Sensor Measurement Solution

RX23E-A offers a high-precision Analog Front End (AFE) with a 24-bit ΔΣ A/D converter in a compact package for industrial sensor measurement analog/digital conversion solution.

Reference designs of high-precision measurements and evaluation kit for the RX-E series introduction are available.

Features

Due to trends in factory automation and IoT, sensor devices are evolving towards miniaturization, digitalization, multi-sensing, distributed processing, and wireless capabilities. We offer solutions from the RX23E-A group aligned with these latest technology trends.

Digitalizing Sensor Modules By Compact Circuit

The RX23E-A, integrating a high-precision AFE and a high-performance RX CPU onto a single chip, can realize intelligent digital sensors that balance digitalization and miniaturization.

Measurement, Computation/Control Into A Single Chip

The roles of dedicated AFE and general-purpose MCU combine into one chip RX23E-A. No need to handle communication between the AFE-MCU and easy to synchronize measurement and control cycles.

Data Acquisition (DAQ) And Distributed Processing

Distribute analog/digital signal processing on the sensor side and reduce the processing load on the host MCU.

*DAQ: A function that collects, analyzes, and displays data from various sensors

Connectivity and Industrial Functional Safety Support

Support connectivity such as IO-Link and wireless (Wi-Fi, Bluetooth) aligning with the advancement of sensor intelligence. Also compile with functional safety requirements such as the European standard (IEC61508)

Conventional Development Process

Intro. Concept Detail Design/Prototyping Function Evaluation Main Inspection Certification

Our solution

Development Time

1/3

Functional Safety Solution
Reference Designs

Tiny Board for Digital Loadcell
RX23E-A with high-precision AFE aids in circuit board miniaturization. Achieve 22mm x 16mm size integrable with a loadcell.

Thermoelectric Peltier Controller
Temperature control using the Peltier effect for heating and cooling. Single RX23E-A can implement the measurement, computation, and control.

Muti-channel Isolated Analog Measurement
4 RX23E-A for 4-channel synchronous, isolated measurement. Utilize RX23E-A's processing capability for distributed processing.

IO-Link Solution / Functional Safety Solution
IO-Link (IEC61131-9) reference designs and functional safety solutions for functional safety standards (IEC61508) are available.

Development Tools

RX23E-A Development Tools (Renesas solution Starter Kit for RX23E-A)
Evaluation kit for RX23E-A introduction: equipped with RX23E-A and sensor measurement circuits, GUI tool, reference software
Without software development, evaluating AFE functions with the packaged sensor is possible
On-board circuit-supported sensor types: thermocouple, temperature resistance detector (RTD), strain gauge.
GUI function: Parameter setting via GUI, waveform of A/D conversion values, histogram display, etc.

TIPS: Sensor Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Overview</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td>Sensor Device (Sensor Element)</td>
<td>• A sensor element without electronic circuits</td>
<td>RTD, Strain gauge, Temp. sensor, CO2 sensor</td>
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<tr>
<td></td>
<td>• Not packaged or only simply packaged</td>
<td></td>
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<td></td>
<td>• The mechanical structure needed for sensing is not constructed.</td>
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<tr>
<td>Sensor Assembly (Sensor ASSY)</td>
<td>• Does not include electronic circuits</td>
<td>Loadcell, Sheathed RTD</td>
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<td></td>
<td>• Features the sensor element attached to a structure and sealed to protect it from external air/exposure</td>
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<tr>
<td></td>
<td>• The mechanical structure required for sensing is mostly assembled.</td>
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<tr>
<td>Sensor Module</td>
<td>• A sensor ASSY or sensor element with added electronic circuits (e.g., signal amplification with an amp, digital output through AD conversion, physical quantity conversion, etc.)</td>
<td>Pressure Sensing Module, Thermopile Module</td>
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<td></td>
<td>• Rarely used on its own; often integrated into devices.</td>
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<tr>
<td>Sensor Device (Sensing System)</td>
<td>• Features an LCD display, can output alarms, capable of communicating with higher-level devices; essentially, it's finished goods as a device.</td>
<td>Temperature Controller, Pressure Meter</td>
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Target applications of this solution

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