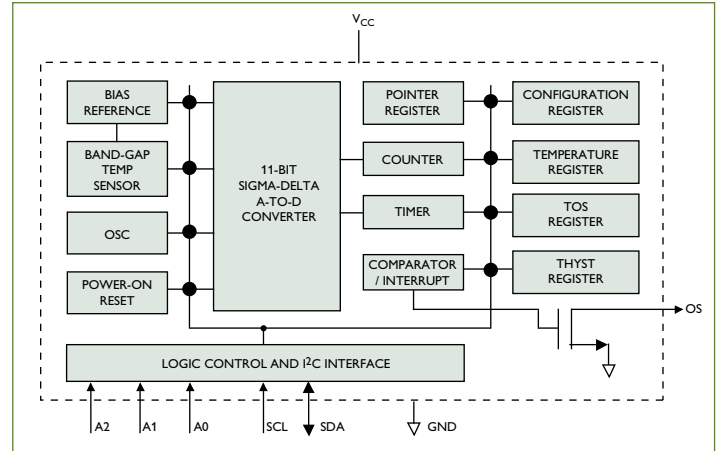
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On power-up, the device is automatically set to operate as a standalone thermostat with predefined temperature set points. The default start-up settings are normal operation mode, OS in comparator mode, temperature threshold of $80\text{ }^{\circ}\text{C}$ and hysteresis at $70\text{ }^{\circ}\text{C}$.



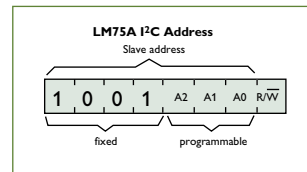
LM75A pin configuration



LM75A functional block diagram

PIN	SYMBOL	DESCRIPTION
1	SDA	Digital 1/0. I ² C serial bi-directional data line. Open Drain.
2	SCL	Digital input. I ² C serial clock input.
3	OS	Overtemp Shutdown output. Open Drain
4	GND	Ground. To be connected to the system ground
5	A2	Digital input. User-defined address bit2.
6	A1	Digital input. User-defined address bit1.
7	A0	Digital input. User-defined address bit0.
8	V _{CC}	Power supply.

LM75A pin description



LM75A I²C address



Purchase of Philips I²C components conveys a license under the Philips' patent to use the components in the I²C system provided the system conforms to the I²C specification defined by Philips.

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