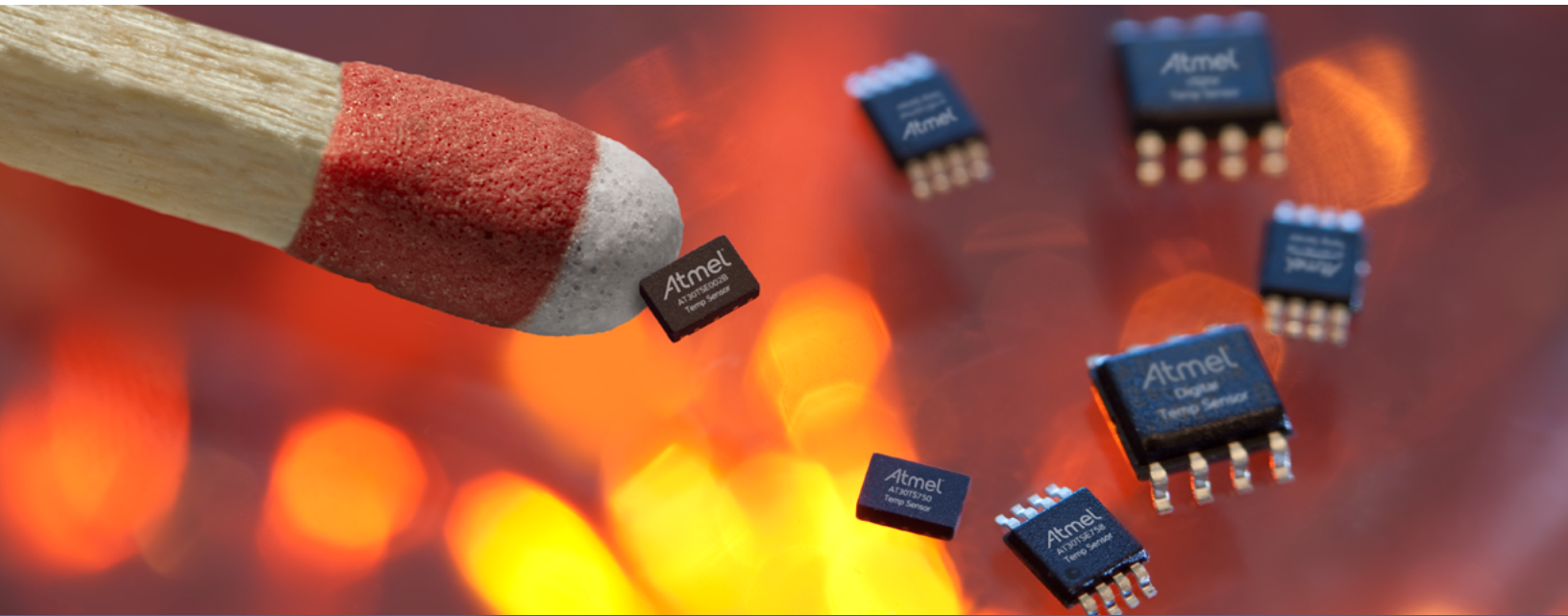


# Atmel®



## Atmel Digital Temperature Sensors

World's Most Versatile Temperature Sensing Solutions

## World's Most Versatile Temperature Sensing Solutions

Ideal For:

