



# PCI-RTA™ Board Family

## Description

The PCI-RTA is a line of intelligent, high-performance PCI boards designed specifically for real-time simulation, development testing, and acceptance testing of electronic control modules (ECM) for automotive, aerospace and defense applications. The PCI-RTA boards are used with ADI's rtX real-time simulation computer to emulate common analog sensors.

## High-Speed PCI Board Architecture

Each PCI-RTA board uses a Motorola MPC565 microcontroller to handle on-board computation and high-speed PCI bus communication. The MPC565 includes a 48MHz, 32-bit PowerPC processor core. The MPC565 minimizes PCI bus read/write times by writing results directly to the PCI bus without tying up the PC's CPU. This architecture minimizes the computational load placed on the real-time simulator's main processor(s) and maximizes the simulator's ability to handle high-fidelity, small-integration-step simulation models and large signal counts.

## Self-Calibration

Each PCI-RTA board includes a self-calibration feature. Self-calibration on the PCI-RTA boards is accomplished using an on-board reference voltage and a channel multiplexer. Calibration parameters are calculated automatically upon software request.

## Fault Protection

Fault insertion is an important part of a thorough electronic control module test plan. Fault insertion involves applying electrical faults to controller inputs and outputs and demonstrating that the controller is able to safely handle failure conditions. This practice tests the what-if scenarios of system and sensor failure for safety-critical embedded system functions. A significant challenge when performing fault in-



sertion is to ensure that the real-time simulator circuitry is not damaged. The PCI-RTA line of boards was designed with fault insertion in mind. Signal channels in each of the four PCI-RTA boards include hot short protection in +/-50V range and over-current protection.

## Sensor Synchronization

Another important feature of the PCI-RTA boards is multi-board synchronization. Each of the PCI-RTA boards includes a synchronization link that may be used to synchronize the analog sensor emulation output with frequency-based signals from the PCI-Engine board. This feature may be used to emulate crank-synchronous sensors such as in-cylinder pressure for engine control unit development.

## Features

- Specifically designed for the emulation of common analog sensors
- Uses a dual access memory PCI bus interface to minimize read/write times for ultra-small-step real-time simulation
- On-board signal conditioning minimizes cabling and signal noise
- On-board self calibration
- Fault and over-current protection for fault insertion testing
- ADvantageDE provides a convenient and powerful interface for connecting model variables to sensor emulation channels

Board	Sensors Emulated	Channels	Output Signal	Resolution	Accuracy
PCI-RTA-RATIO	Strain gauge, oil quantity, etc.	8	+/- 10V, 10mA max	16 bits	+/- 4 LSBs
PCI-RTA-HVRATIO	High voltage ratiometric analog out	8	+/- 20V, 10mA max	16 bits	+/- 4 LSBs
PCI-RTA-THERMIST	Thermistor	8	0 - 200,000 ohms	16 bits	+/- 4 LSBs
PCI-RTA-LVDAC	Oxygen, manifold absolute pressure, lambda, mass airflow	8	+/- 1.0V	16 bits	+/- 4 LSBs
PCI-RTA-THERMO	Thermocouples	8	+/- 100mV	16 bits	+/- 4 LSBs

rtX - The expandable Real-Time Simulator