

High-precision, Low-Power Digital Temperature Sensor Compatible with SMBus and I²C Interface

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1 Features

- Temperature accuracy:
 - < $\pm 0.10^{\circ}\text{C}$ ($-20^{\circ}\text{C} \sim +50^{\circ}\text{C}$)
 - < $\pm 0.15^{\circ}\text{C}$ ($-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$)
 - < $\pm 0.20^{\circ}\text{C}$ ($-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$)
 - < $\pm 0.25^{\circ}\text{C}$ ($-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$)
 - < $\pm 0.30^{\circ}\text{C}$ ($-55^{\circ}\text{C} \sim +150^{\circ}\text{C}$)
- Temperature range: $-55^{\circ}\text{C} \sim +150^{\circ}\text{C}$
- Low power consumption:
 - 3.5 μA (1Hz conversion cycle, no averaging output)
 - 18 μA (1Hz conversion cycle, 8-time averaging output)
 - 50-nA (shutdown current)
- User-programmable EEPROM: 48 bits
- Supply voltage: 2.5V to 5.5V
- High resolution: 16bits / $0.0078125^{\circ}\text{C}$ (1LSB)
- Programmable temperature alarm thresholds, averaging output count, and digital temperature offset calibration
- NIST-traceable ID
- Digital output:
 - SMBus, I²C interface compatibility
- Package Information:

PART NUMBER	PACKAGE	BODY SIZE (mm ²)
GXT117ED	DFN-6	2.00 × 2.00
GXT117EW	WLCSP-6	1.42 × 0.78

2 Applications

- Digital thermometer
- Wearable temperature monitoring devices
- Cold chain temperature monitoring
- Temperature transmitters
- Alternative RTD components: PT100, PT500, PT1000

3 Description

The GXT117E is a high-precision, low-power digital temperature sensor that provides 16-bit temperature measurements ($0.0078125^{\circ}\text{C}/\text{LSB}$), achieving a measurement accuracy of $\pm 0.1^{\circ}\text{C}$ within the -20°C to $+50^{\circ}\text{C}$ range. Compatible with SMBus and I²C communication protocols, up to four GXT117E devices with different slave addresses can be connected on a single bus. The GXT117E integrates an EEPROM, offering 48 bits of user-programmable memory.

The low power consumption of the GXT117E minimizes the impact of self-heating on measurement accuracy. It operates over a voltage range of 2.5V to 5.5V, with a typical power consumption of just 3.5 μA in continuous conversion mode at 1Hz and without averaging output.

The GXT117E serves as a single-chip digital solution capable of replacing platinum resistance thermometry. Its temperature accuracy rivals that of Class AA RTDs while significantly reducing power consumption. By eliminating complex components typically associated with RTD-based temperature sensing—such as precision reference sources, matched trace routing, sophisticated algorithms, and post-production calibration—the GXT117E greatly simplifies system design.

All GXT117E units are 100% tested during manufacturing, and each chip features a unique NIST-traceable ID.

10 Ordering Information

Order Number	Chip Model	Package	SPQ	Note
GXT117ED-T&R	GXT117ED	DFN-6	4000	Tape & Reel
GXT117EW-T&R	GXT117EW	WLCSP-6	4000	Tape & Reel

Note: "D" denotes the DFN-6 package, and "W" denotes the WLCSP-6 package.