

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *dSPACE DS1104* at our website: ***Click HERE***

DS1104 R&D Controller Board

Cost-effective system for controller development

Highlights

- Single-board system with real-time hardware and comprehensive I/O
- Cost-effective
- PCI hardware for use in PCs



Application Areas

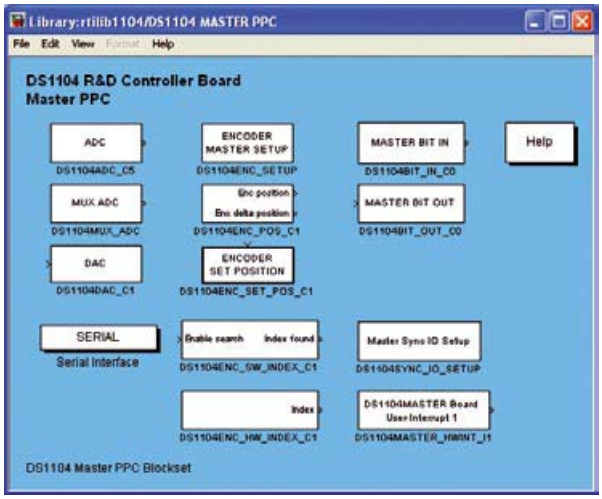
The real-time hardware based on PowerPC technology and its set of I/O interfaces make the controller board an ideal solution for developing controllers in various fields, such as drives, robotics, and aerospace. The board is used in many university laboratories.

Key Benefits

The DS1104 R&D Controller Board upgrades your PC to a powerful development system for rapid control prototyping („R&D" stands for research & development). Real-Time Interface (RTI) provides Simulink® blocks for graphical I/O configuration. The board can be installed in virtually any PC with a free 5-V PCI slot.

Using Real-Time Interface

With Real-Time Interface (RTI), you can easily run your function models on the DS1104 R&D Controller Board. You can configure all I/O graphically, insert the blocks into a Simulink block diagram, and generate the model code via Real-Time Workshop®. The real-time model is compiled, downloaded, and started automatically. This reduces the implementation time to a minimum.



Catalog 2009 • dSPACE • Technologiepark 25 • 33100 Paderborn • Germany • info@dspace.de • www.dspace.com
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Details

Parameter		Specification
Processor		■ MPC8240 processor with PPC 603e core and on-chip peripherals ■ 64-bit floating-point processor ■ CPU clock: 250 MHz ■ 2 x 16 KB cache, on-chip ■ On-chip PCI bridge (33 MHz)
Memory	Global memory	■ 32 MB SDRAM
	Flash memory	■ 8 MB
Timer	4 general-purpose timers	■ 32-bit down counter ■ Reload by hardware ■ 80-ns resolution
	1 sampling rate timer (decrementer)	■ 32-bit down counter ■ Reload by software ■ 40-ns resolution
	1 time base counter	■ 64-bit up counter ■ 40-ns resolution
Interrupt controller		■ 5 timer interrupts ■ 2 incremental encoder index line interrupts ■ 1 UART interrupt ■ 1 slave DSP interrupt ■ 1 slave DSP PWM interrupt ■ 5 A/D converter (end of conversion) interrupts ■ 1 host interrupt ■ 4 external interrupts (user interrupts)
A/D converter	Channels	■ 4 multiplexed channels equipped with one sample & hold A/D converter (1x16-bit) ■ 4 parallel channels each equipped with one sample & hold A/D converter (4x12-bit) ■ Note: 5 A/D converter channels (1x16-bit and 4x12-bit) can be sampled simultaneously
	Resolution	■ Multiplexed channels: 16 bit ■ Parallel channels: 12 bit
	Input voltage range	■ ±10 V
	Conversion time	■ Multiplexed channels: 2 µs[1)] ■ Parallel channels: 800 ns[1)]
	Offset error	■ ±5 mV
	Gain error	■ Multiplexed channels: ±0.25% ■ Parallel channels: ±0.5%
	Offset drift	■ 40 µV/K
	Gain drift	■ 25 ppm/K
	Signal-to-noise ratio	■ Multiplexed channels: >80 dB ■ Parallel channels: >65 dB
D/A converter	Channels	■ 8 channels
	Resolution	■ 16-bit
	Output range	■ ±10 V
	Settling time	■ Max. 10 µs (full-scale, accuracy ½ LSB)
	Offset error	■ ±1 mV
	Gain error	■ ±0.1%
	Offset drift	■ 130 µV/K
	Gain drift	■ 25 ppm/K
	Signal-to-noise ratio	■ >80 dB
	I_{max}	■ ±5 mA
Digital I/O	Channels	■ 20-bit parallel I/O ■ Single bit selectable for input or output
	Voltage range	■ TTL input/output levels
	$I_{out, max}$	■ ±5 mA

