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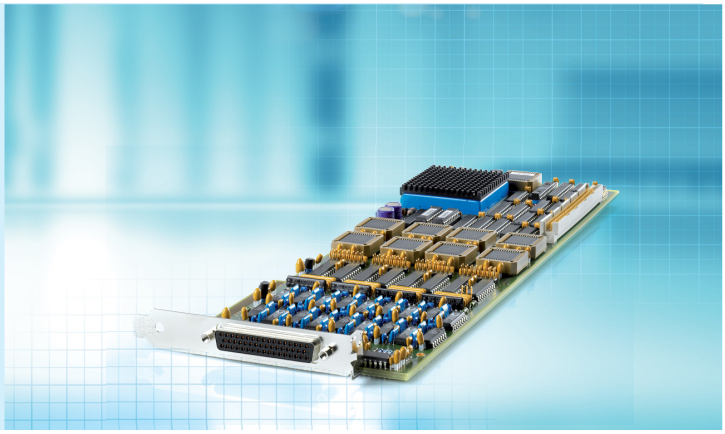
Find the *dSPACE DS2103* at our website: *Click HERE*

DS2101/DS2102/DS2103 D/A Boards

Fast D/A boards

Highlights

- D/A boards with various resolutions, channel numbers, and speeds
- Up to 32 channels
- Resolution up to 16 bit
- Minimum settling time of 1.6 µs



Application Areas

D/A conversion is required by many rapid control prototyping applications to provide the control signal for actuators. In the other direction, in hardware-in-the-loop applications, sensors that provide analog signals have to be simulated.

Key Benefits

The D/A boards provide various channel numbers, resolutions, and speeds for you to choose from. The table below gives you an initial overview. All three boards can be configured from Simulink® with Real-Time Interface. You can select the voltage range for each channel individually.

Comparing All Three Boards

Board	Channels	Resolution	Sample Time [1]
DS2101 D/A Board	5 out	12 bit	3.0 µs
DS2102 High-Resolution D/A Board	6 out	16 bit	1.6 µs
DS2103 Multi-Channel D/A Board	32 out	14 bit	10.0 µs

[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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DS2101 D/A Board

Technical Details

Parameter		Specification
General		■ 5 parallel D/A converters ■ 12-bit resolution ■ ±5 V, ±10 V or 0 ... +10 V output voltage range (programmable) ■ Reset to 0 V on I/O error (programmable)
D/A channels [1), 2)]	Settling time	■ 3 µs typ. (4 µs max.) to ±0.01% of FSR (full-scale range)
		■ 1 µs typ. at major carry
	Output current	■ ±5 mA max.
	Output impedance	■ 0.3 Ω
	Offset error	■ < 3 mV
	Gain error	■ < 0.1 %
	Offset drift	■ ±10 ppm of FSR/K
	Gain drift	■ ±30 ppm of FSR/K
	Linearity error	■ ±1/2 LSB
	Differential linearity error	■ ±3/4 LSB
	Monotonicity	■ Fully monotonic
Triggering		■ By software from the processor board ■ Immediate output or simultaneous output
Physical connections		■ 25-pin female Sub-D output 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%, 2.25 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 and ±10 V output voltage range (FSR = full-scale range).*

Order Information

Product	Order Number
DS2101 D/A Board	■ DS2101

Relevant Software and Hardware

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

Hardware		Order Number
Optional	■ Connector Panel for DS2101 (p. 456)	■ CP2101

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DS2102 High-Resolution D/A Board

Technical Details

Parameter		Specification
General		■ 6 parallel D/A converters ■ 16-bit resolution ■ ±5 V, ±10 V or 0 ... +10 V output voltage range (programmable) ■ Reset to 0 V on I/O error (programmable)
D/A channels[1), 2)]	Settling time	Board revisions DS2102-01 … DS2102-04[3)]: ■ Deglitcher disabled: 1.3 µs to ±0.025% of FSR (full-scale range) ■ Deglitcher enabled: 2 µs to ±0.025% of FSR
		Board revision DS2102-05[3)]: ■ 1.6 µs to ±0.025% of FSR
	Output current	■ ±5 mA max.
	Offset error	■ ±1 mV
	Gain error	■ 0.05%
	Offset drift	■ ±14 ppm of FSR/K
	Gain drift	■ ±25 ppm of FSR/K
	Linearity error	■ ±2 LSB
	Differential linearity error	■ ±4 LSB
	Monotonicity	■ 14 bits
	THD (total harmonic distortion)	■ -90 dB (at 10 KHz)
Triggering		■ By software from the processor board ■ Immediate output or simultaneous output
Physical connections		■ 37-pin female Sub-D output 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%, 3.3 A (DS2102-01 ... DS2102-04) ■ +5 V ±5%, 1.6 A (DS2102-05) ■ ±12 V ±5%, 50 mA

