

TMP461 High-Accuracy Remote and Local Temperature Sensor with Pin-Programmable Bus Address

1 Features

- $\pm 0.75^{\circ}\text{C}$ Remote Diode Temperature Sensor Accuracy
- $\pm 1^{\circ}\text{C}$ Local Temperature Sensor Accuracy
- $\pm 0.8^{\circ}\text{C}$ Accuracy for Local and Remote Diode Sensors
- 0.0625°C Resolution for Local and Remote Channels
- 1.7-V to 3.6-V Supply and Logic Voltage Range
- 35- μA Operating Current (1 SPS), 3- μA Shutdown Current
- Series Resistance Cancellation
- η -Factor and Offset Correction
- Programmable Digital Filter
- Diode Fault Detection
- Two-Wire and SMBus™ Serial Interface with Pin-Programmable Address
- 10-Lead WQFN Package

2 Applications

- Processor Temperature Monitoring
- Telecommunication Equipment
- Servers and Personal Computers
- Precision Instruments
- Test Equipment
- LED Lighting Thermal Control

3 Description

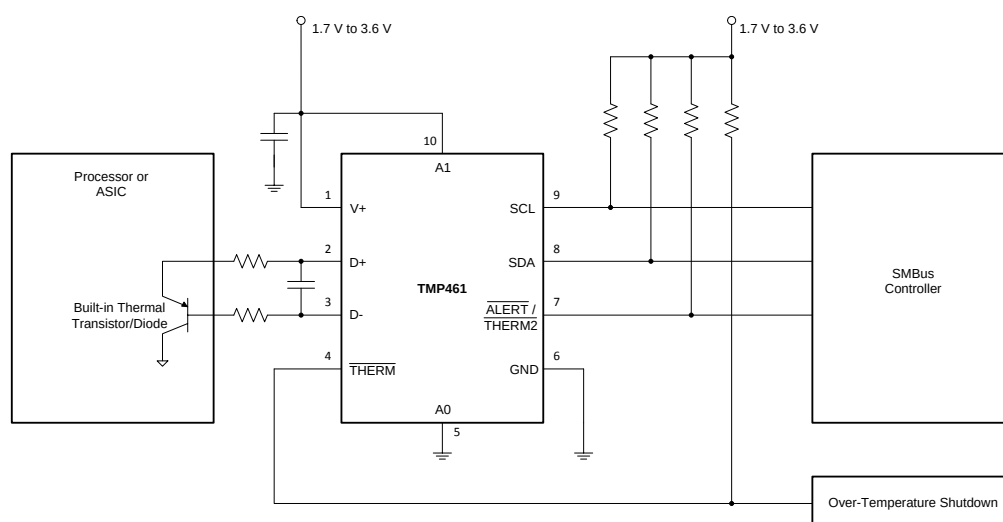
The TMP461 device is a high-accuracy, low-power remote temperature sensor monitor with a built-in local temperature sensor. The remote temperature sensors are typically low-cost discrete NPN or PNP transistors, substrate thermal transistors, or diodes that are integral parts of microprocessors, microcontrollers, or FPGAs. The temperature is represented as a 12-bit digital code for both the local and the remote sensors providing a resolution of 0.0625°C . The two-wire serial interface accepts the SMBus communication protocol with up to 9 different pin-programmable addresses.

Advanced features such as series resistance cancellation, programmable nonideality factor (η -factor), programmable offset, programmable temperature limits, and a programmable digital filter are combined to provide a robust thermal monitoring solution with improved accuracy and noise immunity.

The TMP461 is ideal for multi-location, high-accuracy temperature measurements in a variety of communication, computing, instrumentation, and industrial applications. The device is specified for operation over a supply voltage range of 1.7 V to 3.6 V, and a temperature range of -40°C to 125°C .

Device Information

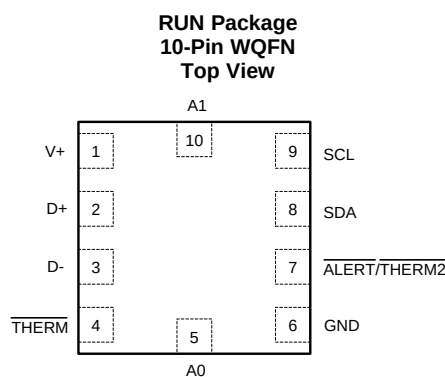
PART NUMBER	PACKAGE	BODY SIZE (NOM)
TMP461	WQFN (10)	2.00 mm × 2.00 mm



4 Revision History

DATE	REVISION	NOTES
June 2015	*	Initial release.