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Parameter		Specification
Digital incremental encoder interface	Channels	■ 2 independent channels ■ Selectable single-ended (TTL) or differential (RS422) input (software programmable for each channel)
	Position counters	■ 24-bit resolution ■ Max. 1.65 MHz input frequency, i.e., fourfold pulse count up to 6.6 MHz ■ Counter reset or reload via software
	Sensor supply voltage	■ 5 V/0.5 A
Serial interface	Configuration	■ Single UART (universal asynchronous receiver and transmitter) with FIFO ■ PLL-driven UART for accurate baud rate selection ■ RS232/RS422/RS485 compatibility
	Baud rate	■ Up to 115.2 kBd (RS232) ■ Up to 1 MBd (RS422/RS485)
Slave DSP	Type	■ Texas Instruments TMS320F240 DSP ■ 16-bit fixed-point processor
	Clock rate	■ 20 MHz
	Memory	■ 64Kx16 external code memory ■ 28Kx16 external data memory ■ 4Kx16 dual-port memory for communication ■ 32 KB flash memory
	I/O channels	■ 10 PWM outputs ■ 4 capture inputs ■ 1 serial peripheral interface
	Input voltage range	■ TTL input/output level ■ A/D converter inputs: 0 … 5 V
	Output current	■ Max. ±13 mA
Host interface		■ Requires one 33 MHz / 32-bit 5-V PCI slot
Physical characteristics	Physical size	■ 185 x 107 mm (7.28 x 4.2 in)
	Ambient temperature	■ 0 … 55 °C (32 … 131 °F)
	Cooling	■ Active cooling by fan
	Power consumption	■ 18.5 W
	Power supply	■ +5 V ±5%, 2.5 A ■ +12 V ±5%, 0.3 A ■ -12 V ±5%, 0.2 A

Catalog 2009 • dSPACE • Technologiepark 25 • 33100 Paderborn • Germany • info@dspace.de • www.dspace.com
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Order Information