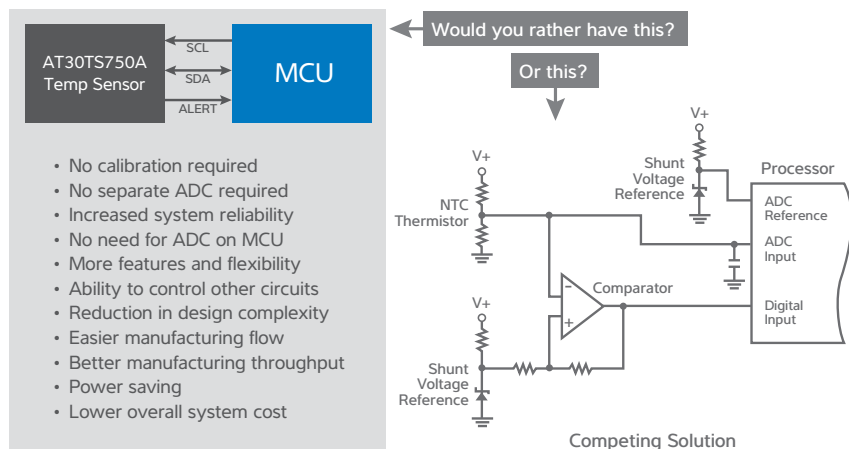
- **Industrial:** Industrial controls, smart meters, HVAC, lighting ballast, fire alarms, test equipment, medical devices, and LED lighting
- **Consumer:** Li-ion batteries, set-top boxes, audio/video equipment, game consoles, white goods, thermostats, and LED lighting
- **Communications:** Telecom equipment, smartphones, gateways, routers, headsets, call servers, and power supplies
- **Computers:** Desktops, laptops, netbooks, tablets, servers, SSDs and HDDs

## Why Do Applications Need a Temperature Sensor?

As today's electronic systems run faster and as silicon content increases, these applications are generating more heat than ever, making the need to monitor temperature increasingly important. A temperature sensor can effectively measure the system and processor temperatures and allows the processor and system bus frequencies to be throttled back when the temperature exceeds a preset limit. This ensures product safety and reliability while minimizing the need for cooling fans and heat sinks which may not be practical in today's increasingly compact designs. For systems that do include a fan to maintain proper conditions, temperature sensors can be used to vary the fan speed as needed to reduce noise, reduce power consumption, and prolong the life of the fan.

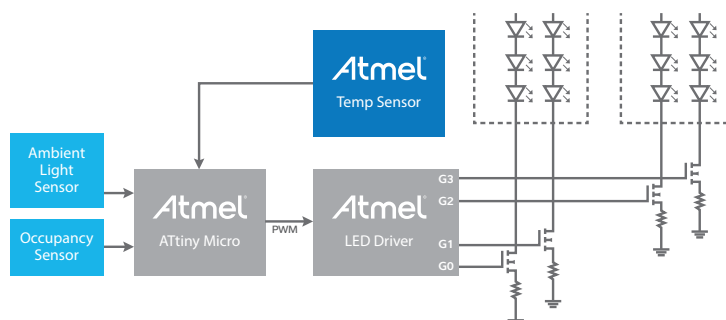
In portable applications that utilize Li-ion or Li-polymer batteries, temperatures in excess of 60°C can cause the batteries to overheat and swell, catch on fire, or even explode. A temperature sensor can actively monitor the battery temperature, allowing the system to warn the user, to shut itself down, or to even shut down the battery charging in the event of an over-temperature situation, thereby increasing the safety and reliability of the application.

## Digital Temperature Sensor Advantages and Benefits



## Application Example:

Atmel Digital Temperature Sensors provide highly accurate measurement to better control temperature and prolong the life of the LEDs.



# Atmel Digital Temperature Sensors

World's Most Versatile Temperature Sensing Solutions

## Atmel Digital Temperature Sensors

### Accurate, Complete, and Easy to Use

Atmel Digital Temperature Sensor products are complete and easy-to-use solutions that address the ever-growing need for temperature sensing. Atmel offers these solutions as drop-in replacements for industry-standard LM75-type devices as well as JEDEC-standard compliant solutions for DDR3 and DDR4 DIMM modules. Atmel Digital Temperature Sensors also provide enhanced features, such as integrated EEPROM and nonvolatile registers, to reduce BOM cost, improve system flexibility and product reliability, and enhance application safety.

In terms of performance, Digital Temperature Sensors offer excellent accuracy and a precise, fully calibrated digital temperature reading in degrees celsius. Digital Temperature Sensors eliminate the need for additional components, such as an A/D converter, within the application, and there is no need to calibrate components or the system at specific reference temperatures as required when using thermistors. Atmel Digital Temperature Sensors take care of it all, enabling the critical system temperature monitoring function to be simplified.