5 Pin Configuration and Functions



Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
A0	5	Digital input	Address select. Connect to GND, V+, or leave floating.
A1	10	Digital input	Address select. Connect to GND, V+, or leave floating.
$\overline{\text{ALERT/THERM2}}$	7	Digital output	Interrupt or SMBus alert output. Can be configured as a second $\overline{\text{THERM}}$ output. Open-drain; requires pullup resistor to voltage between 1.7 V and 3.6 V.
D–	3	Analog input	Negative connection to remote temperature sensor.
D+	2	Analog input	Positive connection to remote temperature sensor.
GND	6	Ground	Supply ground connection.
SCL	9	Digital input	Serial clock line for SMBus. Input; requires pullup resistor to voltage between 1.7 V and 3.6 V if driven by open-drain output.
SDA	8	Bidirectional digital input-output	Serial data line for SMBus. Open-drain; requires pullup resistor to voltage between 1.7 V and 3.6 V.
$\overline{\text{THERM}}$	4	Digital output	Thermal shutdown or fan-control pin. Open-drain; requires pullup resistor to voltage between 1.7 V and 3.6 V.
V+	1	Power supply	Positive supply voltage, 1.7 V to 3.6 V.

6 Device and Documentation Support

6.1 Trademarks

SMBus is a trademark of Intel Corporation.

6.2 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

6.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

7 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TMP461AIRUNR	PREVIEW	QFN	RUN	10	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	ZDW1	
TMP461AIRUNT	PREVIEW	QFN	RUN	10	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	ZDW1	

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

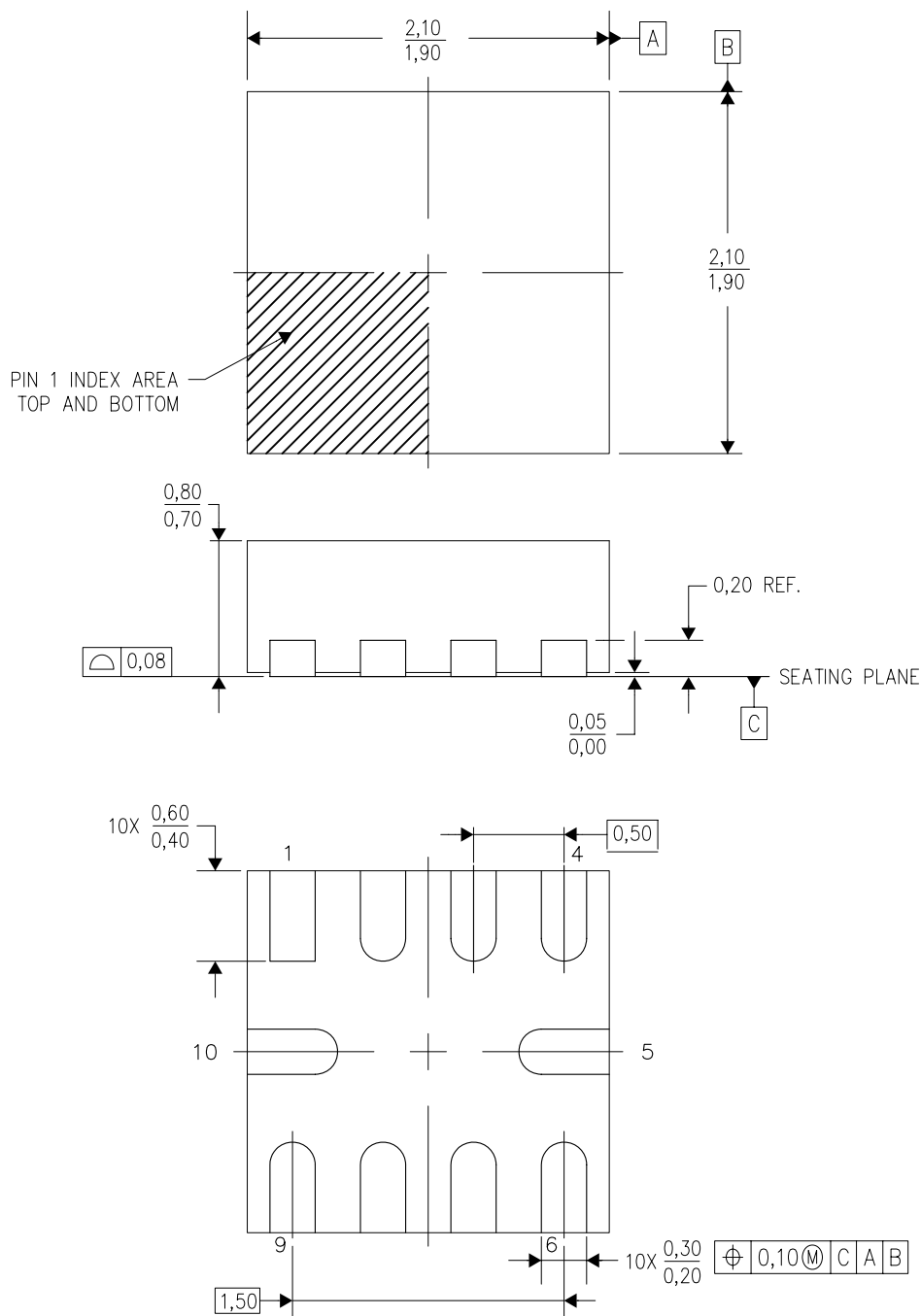
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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RUN (S-PWQFN-N10)

PLASTIC QUAD FLATPACK NO-LEAD



4209107/B 11/10

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. Quad Flatpack, No-Leads (QFN) package configuration.

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