STTS424E02

Memory module temperature sensor with a 2Kb SPD EEPROM

Data Brief

Features

- Temperature sensor compliant with JEDEC JC42.4, integrated with 2Kbit Serial Presence Detect (SPD) EEPROM.

Temperature sensor

- Temperature sensor resolution: 0.25°C (typ)/LSB
- Temperature sensor accuracy:
  - ± 1°C from +75°C to +95°C
  - ± 2°C from +40°C to +125°C
  - ± 3°C from –40°C to +125°C
- ADC conversion time: 125ms (max)
- Supply voltage: 2.7V to 3.6 V
- Maximum operating supply current: 200µA
- Hysteresis selectable set points from: 0, 1.5, 3, 6.0°C
- Ambient temperature sensing range: -40°C to +125°C

2Kb SPD EEPROM

- Functionality identical to ST's M34E02 SPD EEPROM
- Permanent and reversible software data protection for the lower 128 bytes
- Single supply voltage: 2.7V to 3.6V
- Byte and page write (up to 16 bytes)
- Self-time WRITE cycle (5ms, max)
- Automatic address incrementing
- More than 1 million erase/WRITE cycles
- Operating temperature range: -40°C to +85°C

DFN8 (DA)
2mm x 3mm
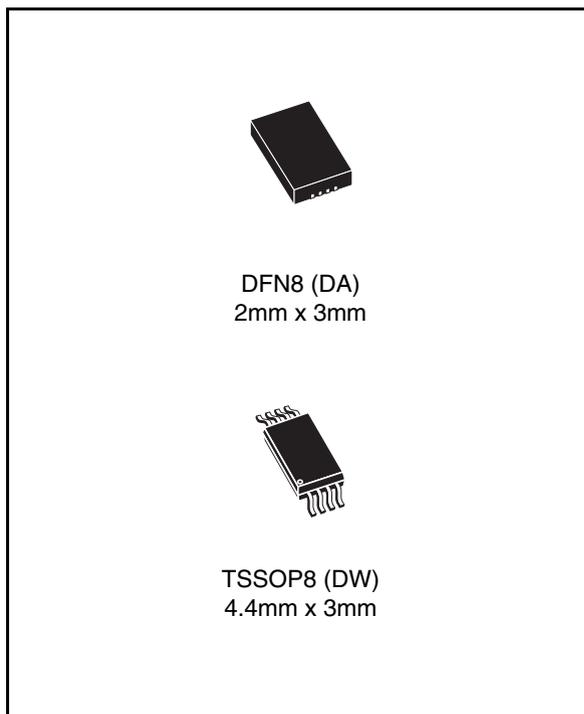
TSSOP8 (DW)
4.4mm x 3mm

Two-wire bus

- 2-Wire SMBus/I^{2}C -compatible serial interface
- Supports up to 100kHz transfer rate

Packages

- 2mm x 3mm DFN8, height: 0.85mm (typ)
- 4.4mm x 3mm TSSOP8[a]
- Halogen-free, lead-free

a. Contact local ST sales office for availability.

Description

The STTS424E02 is targeted for DIMM Modules in Mobile Personal Computing Platforms (Laptops), Server Memory Modules and other industrial applications. The Thermal Sensor (TS) in the STTS424E02 is fully compliant with the JEDEC 42.4 specification, which defines Memory Module Thermal Sensors requirements for Mobile platforms. The 2Kbit Serial Presence Detect (SPD) I^2C-compatible Electrically Erasable Programmable Memory (EEPROM) in the STTS424E02 is organized as 256 x8 bits and is functionally identical to the industry standard M34E02.

Ambient temperature sensing range for the temperature sensor is -40°C to +125°C per JC42.4 specifications. The operating temperature range for the SPD EEPROM is guaranteed for -40°C to +85°C.

The TS-SPD EEPROM combination provides space as well as cost savings for Mobile and Server Platform Dual Inline Memory Modules (DIMM) manufacturers, as it is packaged in the compact 2mm x 3mm 8-lead DFN package which has a height that will not exceed 0.9mm. It is also available in the JEDEC compliant TSSOP8 package.

The temperature sensor includes a band gap-based temperature sensor and 10-bit Analog-to-Digital Converter (ADC) which monitor and digitize the temperature to a resolution of up to 0.25°C. The typical accuracies over these temperature ranges are:

- ±3°C (max) over the full temperature measurement range of −40°C to 125°C,
- ±2°C in the +40°C to +125°C temperature range, and
- ±1°C in the +75°C to +95°C temperature range.

The temperature sensor in the STTS424E02 is specified for operating at supply voltages from 2.7V to 3.6V. Operating at 3.3V, the supply current is 100µA (typ).