|                   |   |
|-------------------|---|
| AT30TS00          | <ul style="list-style-type: none"><li>• JEDEC-defined industry-standard solutions for DDR3 and DDR4</li><li>• Fixed 11-bit resolution (0.125°C)</li><li>• Supports three programmable temperature limits</li><li>• User-selectable hysteresis control</li></ul>       |
| AT30TSE002B       |   |
| AT30TSE004A       |   |
|                   | <ul style="list-style-type: none"><li>• AT30TSE002B integrates 2Kb of SEEPR0M</li><li>• AT30TSE004A integrates 4Kb of SEEPR0M for DDR4 applications</li></ul>   |
| AT30TS75x         | <ul style="list-style-type: none"><li>• Enhanced version of industry-standard LM75</li><li>• Selectable 9-bit to 12-bit resolution (0.5°C to 0.0625°C)</li><li>• Supports two programmable temperature limits</li><li>• Power-saving Shutdown/One-shot Mode</li></ul> |
| AT30TS750x        |   |
| AT30TSE752x/4x/8x |   |
|                   | <ul style="list-style-type: none"><li>• AT30TS75x also supports I<sup>2</sup>C High-speed Mode (3.4MHz)</li><li>• AT30TS750x also incorporates nonvolatile registers</li><li>• AT30TSE752x/4x/8x also integrate 2/4/8Kb of SEEPR0M</li></ul>                          |

All devices are available in 8-lead packages and support SMBus Time-out



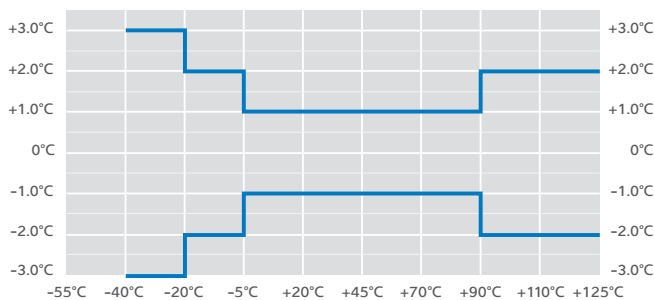
## AT30TS/TSE75x Devices

The Atmel AT30TS/TSE75x Digital Temperature Sensor Family comprises five high-precision devices based on the industry-standard LM75 functionality. These devices offer designers a choice of nonvolatile registers and serial EEPROM for optimal system reliability and increased integration.

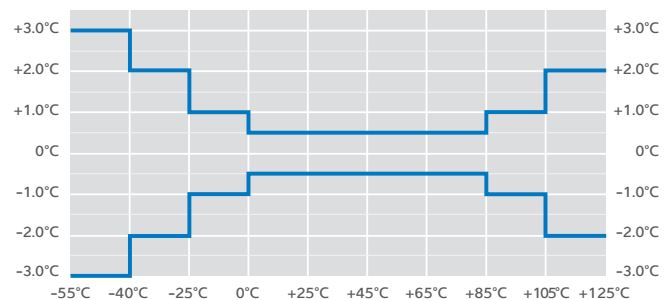
The Atmel AT30TS/TSE75x Digital Temperature Sensor Family is a complete, fully factory-calibrated, real-time temperature monitoring solution that operates over the -55°C to +125°C temperature range. The devices output digitized temperature data via a standard I<sup>2</sup>C/SMBus-compatible serial interface, eliminating the need for any external components such as A/D converters and data post-processing.

| Feature  | Benefit  | Devices   |
|--|--|---|
| Non-volatile registers                           | Pre-configured power-up settings minimize MCU power-up involvement and enforce preset conditions to improve safety       | AT30TS750,<br>AT30TSE752/4/8<br>AT30TS750A,<br>AT30TSE752A/4A/8A  |
| Integrated 2Kb, 4Kb, or 8Kb EEPROM               | Reduces component count and BOM costs and minimizes board space  | AT30TSE752/4/8<br>AT30TSE752A/4A/8A                               |
| Widest Vcc range of 1.7V to 5.5V                 | Best-in-class operating voltage range and low voltage capability to save power   | AT30TS75A,<br>AT30TS750A,<br>AT30TSE752A/4A/8A                    |
| Lockable settings                                | Minimize liability exposure from user misconfiguration and tampering   | AT30TS750,<br>AT30TSE752/4/8,<br>AT30TS750A,<br>AT30TSE752A/4A/8A |
| SMBus Time-out                                   | Enhances fault tolerance   | All   |
| I <sup>2</sup> C High-speed Mode (3.4MHz)        | System does not need to throttle down to communicate with the temperature sensor and thus maintains high-speed operation | AT30TS75<br>AT30TS75A   |
| I <sup>2</sup> C Fast Mode Plus (1MHz) frequency | Allows faster data throughputs   | AT30TS75A, AT30TS750A,<br>AT30TSE752A/4A/8A                       |
| One-shot Mode                                    | Turn on device only when needed to save power  | All   |
| 9-bit to 12-bit selectable resolution            | Choice of resolution versus conversion speed to custom fit application requirements                                      | All   |