Product	Order Number
DS1104 R&D Controller Board	■ DS1104

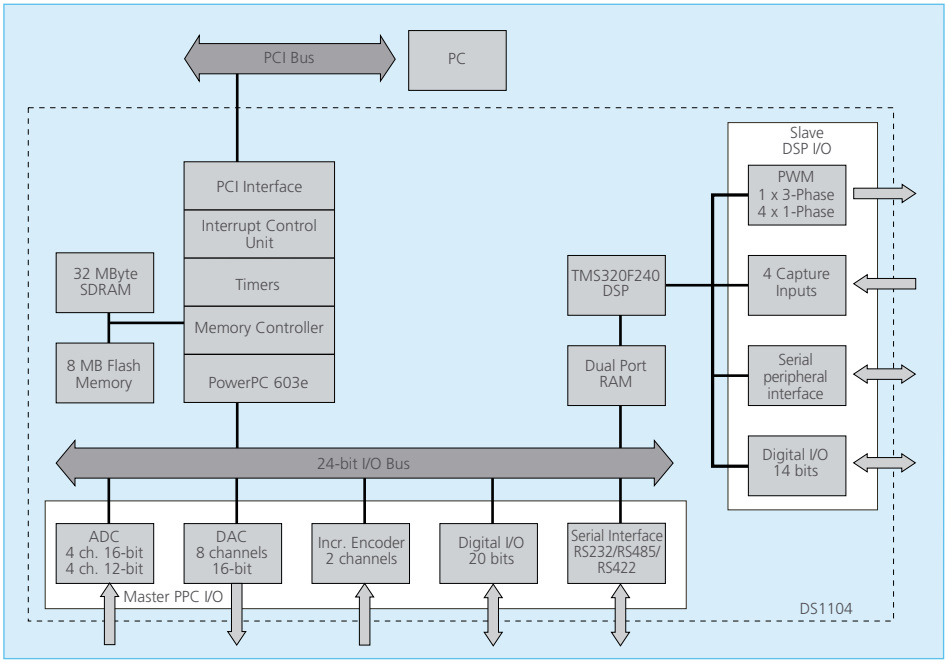
Relevant Software and Hardware

Software		Order Number
Included	■ DS1104 Real-Time Library	–
	■ Experiment and Platform Manager for hardware management	–
Required	■ Real-Time Interface (RTI) (p. 166)	■ RTI
	■ Microtec C Compiler (p. 189)	■ CCPPPC
Optional	■ ControlDesk Standard – Operator Version (p. 190)	■ CS_O
	■ ControlDesk Standard – Developer Version (p. 190)	■ CS_D
	■ MLIB/MTRACE (p. 232)	■ MLIB/MTRACE
	■ CLIB (p. 231)	■ CLIB

Hardware		Order Number
Optional	■ Connector Panel (p. 338)	■ CP1104
	■ Combined Connector/LED Panel (p. 338)	■ CLP1104
	■ Adapter cable for DS1104	■ ADP_CAB1104

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Block Diagram



Catalog 2009 • dSPACE • Technologiepark 25 • 33100 Paderborn • Germany • info@dspace.de • www.dspace.com
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Induction Motor Control

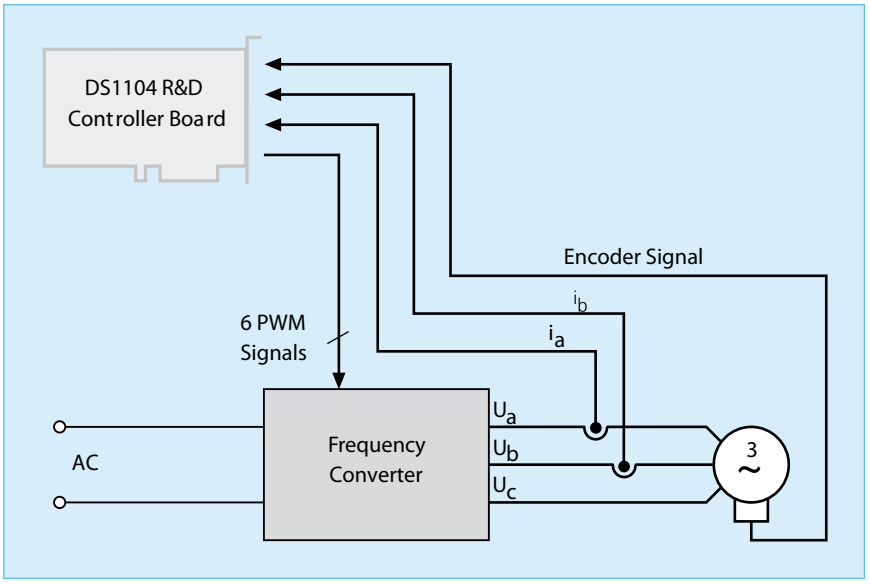
Use Case

Drive Control

In this use case, an induction motor controller is developed with the DS1104. The DS1104 is well suited for drive control: while in this use case the slave DSP system calculates the PWM signals, the PowerPC's calculation power supports convenient simulation. With an experiment software such as ControlDesk (p. 190), measuring and paramenterization can be performed during run-time.

Determining Values

One of the board's incremental encoder interfaces picks up the encoder signal of the motor, while two A/D converters are required to analyze the motor currents. The controller board calculates the control algorithm on the basis of the measured values and determines the corresponding pulse width modulation (PWM). The three-phase PWM signals are generated on the board's DSP subsystem and determine the converter's output voltage and frequency.



Catalog 2009 • dSPACE • Technologiepark 25 • 33100 Paderborn • Germany • info@dspace.de • www.dspace.com
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP