STTS75

Digital temperature sensor, low current, high precision

STMicroelectronics' STTS75 is a precision digital output temperature sensor operating over a -55 °C to +125 °C temperature range.

It is ideal for low-power applications, offering:

- 1 µA standby current
- 75 µA typical active current
- Power-saving one-shot temperature measurement
- SMBus timeout function

Versatile I²C bus programming allows for configuration of thermometer resolution, bus addresses, temperature threshold and hysteresis set points with a bus timeout that prevents lockup of I²C bus.

Key features

- Measurement range: -55 °C to +125 °C
- Measurement accuracy: +/-2 °C from -25 °C to +100 °C (max)
- Operating voltage range: 2.7 V to 5.5 V
- Low operating current: 75 µA (typ) @ 3.3 V
- 2-wire I²C/SMBus-compatible serial interface:
  - 400 kHz I²C/SMBus
  - Supports bus time-out feature
  - Selectable bus address allows connection of up to eight devices on the bus
- Programmable temperature threshold and hysteresis set points
- Thermometer resolution is user-configurable, from 9 bits (0.5 °C) to 12 bits (0.0625 °C)
- Pin- and software-compatible with LM75, DS75, TCN75, TCN75A and MAX7500
- Power-up defaults permit standalone operation as a thermostat
- One-shot and shutdown modes to minimize power consumption
- Package options:
  - SO-8
  - MSOP8/TSSOP8

Main applications

- Servers and workstations
- Routers
- Multimedia PDA devices
- Set-top boxes
- Backlight for LCD panels
- GPS devices
- Cellular base stations
- Office equipment
- Electronic test equipment
- Thermal protection of sensitive applications

Best in class:
- 1.0 µA standby current
- 75 µA operating current @ 3.3 V
- Configurable 9- to 12-bit resolution
- 360 ms typical 12-bit conversion time
- Power saving one-shot temperature measurement

The STTS75 is a high-precision digital CMOS temperature sensor IC with a sigma-delta temperature-to-digital converter and an I2C-compatible serial digital interface. It is targeted for general applications such as personal computers, system thermal management, electronics equipment and industrial controllers. With best-in-class power-saving features and a small package, it is ideal for handheld devices such as mobile phones and PDAs.

The STTS75 has two package options: industry-standard 8-lead MSOP/TSSOP, and SO.

The device contains a band-gap temperature sensor and programmable 9- to 12-bit ADC, which monitors and digitizes the temperature to a resolution up to 0.0625 °C. The part is accurate to +3 °C over the full temperature measurement range of -55 °C to 125 °C, with +2 °C accuracy in the -25 °C to +100 °C range.

The STTS75 is specified to operate at supply voltages from 2.7 V to 5.5 V. Operating at 3.3 V, the supply current is typically 75 µA.

The on-board sigma-delta analog-to-digital converter (ADC) converts the measured temperature to a digital value that is calibrated in degrees Celsius; for Fahrenheit applications, a lookup table or conversion routine is required.

The STTS75 is factory-calibrated and requires no external components to measure temperature. The power-up defaults permit standalone operation as a thermostat. A dual-purpose event pin operates as an interrupt or comparator/thermostat output. The power-saving one-shot mode can be used when the part is in shutdown to perform a single temperature conversion.

The STTS75 has a simple 2-wire I2C-compatible digital serial interface which allows the user to access the data in the temperature register at any time. It communicates via the serial interface with a master controller which operates at speeds up to 400 kHz. Three pins (A0, A1 and A2) are available for address selection, and enable the user to connect up to 8 devices on the same bus without address conflict. In addition, the serial interface gives the user easy access to all STTS75 registers to customize operation of the device.
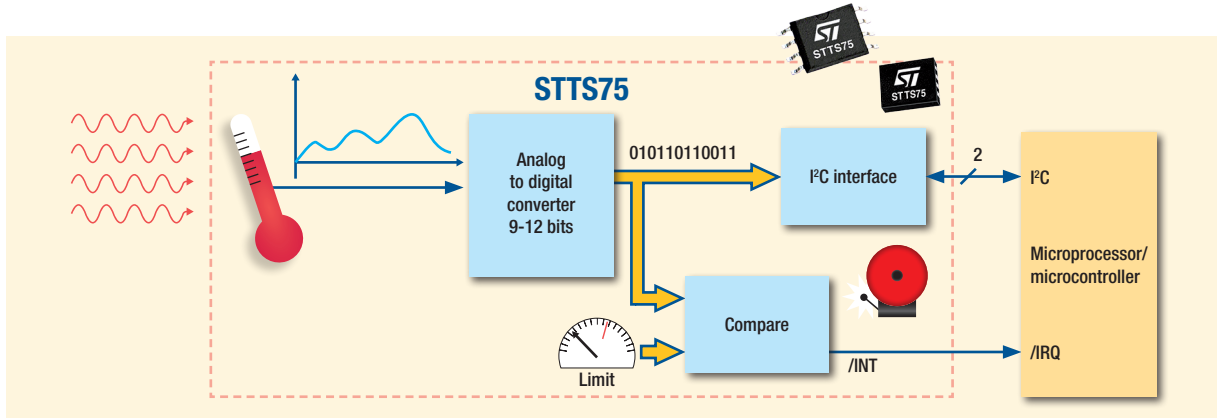
Digital temperature sensor family key parameters

Part number	Standby current max (µA)	Operating current max (µA)	Accuracy @ -25 °C to 100 °C (+/- °C)	Resolution (bits)	Temperature range (°C)	One shot mode	SMBus timeout	Package
STTS75M2F	1.0	100	2.0	9 to 12	−55 to 125	Yes	Yes	SO8
STTS75DS2F	1.0	100	2.0	9 to 12	−55 to 125	Yes	Yes	MSOP8/TSSOP8
STLM75M2F	1.0	150	2.0	9	−55 to 125	No	No	SO8
STLM75DS2F	1.0	150	2.0	9	−55 to 125	No	No	MSOP8/TSSOP8
STCN75M2F	1.0	150	2.0	9	−55 to 125	No	No	SO8
STCN75DS2F	1.0	150	2.0	9	−55 to 125	No	No	MSOP8/TSSOP8
STDS75M2F	1.0	150	2.0	9 to 12	−55 to 125	No	No	SO8
STDS75DS2F	1.0	150	2.0	9 to 12	−55 to 125	No	No	MSOP8/TSSOP8

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