AT30TS75x/TSE752/4/8  
Device Typical Accuracy



AT30TS75xA/TSE752A/4A/8A  
Device Typical Accuracy



# Atmel Digital Temperature Sensors

## World's Most Versatile Temperature Sensing Solutions

### AT30TS/TSE00x Devices

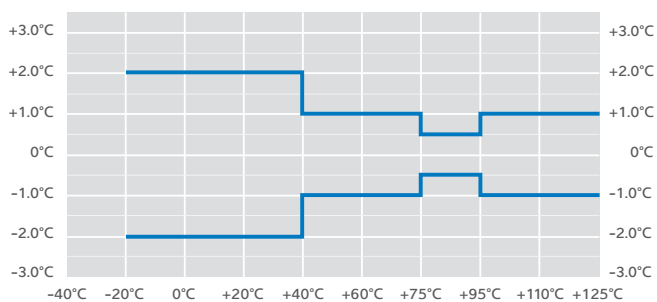
In addition to DDR3 and DDR4 DIMM applications, the Atmel AT30TS/TSE00x devices are ideal solutions for any application that requires high levels of safety and reliability and a reduced risk of overheating—with the added benefit of an integrated, robust 2Kb or 4Kb serial EEPROM to store customer preference data. In many cases, the AT30TS/TSE00x devices can drop in and replace an existing low-density I<sup>2</sup>C serial EEPROM while offering the value-added security of real-time temperature monitoring to enhance safety and reliability of the product.

| Feature  | Benefit  |
|--|--|
| Three user-programmable temperature limits                 | Third temperature limit to improve the temperature monitoring robustness of a system |
| Integrated 2Kb or 4Kb EEPROM (AT30TSE002B and AT30TSE004A) | Reduces component count and BOM costs and minimizes board space                      |
| Wide Vcc range of 1.7V to 3.6V (AT30TSE004A)               | Low voltage operation to reduce power consumption                                    |
| User-selectable hysteresis levels                          | Ensures temperature limit violations are valid and not glitch-related                |
| SMBus Time-out   | Enhances fault tolerance   |
| I <sup>2</sup> C Fast Mode Plus (1MHz) frequency           | Allows faster data throughputs   |

### AT30TS/TSE00x Comparison

| Feature                              | AT30TSE002B                            | AT30TSE004A   | AT30TS00                               |
|--------------------------------------|--|---|--|
| EEPROM memory size                   | 2Kb                                    | 4Kb   | N/A                                    |
| Operating voltage range              | 2.7V to 3.6V                           | 1.7V to 3.6V  | 2.7V to 3.6V                           |
| Maximum clock frequency              | I <sup>2</sup> C Fast Mode (400kHz)    | I <sup>2</sup> C Fast Mode Plus (1MHz)                | I <sup>2</sup> C Fast Mode Plus (1MHz) |
| Permanent write protection           | Yes                                    | No  | N/A                                    |
| Reversible software write protection | Yes (protect one section of 128 bytes) | Yes (protect one of four quadrants of 128 bytes each) | N/A                                    |
| Package options                      | WDFN-8                                 | WDFN-8<br>UDFN-8                                      | WDFN-8<br>UDFN-8                       |

