



CPU Module Datasheet

Graphically Programmable DSP with Scalable I/O, Real-time Services and Power Consumption in Milliwatts



ZBrains are CPU Modules based on **Blackfin** Processors by Analog Devices. The processors, additional peripherals, programmable logic and several memory banks are integrated on a half credit card format. Most processor signals are directly accessible by plug-in connectors for easiest integration into standard or custom specific baseboards.

The graphical programming environment **LabVIEW Embedded** with the board support package from Schmid Engineering provides a wealth of high-level function blocks (VI's) to be drag & dropped into the application block diagram.

The **Graphical Fast Debug Mode (FDM)** and deterministic **Real-time Services** deliver an out-of-the-box technology for cutting edge stationary or mobile measurement and control systems



- ▶ Check **ZBrain BSP for NI LabVIEW Datasheet** for SW Details
- ▶ Check **ZMobile Datasheet** (Mixed Signal Baseboard)
- ▶ Check **ZMobile Development Kit Datasheet**
- ▶ Check Flyer "**Rapid Prototyping**" for Reference Projects

Key Features

- **Graphical DSP Programming with LabVIEW**
- **Fast, Graphical Debugging**
- **Deterministic Realtime Services in [μs]**
- **Graphical, Easy Multitasking**
- **C/C++ Programmable**
- **Reconfigurable Logic**
- **Scalable Power for mW/Battery Operation**
- **Based on the ADI Blackfin® Processor**
- **500MHz 16/32Bit CPU**
- **Wide Range of Field-Proven Process I/O**

Real-time Services

- Reaction to external trigger in [ns]
- Context switching in [μs] (Timestamps)

Scalable Power for mW Operation

- Various sleep modes
- Scalable core clock 50...500MHz
- Scalable core voltage 0.7...1.3V

Memory Expansion

- 148 KB fast onchip memory
- 32MB up to 128MB (*) 133MHz SDRAM
- 1MB fast R/W NVSRAM with battery backup
- 32KB KB EEPROM
- 512KB firmware flash,8MB application flash

Peripherals

- 5x high-speed UART
- 1x SPI, 1x SPORT
- 1x high-speed PPI interface
- 25 general purpose I/O's
- Reconfigurable logic (FPGA)
- 8 programmable external chipselects
- 3x configurable timer (PWM, Counter, Event)
- 1x RTC

Scalable Process I/O *

- Up to 32x Analog In (unipolar,bipolar 5V/10V, 4-20mA).
- Up to 16x Analog Out (0...10V, +/-10V)
- Up to 32x Digital In (Opto,TTL,Button)
- Up to 32x Digital Out (Opto,TTL,Diff)
- Up to 12x Encoder Inputs
- Up to 16x Lowside Switches
- CAN & Ethernet *

ZBrain BSP for NI LabVIEW™

- On top of the default LabVIEW VIs, 200 function blocks for typical embedded system tasks are delivered : realtime services, power and battery management, analog and digital I/O, serial I/O, data storage on removable media, timer, GPIO, RTC and watchdog, color display with touch and security functions.
- Deterministic Realtime Services for [μs]
- Graphical Fast Debug Mode (FDM)
- Utilities for application,firmware,parameter flash
- Bootloader and board diagnostics

Support & Services

- Design-In support and project assistance
- Hardware design checks
- Customer specific baseboard development
- Field-proven, re-usable HW/SW components

Characteristics

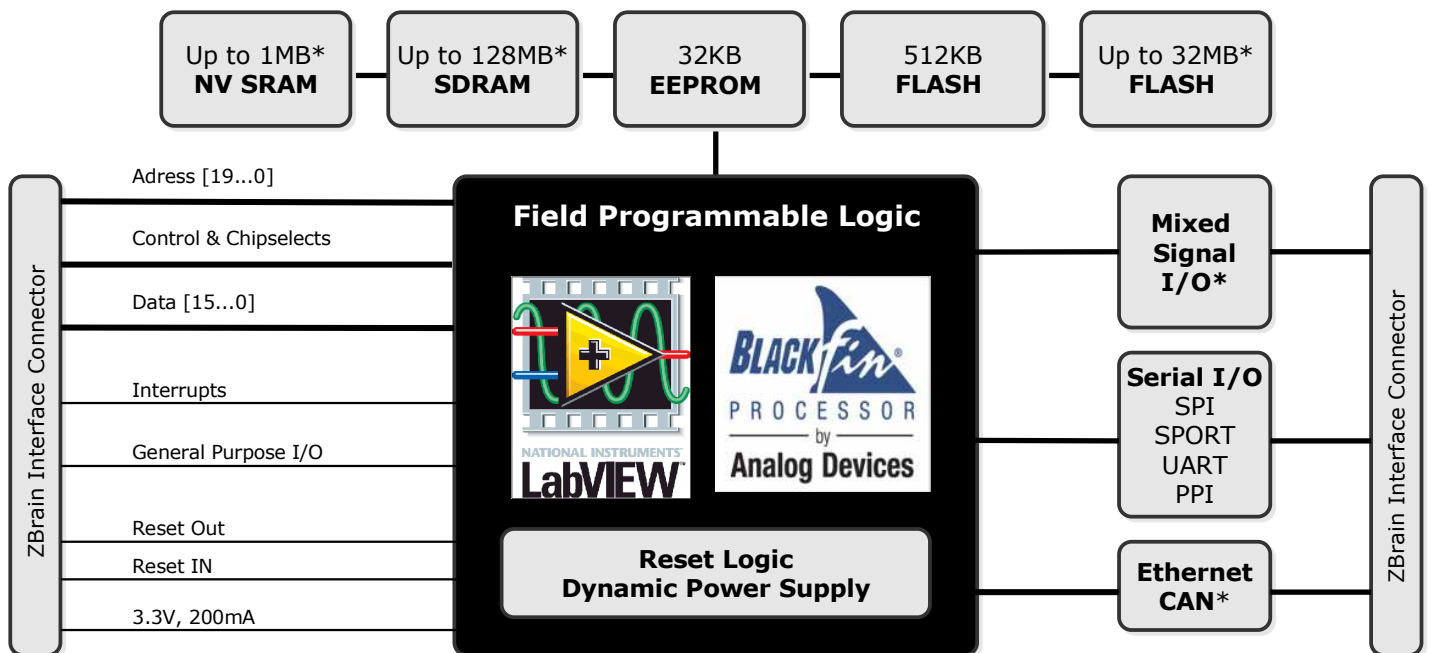
- Dimensions: 55mm x 38mm.
- Board to Board space: 3...5mm
- Temperature range: -20..75°C, other ranges on request.
- Power : 3.3V, 10mA-300mA
- ROHS compliant
- 2 years product warranty