The on-board sigma delta ADC converts the measured temperature to a digital value that is calibrated in °C. For Fahrenheit applications, a lookup table or conversion routine is required. The STTS424E02 is factory-calibrated and requires no external components to measure temperature.

The digital temperature sensor component has user-programmable registers that provide the capabilities for DIMM temperature-sensing applications. The open drain Event output pin is active when the monitoring temperature exceeds a programmable limit, or it falls above or below an alarm window. The user has the option to set the Event output as a critical temperature output. This pin can be configured to operate in either a comparator mode for thermostat operation or in interrupt mode.

The 2Kbit serial EEPROM memory in the STTS424E02 has the ability to permanently lock the data in its first half (upper) 128 bytes (locations 00h to 7Fh). This facility has been designed specifically for use in DRAM DIMMs with SPD. All of the information concerning the DRAM module configuration (e.g. access speed, size, and organization) can be kept write protected in the first half of the memory. The second half (lower) 128 bytes of the memory can be write protected using two different software write protection mechanisms.

By sending the device a specific sequence, the first 128 bytes of the memory become write protected: permanently or resettable. In the STTS424E02 the EEPROM Write Control ($\overline{WC}$) is always held low. Thus, the write protection of the memory array is dependent on whether the software protection has been set.

Figure 1.   Logic diagram
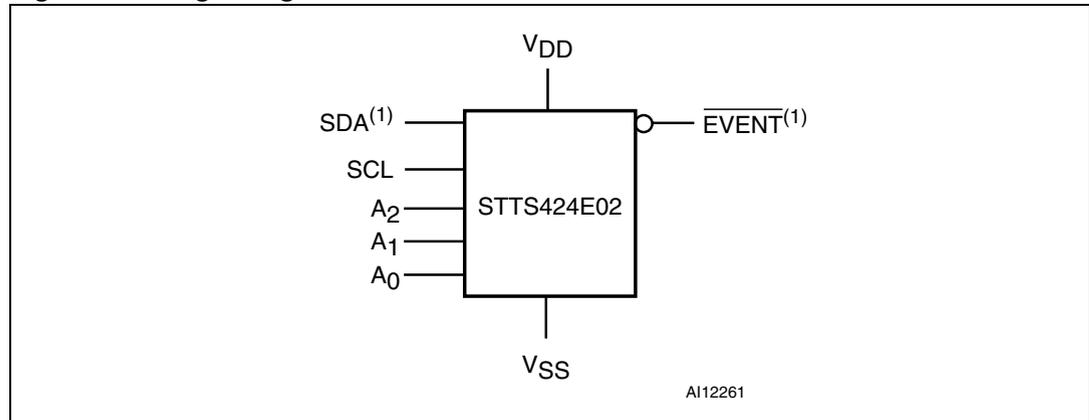
1. SDA and $\overline{\text{EVENT}}$ are open drain.

Table 1.   Signal names

| Pin	Symbol	Description	Direction
1	A0	Serial Bus Address selection pin. Can be tied to V_{SS} or V_{DD}.	Input
2	A1	Serial Bus Address selection pin. Can be tied to V_{SS} or V_{DD}.	Input
3	A2	Serial Bus Address selection pin. Can be tied to V_{SS} or V_{DD}.	Input
4	V_{SS}	Supply ground	
5	SDA[1]	Serial Data	Input/output
6	SCL	Serial Clock	Input
7	$\overline{\text{EVENT}}$[1]	Event output pin. Open drain and active-low	Output
8	V_{DD}	Supply power (2.7V to 3.6V)	

1. SDA and $\overline{\text{EVENT}}$ are open drain.

Figure 2.   Connections (DFN8 and TSSOP8)
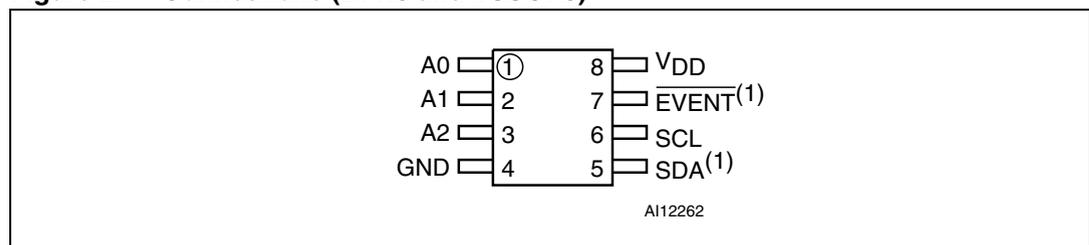
1. SDA and $\overline{\text{EVENT}}$ are open drain.