### AT30TS/TSE00x Device Typical Accuracy

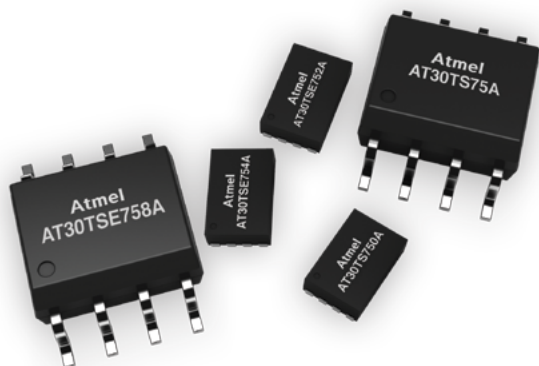


## Product Availability and Ordering Information

| Atmel Ordering Code | Voltage Range | Interface              | Nonvolatile Registers | Integrated EEPROM | Package | Availability |
|---------------------|---------------|------------------------|-----------------------|-------------------|---------|--------------|
| AT30TS75A-XM8M-T    | 1.7-5.5V      | I <sup>2</sup> C/SMBus | No                    | No                | MSOP-8  | Q3-2013      |
| AT30TS75A-SS8M-T    | 1.7-5.5V      | I <sup>2</sup> C/SMBus | No                    | No                | SOIC-8  | Q3-2013      |
| AT30TS75A-MA8M-T    | 1.7-5.5V      | I <sup>2</sup> C/SMBus | No                    | No                | UDFN-8  | Q3-2013      |
| AT30TS750A-XM8M-T   | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | No                | MSOP-8  | Q3-2013      |
| AT30TS750A-SS8M-T   | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | No                | SOIC-8  | Q3-2013      |
| AT30TS750A-MA8M-T   | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | No                | UDFN-8  | Q3-2013      |
| AT30TSE752A-XM8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 2Kb               | MSOP-8  | Q3-2013      |
| AT30TSE752A-SS8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 2Kb               | SOIC-8  | Q3-2013      |
| AT30TSE752A-MA8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 2Kb               | UDFN-8  | Q3-2013      |
| AT30TSE754A-XM8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 4Kb               | MSOP-8  | Q3-2013      |
| AT30TSE754A-SS8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 4Kb               | SOIC-8  | Q3-2013      |
| AT30TSE754A-MA8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 4Kb               | UDFN-8  | Q3-2013      |
| AT30TSE758A-XM8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 8Kb               | MSOP-8  | Q3-2013      |
| AT30TSE758A-SS8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 8Kb               | SOIC-8  | Q3-2013      |
| AT30TSE758A-MA8M-T  | 1.7-5.5V      | I <sup>2</sup> C/SMBus | Yes                   | 8Kb               | UDFN-8  | Q3-2013      |
| AT30TS00-MAH-T      | 2.7-3.6V      | I <sup>2</sup> C/SMBus | No                    | No                | WDFN-8  | Now          |
| AT30TSE002B-MAH-T   | 2.7-3.6V      | I <sup>2</sup> C/SMBus | No                    | 2Kb               | WDFN-8  | Now          |
| AT30TSE004A-MAA5M-T | 1.7-3.6V      | I <sup>2</sup> C/SMBus | No                    | 4Kb               | WDFN-8  | Q2-2013      |
| AT30TSE004A-MA5M-T  | 1.7-3.6V      | I <sup>2</sup> C/SMBus | No                    | 4Kb               | UDFN-8  | Q2-2013      |