Graphical Programming/Debugging and Deterministic Realtime Services

- **LabVIEW Embedded:** a powerful graphical design environment with a tool-chain link to the default blackfin processor platform.
- **Realtime Services:** a low level software framework control the VDK-Kernel, the memory, the processor core, the DMA channel and even the interrupt level. This ensures instant availability and deterministic real-time
- **Graphical Fast Debug Mode:** turns the target into a smart I/O device and allows to conveniently design and test application frameworks and algorithms with instant results.
- **Easy Multitasking:** thanks to LabVIEW's inherent parallel program execution feature, multitasking becomes straightforward. Also for system and process experts with no embedded programming experience.
- **Built-in math analyses and signal processing function blocks optimized for the Blackfin Processor**

ZBrain Development Tools, Board Support, Services

- **ZMdevkit**, an industrial grade, complete starterkit, development platform and testbench. Included are: 1x ZMobile, 1x Evaluation baseboard, LabVIEW "Base" test drive, ZBrain BSP for NI LabVIEW, Accessories.
- The **ZBrain BSP for NI LabVIEW** includes 12 additional Palettes to the default LabVIEW function blocks (VIs) with over 200 VIs, Realtime Services, a Graphical Fast Debug Mode, Flash Utilities, boot-loader and board diagnostics.
- **Professional Target Deployment** for real-time and standalone operation. Included are: "LabVIEW Embedded Module for ADI Blackfin", VisualDSP++ IDDE, ZBrain Emulator
- Problem analysis service and feasibility studies
- Field-proven, known good HW/SW reference designs
- Development of custom specific baseboards
- Development of custom specific I/O HW/SW

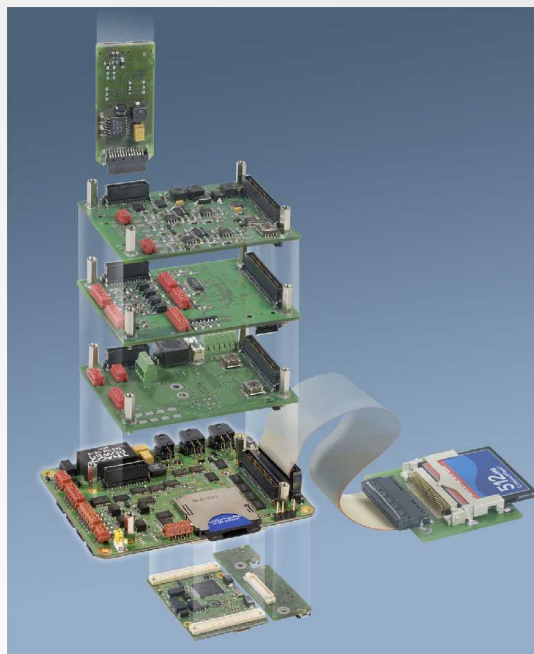


The ZBrain System

This concept enhances ZBrain CPU Modules with scalable I/O, optimized for measurement and control with a power consumption in the milliwatt range. Modular HW and SW adapt to different process requirements and geometries. The ZBrain System generally consists of 3 elements:

- **Blackfin CPU Modules**
- **Standard Baseboards in credit card format**
- **Stackable Process I/O Modules**

Generally, the baseboard and process I/O form factor is not limited to the credit card format. ZMobile (picture on the right) as an example integrates several mixed signal I/O on 100x80mm and demonstrates that other, also custom specific modules, can be derived from the ZBrain System Standard. These new customer platforms are in fact a copy & paste of field-proven re-usable HW/SW components and therefore risk-free.



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- Up to 12x Encoder Inputs
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*) ZBrainLV only