1) *Typical values at 25 °C and ±10 V output voltage range.*
2) *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.*
3) *Up to board revision DS2102-04, deglitchers are available that you can enable/disable via software (RTI or RTLib). As of board revision DS2102-05, the DS2102 uses D/A converters with reduced output spikes.*

Order Information

Product	Order Number
DS2102 High-Resolution D/A Board	■ DS2102

Relevant Software and Hardware

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

Hardware		Order Number
Optional	■ Connector Panel for DS2102 (p. 456)	■ CP2102

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DS2103 Multi-Channel D/A Board

Technical Details

Parameter		Specification
General		■ 32 parallel D/A converters ■ 14-bit resolution ■ ±5 V or ±10 V ouput voltage range (programmable) ■ Reset to 0 V on I/O error (programmable)
D/A channels[1), 2)]	Settling time	■ 10 µs to ±0.012% of FSR (full-scale range)
	Output current	■ ±5 mA max.
	Offset error	■ ±1 mV
	Gain error	■ ±0.2% of FSR
	Offset drift	■ ±10 ppm of FSR/K
	Gain drift	■ ±10 ppm of FSR/K
	Differential linearity error	■ ±1 LSB
	Monotonicity	■ 14 bits
	THD (total harmonic distortion)	■ -92 dB (at 10 kHz)
Triggering		■ By software from the processor board ■ Immediate output or simultaneous update in groups of four channels
Physical connections		■ 50-pin female Sub-D output 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%, 3.0 A ■ ±12 V ±5%, 50 mA

1) *Typical values at 25 °C and ±10 V output voltage range.*
2) *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.*

