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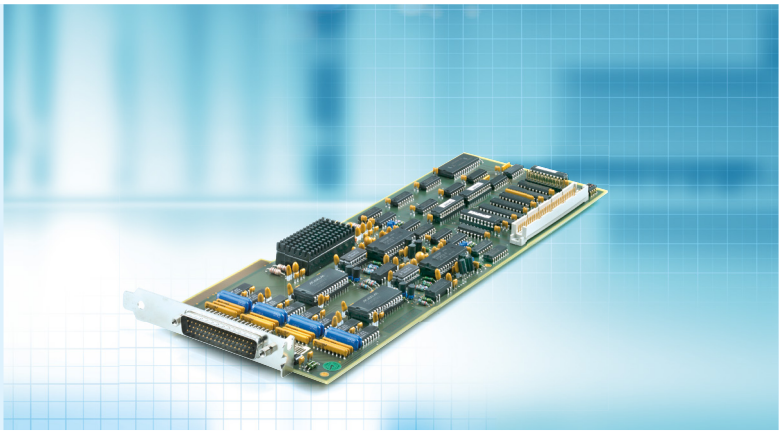
Find the *dSPACE DS2003* at our website: *Click HERE*

DS2002/DS2003 A/D Boards

High-resolution A/D boards

Highlights

- A/D boards with various resolutions, channel numbers and speeds
- Up to 32 channels; resolution up to 16 bit
- Sample times 3.9 - 5.6 µs (16 bit)



Application Areas

A/D conversion is an element of most applications in rapid control prototyping and hardware-in-the-loop (HIL) simulation. In rapid control prototyping, sensors for pressure, temperature, or other signals provide analog voltages or currents. In HIL simulations, the electronic control unit provides analog voltages or currents that control the simulated actuators.

Key Benefits

The A/D boards provide various channel numbers, resolutions, and speeds for you to choose from. The table below gives you an initial overview. The boards can be configured from Simulink® using Real-Time Interface (p. 56). You can select the voltage range and the resolution separately for each channel or A/D converter.

Comparing the Boards

Board	Channels	Resolution	Sample Time[1] (2 Channels)	Sample Time[1] (All Channels)
DS2002 Multi-Channel A/D Board	32 in	4, 8, 12, 16 bit, shortcycling	3.9 µs (16 bit)	66.9 µs (16 bit)
DS2003 Multi-Channel A/D Board	32 in	4, 8, 10, 12, 13, 14, 15, 16 bit, shortcycling	5.6 µs (16 bit)	56.6 µs (16 bit)

[1] *Speed and timing specifications describe the capabilities of the hardware components and circuits of dSPACE products. Depending on the software complexity the attainable overall performance can deviate significantly from the hardware specification.*

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DS2002 Multi-Channel A/D Board

Technical Details

Parameter		Specification
General		■ 32 A/D input channels (single-ended) ■ 2 independent A/D converters with separate sample & hold (S/H), 16 multiplexed inputs each ■ Hold mode ■ 4-, 8-, 12- or 16-bit resolution (programmable) ■ ±5 V or ±10 V input voltage range (programmable)
A/D channels[1), 2)]	Conversion time[1)]	■ 1.5, 2.0, 2.5, 3.0 µs (resolution-dependent)
	S/H acquisition time	■ 0.9 µs to 0.01% of FSR (full-scale range)
	Multiplexer settling time	■ 1.2 µs to 0.01% of FSR
	Offset error	■ ±2.0 mV
	Gain error	■ ±0.2% of FSR
	Offset drift	■ ±4 ppm of FSR/K
	Gain drift	■ ±25 ppm of FSR/K
	Linearity error	■ ±0.003% of FSR
	Differential linearity error	■ ±0.002% of FSR
	Missing codes	■ No missing codes at 14-bit resolution
	SNR (signal-to-noise ratio)	■ 78 dB
	Channel crosstalk	■ -75 dB (at 10 kHz signal frequency)
	Input impedance	■ 1 MΩ
	Input overvoltage protection	■ Up to ±15 V
	Warm-up time	■ 2 min.
Interrupt controller		■ 2 interrupts on end of A/D conversion (one for each A/D converter)
Sampling		■ By software from processor board ■ Simultaneous
Physical connections		■ 50-pin male Sub-D input connector
Host interface		■ One 8- or 16-bit ISA slot (power supply only)
Physical characteristics	Physical size	■ 340 x 125 x 15 mm (13.4 x 4.9 x 0.6 in)
	Ambient temperature	■ 0 … 70 °C (32 … 158 °F)
	Power supply	■ +5 V ±5%, 2.5 A ■ +12 V ±5%, 200 mA ■ -12 V ±5%, 130 mA

