MICRO-BOX

MICRO-BOX X86 BASED

Intel® Celeron® M 1GHz | 256MB RAM | 64MB Compact flash | PC/104 / PCI | Fanless | Portable

Creating Innovative Solution

TeraSoft 鈦思科技
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MICRO-BOX

MathWorks™ xPC Enabled Real-Time System

Solutions 4U

Features

MICRO-BOX

* Rugged, high-performance industrial PC
  - Fanless, low-power consumption design (22W typical)
  - Support for all standard PC peripherals, includes external floppy
  - Sturdy, compact size
* I/O- equipped with AD/DA, Encoder, CAN, and DI/O modules.
* Two suite offerings
  - Micro-Box 2000/Micro-Box 2000C (PC104 interface)
  - Micro-Box 3000 (PCI interface)
* Onboard Celeron® M 1GHz/256 MB DDR RAM, 64MB Compact Flash RAM (expandable to 1G)
* Stand-alone operation with xPC Target Embedded Option™. Users can write the Simulink® model onto a CF card without an internet connection.

Micro-Box is an affordable and robust platform for rapid control prototyping applications. Micro-Box works seamlessly with the MathWorks® family of products including MATLAB®, Simulink®, xPC Target™ and Simulink Code (Formerly known as Real-Time Workshop (RTW)®), enabling engineers to model physical systems and execute them in real-time under harsh environmental conditions.

Micro-Box is a rugged, high-performance, industrial PC with no internal moving parts. The product supports all standard PC peripherals including video, mouse, and keyboard. For engineers who have real-time analysis and control systems testing needs, Micro-Box offers an excellent mix of performance, compact size, sturdiness, and I/O expandability. A selection of I/O options are available; PC/104 or PCI based AD/DA, DI/O and Counter (PWM) modules that address numerous prototyping requirements as well as support for SCI and TCP/IP. Micro-Box is integrated with MATLAB/Simulink allowing the user to conduct real-time modeling and simulation of control systems, rapid prototyping, and hardware-in-the-loop testing without the need of manual code generation and complicated debug processes. This results in significant cost savings and reduced development time.

Micro-Box for Rapid Prototyping

When configured as part of a rapid prototyping system, Micro-Box is attached to a host computer running the standard MathWorks tools such as MATLAB, Simulink, xPC Target and Stateflow® (optional), operating under the Microsoft® Windows® operating system in non real-time mode. Micro-Box acts as a target PC where the user's application runs on a real-time operating system provided by xPC Target.

Applications are built on the host PC using Simulink, with xPC Target providing blocks to connect to I/O hardware. Real-Time Workshop generates and compiles C-code modules and links them to a Dynamic Linked Library (DLL). xPC Target transforms this DLL to a real-time application and downloads it onto the Micro-Box target PC.

Micro-Box can be configured for use in functional rapid prototyping, on-target rapid prototyping, or hardware-in-the-loop testing.

Micro-Box Specification

- Micro-Box is available for 2 suite options :

Micro-Box 2000/2000C (PC/104 interface)	Micro-Box 3000 (PCI interface)
Celeron® M 1GHz	Celeron® M 1GHz
256MB DDR DRAM	256MB DDR DRAM
64MB Compact Flash card (expandable to 1GB)	64MB Compact Flash card (expandable to 1GB)
I/O-expandability provided through standard PC/104 expansion bus	I/O-expandability provided through standard PCI expansion bus
I/O Support including AD, DA, Encoder, CAN, and DI/O	4 slots/2 slots
255(W) x 152(D) x 82(H) mm, 2.0 kg	Customized I/O cards (optional)
9~36 Volts, Min. 50 W	180(W) x 237(D) x 177(H) mm, 5.0 kg
	20~36 Volts, Min. 96 W

- External power for 110 to 220 VAC, 50 Hz to 60 Hz environment, output voltage of 24V/2.3A.
- Hardware accessories (for Micro-Box 1000)
  - Packing case
  - Micro-Box
  - 3.5" Floppy disk (USB)
  - Power supply (110~220 Voltage)
  - User manual and tutorial CD
- Software
  - I/O blocks are already in the xPC Target library
  - Inverted pendulum control demonstration Simulink model
  - DC motor position/speed control demonstration Simulink model
- Operating Temperature, -10 °C - 50 °C @ 5~85% RH.
- Humidity 95% @ 40 °C (non-condensing)
- Shock Protection: IEC 682-27 Compact Flash: 50 G @ wall mount, half sine, 11ms
- Vibration Protection IEC 682-64 (random 1 octave/min, 1hr/axis)
- Compact Flash: 2Grms @ 5 ~ 500 Hz

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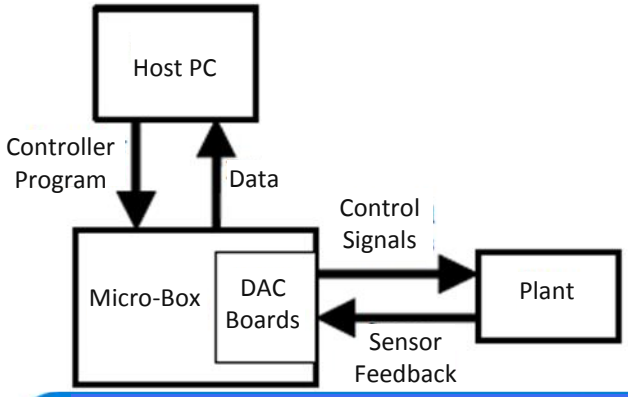
Micro-Box 2000/2000C Support I/O

Micro-Box 2000/2000C I/O specs are as below

I/O Types	
AD	8 channels, +/-10 volts, 16bits, single-ended
DA	4 channels, +/-10 volts, 16 bits
Encoder	4 channels, 24 bits, 0V/5V, A/B/Index
DI/O	16 channels (8 from parallel-port), TTL
CAN	2 ports, CAN2.0b compatible, speed up to 1Mbps



Micro-Box Applications

- Real-Time Control
- Controller Rapid Prototyping
- Motor Control
- Data Recoder

Real Time Control Systems : Micro-Box with MathWorks's xPC Target

xPC Target is a powerful and user friendly tool for rapidly implementing real-time control systems on a digital computer. The software works through MATLAB Simulink, allowing a control system to be designed in block diagram form in Simulink and then realized in the physical world with no need for any low-level programming or circuit assembly. The block diagram is simply compiled to an executable and then loaded onto a dedicated computer (in this case, the Micro-Box) for real-time execution.

There are three major components to any xPC Target control system: The host PC, the Micro-Box, and the plant.

The host PC can be any PC running MATLAB, Simulink, and the Simulink Coder (Formerly known as Real-Time Workshop) and xPC Target toolboxes. A block diagram representing the controller is created on the host PC in Simulink. Special Simulink blocks can be inserted into the diagram that represent different I/O hardware in the Micro-Box.

When the user is ready to run the controller, all that they must do is instruct MATLAB/Simulink to compile the diagram to an executable and upload it to the Micro-Box (this is all done with a single click of the mouse).

The Micro-Box contains the computer hardware that executes the controller. The Micro-Box is a small PC-compatible computer that is designed specifically to run the xPC Target real-time operating system. This means that the entire machine is dedicated to doing nothing but running the controller program; the controller need not compete with other concurrently running programs for system resources which could cause it to stop responding for small (but critical) amounts of time. Through its I/O hardware, the Micro-Box will then interact with the plant. It will read sensor signals through its inputs and then output control signals based on the control law designed by the user.

Additionally, the Micro-Box can optionally send recorded data back to the host PC either in near real-time or after the controller execution has terminated. However, once the executable program has been uploaded from the host PC to the Micro-Box, the Micro-Box is essentially autonomous and need not even be connected to the host computer to run the controller. However, data can optionally be sent back to the host PC in near real-time and some block parameters can be changed while the controller is running, if the Micro-Box remains connected to the Host PC.

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