Figure 3.   Block diagram
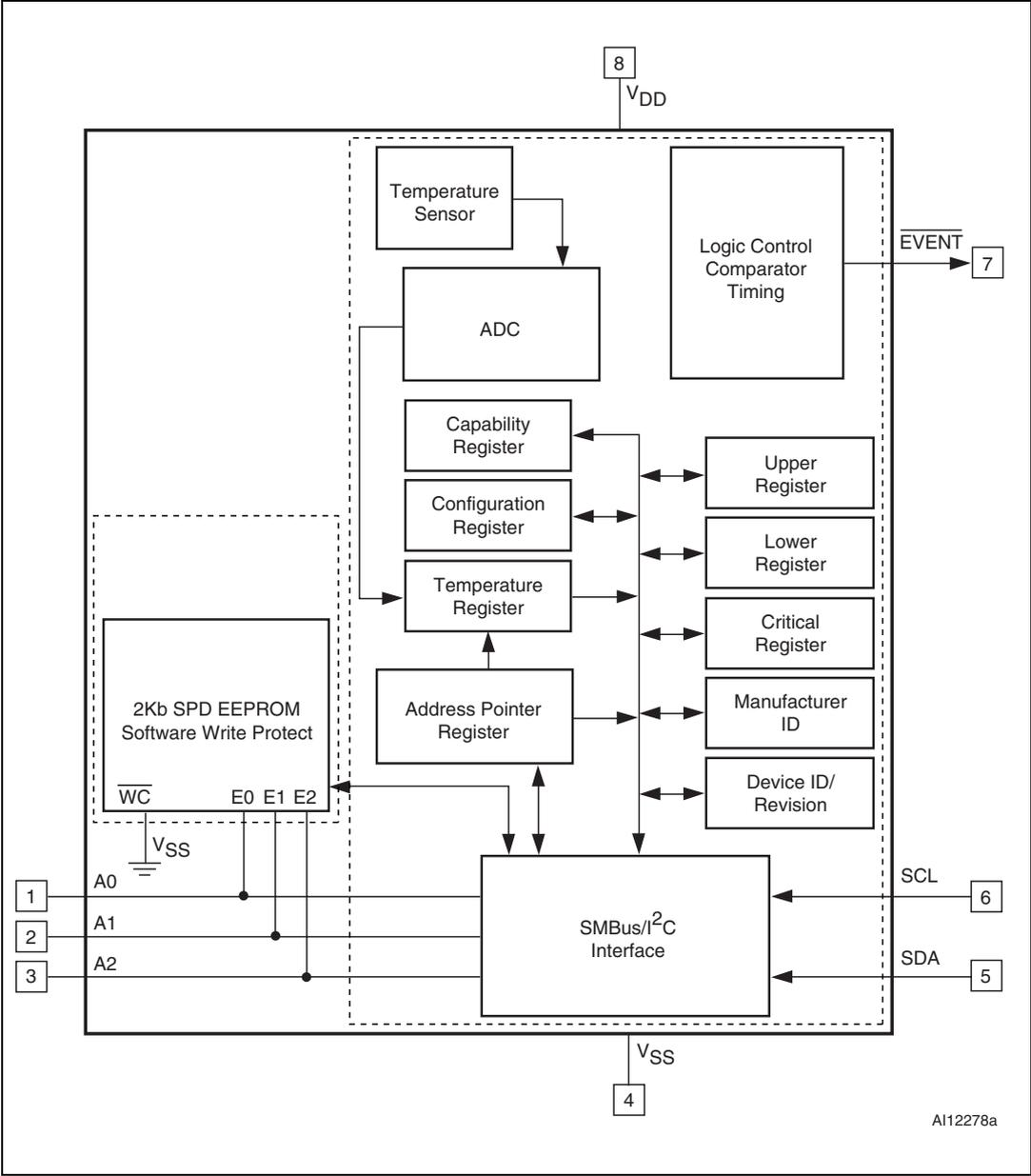
Part numbering

Table 2.   Ordering information scheme

Example: STTS424E02   C   DA   6   F

Device type

STTS424E02

Grade

C: Maximum accuracy 75°C to 95°C = ± 2°C

B: Maximum accuracy 75°C to 95°C = ± 1°C[1]

Package

DA = DFN8

DW = TSSOP8 (4.4mm x 3 mm body size)[1]

Temperature

-40°C to 85°C

Shipping method

F = ECOPACK package, tape & reel packing

E = ECOPACK package, tube packing

1.   Contact local ST sales office for availability.

For other options, or for more information on any aspect of this device, please contact the ST sales office nearest you.

Revision history

Table 3.   Revision history

Date	Revision	Changes
03-Aug-2007	1	Initial release.

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