1) *Speed and timing specifications describe the capabilities of the hardware components and circuits of dSPACE products. Depending on the software complexity the attainable overall performance can deviate significantly from the hardware specification.*
2) *Typical values at 25 °C, 16-bit resolution and ±10 V input voltage range (FSR = full-scale range).*

Order Information

Product	Order Number
DS2002 Multi-Channel A/D Board	■ DS2002

Relevant Software and Hardware

Software		Order Number
Required	■ Real-Time Interface (p. 56)	■ RTI

Hardware		Order Number
Optional	■ Connector Panel for DS2002 (p. 504)	■ CP2002

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DS2003 Multi-Channel A/D Board

Technical Details

Parameter		Specification
General		■ 32 A/D input channels (single-ended) ■ 2 independent A/D converters ■ Simultaneous sample-and-hold (S/H) ■ Hold mode ■ 4-, 8-,10-, 12-, 13-, 14-, 15- or 16-bit resolution (programmable separately for each channel pair) ■ ±5 V or ±10 V input voltage range (programmable) ■ 1 external trigger input line
A/D Channels[1), 2)]	Conversion time[1)]	■ 1.4 ... 3.0 µs (resolution-dependent)
	S/H acquisition time	■ 1 µs to 0.01% of FSR (full-scale range)
	Hold step time	■ 1.6 µs to 0.01% of FSR
	Multiplexer settling time	■ 400 ns
	Offset error	■ ±2.5 mV
	Gain error	■ ±0.2% of FSR
	Offset drift	■ ±10 ppm of FSR/K
	Gain drift	■ ±35 ppm of FSR/K
	Linearity error	■ ±0.006% of FSR
	Differential linearity error	■ ±0.002% of FSR
	Missing codes	■ No missing codes at 14-bit resolution
	SNR (signal-to-noise ratio)	■ 78 dB
	Adjacent channel crosstalk	■ -80 dB
	Static crosstalk	■ -80 dB (at 10 kHz signal frequency)
	Dynamic crosstalk	■ -110 dB
	Input impedance	■ 1 MΩ
	Input overvoltage protection	■ Protection up to ±15 V
	Warm-up time	■ 10 min.
Interrupt controller		■ Scan process complete ■ A/D converter data buffer: not empty, half full, full
Sampling		■ By software from processor board ■ By external signal ■ Simultaneous
Physical connections		■ 50-pin male Sub-D input connector
Host interface		■ One 8- or 16-bit ISA slot (power supply only)
Physical characteristics	Physical size	■ 340 x 125 x 15 mm (13.4 x 4.9 x 0.6 in)
	Ambient temperature	■ 0 … 70 °C (32 … 158 °F)
	Power supply	■ +12 V ±5%, 350 mA ■ -12 V ±5%, 280 mA ■ +5 V ±5%, 1.5 A

[1)] *Speed and timing specifications describe the capabilities of the hardware components and circuits of dSPACE products. Depending on the software complexity the attainable overall performance can deviate significantly from the hardware specification.*

[2)] *Typical values at 25 °C, 16-bit resolution and ±10 V input voltage range (FSR = full-scale range).*

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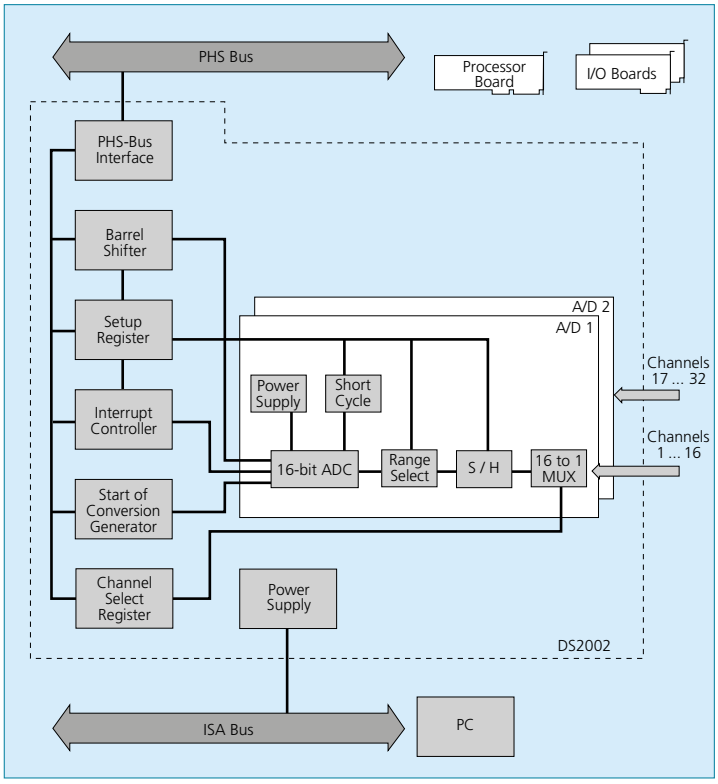
Order Information