Order Information

Product	Order Number
DS2103 Multi-Channel D/A Board	■ DS2103

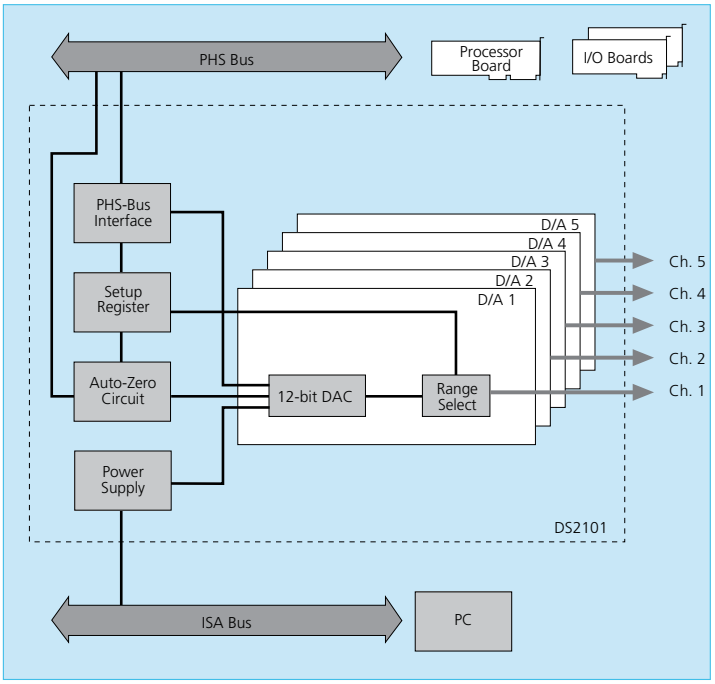
Relevant Software and Hardware

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

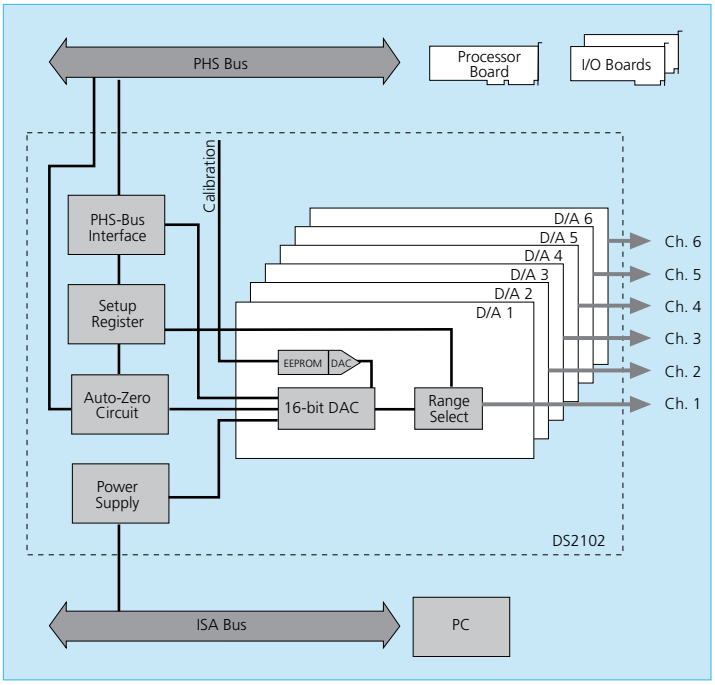
Hardware		Order Number
Optional	■ Connector Panel for DS2103 (p. 456)	■ CP2103

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Block Diagram for DS2101 D/A Board

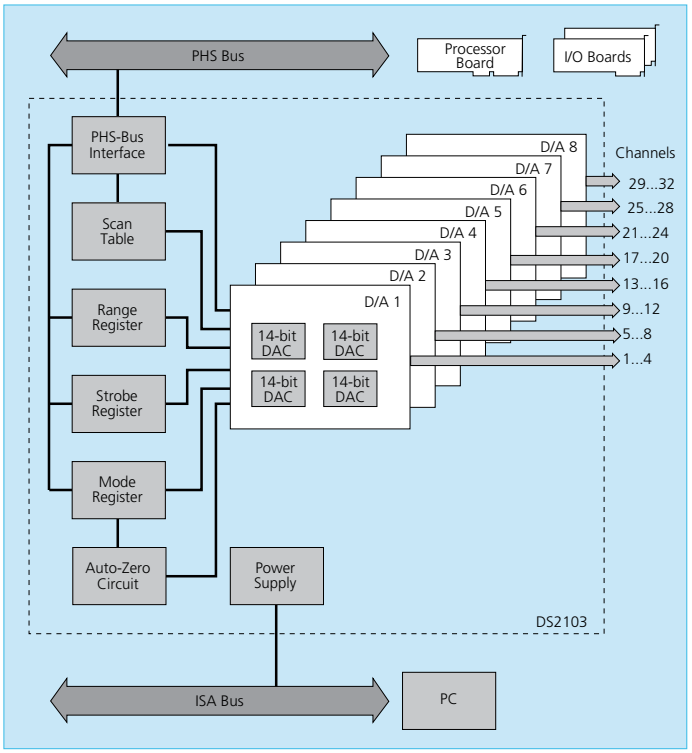


Block Diagram for DS2102 High-Resolution D/A Board



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Block Diagram for DS2103 Multi-Channel D/A Board

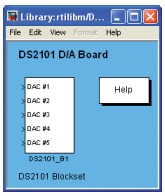


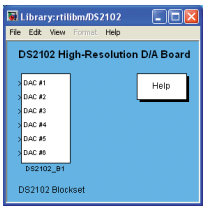
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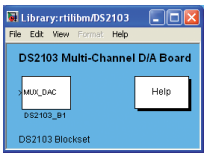
Graphical Programming

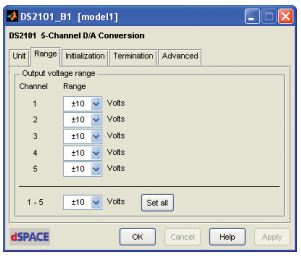
Using Real-Time Interface

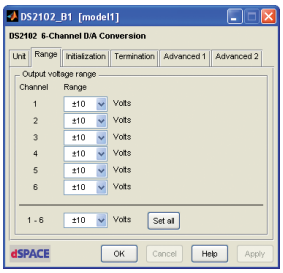
The Real-Time Interface (RTI) board libraries for the D/A boards provide blocks that implement the functionality and I/O capabilities of the boards in Simulink® models. The RTI blocks can be added to a Simulink model via drag & drop. The blocks can be configured using their setup masks.

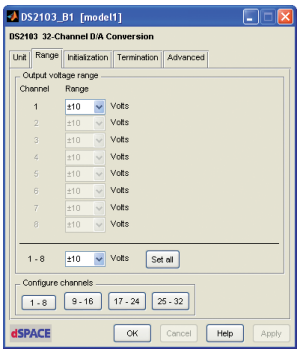












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