**Note:** Current generation AT30TS75, AT30TS750, and AT30TSE752/4/8 devices are available and in production

### AT30TS75xA/TSE752A/4A/8A Devices



### AT30TS/TSE00x Devices



# Atmel Digital Temperature Sensors

World's Most Versatile Temperature Sensing Solutions

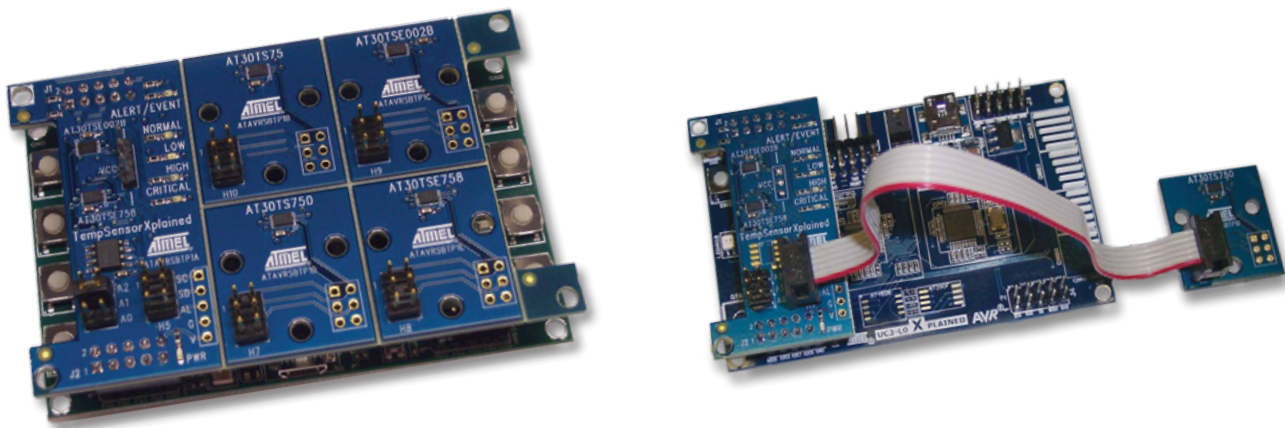
## Atmel Digital Temperature Sensor Tools

### AVR-based Kits with Easy-to-Use Software

The Atmel Digital Temperature Sensor development tools enable rapid development and system integration for applications that require accurate, real-time temperature monitoring to improve product safety and reliability, improve system performance, and reduce the risk of system overheating.

### Temperature Sensor Xplained

- Temperature Sensor Xplained add-on board
- Software development using Atmel AVR® Xplained Kit series



The Atmel ATAVRTEMPSENSORX is an add-on board for the Atmel AVR® Xplained series development platform that adds temperature monitoring functionality in embedded design applications. The ATAVRTEMPSENSORX add-on board has been developed to allow fast system prototyping with a wide range of AVR microcontrollers. The software drivers eliminate low-level development to ease and accelerate development. The boards and software are part of the development environment and tool chain for AVR microcontrollers. Additionally, the ATAVRTEMPSENSORX add-on board was designed with break-away capability to support remote temperature sensing evaluation and development.

Software tools, libraries, and documentation available at [www.atmel.com/ATAVRTEMPSENSORX](http://www.atmel.com/ATAVRTEMPSENSORX)



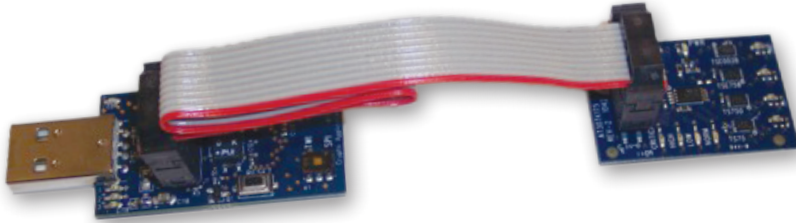


# Atmel Digital Temperature Sensors

## World's Most Versatile Temperature Sensing Solutions

### Temperature Sensor Development Kit

- Easy-to-use demonstration platform
- Flexible modular hardware design
- Compatible with any development platform supporting I<sup>2</sup>C Interface



The Atmel AT30TK175STK development kit allows users to experiment and develop with the Atmel family of Digital Temperature Sensors. The kit includes an AT88Microbase board, an AT30TK175 daughterboard, a ribbon cable to support remote sensing, and a USB cable extension. The daughterboard interfaces to the AT88Microbase board to provide communication to a PC via a USB interface allowing designers to learn and experiment with the temperature sensor demonstration utility. The temperature sensor demonstration utility showcases the unique features of the AT30TSE002B and AT30TS750 family of devices. In addition, the AT30TK175STK daughterboard can be connected to any MCU development platform to easily add temperature monitoring to applications.

Software tools, libraries, and documentation available at [www.atmel.com/AT30TK175STK](http://www.atmel.com/AT30TK175STK)



Atmel Digital Temperature Sensor Products Home Page

[http://www.atmel.com/products/other/digital\\_temperature\\_sensors/default.aspx](http://www.atmel.com/products/other/digital_temperature_sensors/default.aspx)



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