Product	Order Number
DS2003 Multi-Channel A/D Board	■ DS2003

Relevant Software and Hardware

Software		Order Number
Required	■ Real-Time Interface (p. 56)	■ RTI

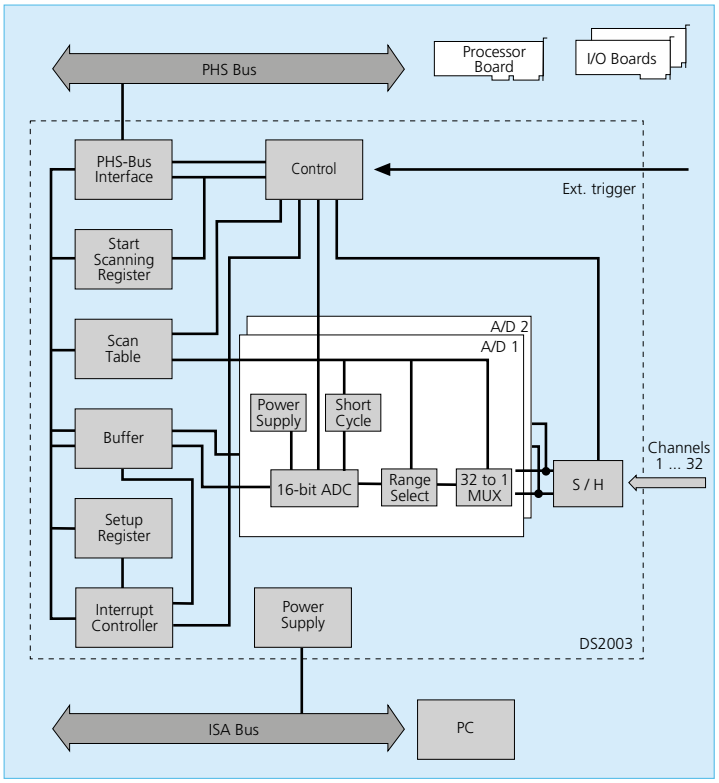
Hardware		Order Number
Optional	■ Connector Panel for DS2003 (p. 504)	■ CP2003



Block Diagram for DS2002 Multi-Channel A/D Board

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Block Diagram for DS2003 Multi-Channel A/D Board

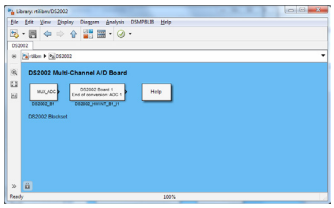


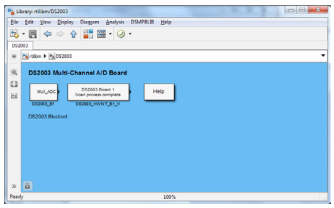
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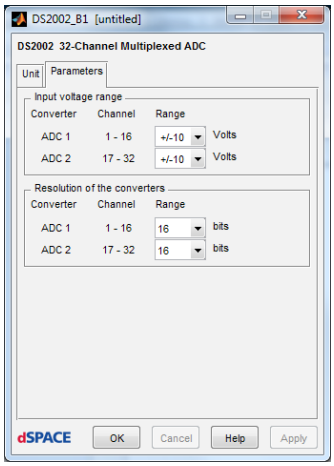
Graphical Programming

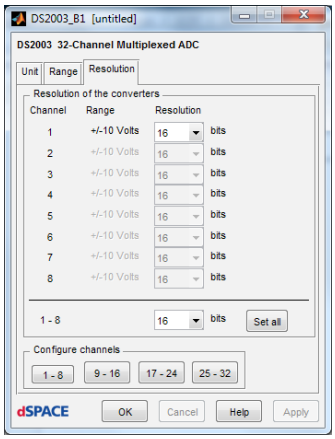
Using Real-Time Interface

The Real-Time Interface (RTI) board libraries for the A/D boards provide blocks that implement the functionality and I/O capabilities of the boards in Simulink® models. The RTI blocks can be added to a Simulink model via drag & drop. The blocks can be configured using the setup mask of the related block.









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