MCP9600/01
Thermocouple Conditioning ICs

A Plug-and-Play Device for Superior System Performance

Designing thermocouple systems can be extremely complicated. A thermocouple design could require more than 15 discrete analog components to provide the correct level of precision and accuracy.

To overcome this challenge, we have leveraged our expertise in thermal systems to create our MCP9600/01 thermocouple conditioning ICs. These devices deliver best-in-class performance in a simple-to-use plug-and-play solution with advanced features to enhance your thermocouple measurement system.

These ICs come in three temperature accuracy grades to meet your thermocouple system design requirements. The MCP9600/01 devices convert the Electromotive Force (EMF) to degrees Celsius, including cold junction compensation. They also offer value-packed, user-programmable features to customize your operational needs across all of your thermocouple systems.

Flexibility and Precision for System Efficiency

Effective thermocouple system design requires expertise in the four main areas of analog, mixed-signal, thermal management and microcontroller design. This knowledge is essential to create the proper front-end precision instrumentation and signal chain circuitry to accurately measure, condition and process the microvolt-level signal to a readable temperature.

The MCP9600/01 devices support eight of the most common thermocouple types and automatically detect which thermocouple type is connected to the device. Each thermocouple type has a high-order equation that must be computed using the cold junction temperature and the voltage measured at the cold junction.

As fully integrated solutions, the MCP9600/01 ICs simplify the design of a thermocouple temperature measurement system. These devices consist of a precision Analog-to-Digital Converter (ADC) with voltage reference to extract and accurately digitize the thermocouple EMF voltage. The ADC measurement resolution is selectable, which allows you to choose faster conversion times and detect fast transient temperatures.

A key feature is the integrated math engine that corrects the thermocouple non-linear error characteristics without the use of an external CPU. It also provides a hot junction accuracy of up to ±0.5°C (typical). The error correction equations are derived from NIST ITS-90 coefficients. Each thermocouple type has a high-order equation that is computed using the cold junction temperature provided by the integrated high-temperature-accuracy digital temperature sensor and the hot junction EMF voltage that are measured by an integrated precision ADC.

The MCP9600/01 devices offer user-programmable registers, giving you wider design flexibility for various thermocouple temperature sensing applications.

As an added feature, the MCP9601 includes an open-circuit and short-circuit detection mechanism for better system performance. An alert signal is asserted when the thermocouple wire is broken, disconnected or shorted, keeping wiring issues at bay.

Key Features and Benefits

- **Precision instrumentation**

This automatically detects up to eight different thermocouple types. No setup or configuration is required.

- **Precision Cold-Junction Compensation (CJC) sensor**

This decodes temperature accurately up to ±0.5°C.

- **Integrated math engine**

This enables real-time thermocouple non-linearity error corrections (up to the ninth order equation) without external CPU calculation assistance.

- **Digital filter**

This user-configurable filter minimizes the effects of system noise and EMI enhancing measurement performance.

- **Open-circuit and short-circuit detection**

An exclusive feature of the MCP9601, this mechanism releases an alert signal for thermocouple wiring issues.

- **Easy-to-use thermocouple IC development kits**

In addition to their customizable features, our user-friendly ICs will accelerate your design to production.

User-Programmable Features

- Temperature and thermocouple status register
- Adjustable sensor resolution for fast response
- Programmable digital filter for temperature measurement stability
- Four programmable temperature alerts
- Low-power and Burst modes

Simplify your next thermocouple design and accelerate your time-to-market with our innovative and fully integrated plug-and-play MCP9600/01 products.

For More Information

Visit the MCP9601 product page to learn more about these ICs, or visit our Technical Support portal if you require technical assistance.

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