

Blackfin ADSP-BF50x Processors

The Next Innovation in Digital Signal Processing for Industrial Applications

The global movement to drive greater energy efficiency across electrical and industrial infrastructure requires sophisticated technology for intelligent power management. Leveraging advanced power control techniques for applications spanning industrial control and automation to renewable energy generation and smart grid energy distribution, system designers can achieve significant efficiency gains that yield greater energy conservation, lower pollution emissions, and tremendous economic savings.

Efficiency Begins with the Processor

Analog Devices' new Blackfin® ADSP-BF50x processors are designed to deliver unmatched price/performance and system integration attributes for advanced power and industrial control applications, extending high performance digital signal processing capabilities to a wider range of feature-rich applications. With optional integrated analog-to-digital converters (ADCs) and flash memory, Blackfin ADSP-BF50x processors enable designers to realize new levels of computational precision to ensure greater energy efficiency for industrial applications.

Best-in-Class Processing Performance for Greater System Optimization

Blackfin ADSP-BF50x processors deliver up to 400 MHz of processing performance at a price point where 150 MHz to 200 MHz clock speeds have been the norm. This performance profile equips designers to achieve greater system functionality and precision through the use of more sophisticated algorithms and enables a number of system-level design objectives, including real-time processing of more data, reduced latency, consolidation of processing tasks to a single processor, and greater flexibility to optimize system interface and control capabilities.

Performance Headroom to Accommodate Sophisticated Software Tools

Designers can also leverage Blackfin ADSP-BF50x's superior performance to utilize more advanced software tools and libraries for code generation, which helps shorten product development cycles and speed time to market—without compromising on processor cost.

Integrated System-Level Functionality Lowers Costs and Enhances Connectivity

With optional integrated dual-SAR, true 12-bit ADI ADCs for more accurate data conversion and 4 MB of on-board executable flash memory, Blackfin ADSP-BF50x processors minimize off-chip components to lower overall system costs. The Blackfin ADSP-BF50x also introduces a new peripheral to the Blackfin portfolio—the ADC control module (ACM)—which provides a precise, low overhead means to synchronize ADC sampling with external events. Standard features such as a removable storage interface and a CAN controller provide the capability to support storage and communication interfaces for both industrial and commercial applications.

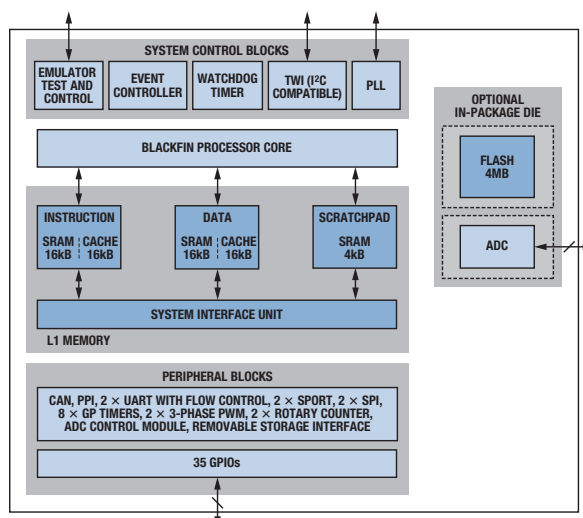


Features

- 400 MHz LP process
- 4 MB flash (instructions and data)
- ADC—dual SAR, 12-channel, 12 bits, up to 2 MSPS
- 2 UARTs, with flow control
- 2 SPORTs
- 2 SPIs
- 1 TWI (I²C compatible)
- Eight 32-bit GP timers
- 1 CAN
- 6 pair PWM unit (in addition to 8 timer PWM)
- 35 GPIOs (muxed with interfaces)
- Two 32-bit up/down counters with rotary support
- Removable storage interface
- 1 PPI, up to 16 bits

Package Options

- 12 mm × 12 mm, 88-lead, 0.5 mm pitch LFCSP with single exposed paddle—no ADC
- 14 mm × 14 mm, 120-lead, 0.4 mm pitch LQFP with dual exposed paddles—with flash and ADC
- Operating temperature: -40°C to +85°C



Blackfin ADSP-BF50x processor architecture.

Blackfin ADSP-BF50x for Industrial Applications

The new Blackfin ADSP-BF50x family equips designers with the performance they need to develop more accurate energy-efficient systems for industrial control and automation applications spanning inverter control, uninterruptible power supplies (UPS), and motor control, as well as smart metering and advanced sensing applications, including power metering and flow/level metering. Blackfin ADSP-BF50x processors' performance headroom enables modern control theory and mathematics to be used in advanced system modeling, resulting in optimal power and control efficiency for many real-time systems.

Motor Control Applications

Blackfin ADSP-BF50x processors' superior performance profile enables designers of motor control systems to execute more complex algorithms, assuring dynamic control that adapts to real-time variations in system behavior to yield smoother performance and reduced power consumption. Greater motor control efficiency can be achieved through the application of sensorless vector control. Utilizing advanced modeling techniques to accurately determine rotor shaft position and/or speed, designers can eliminate the need for position/speed sensors to realize smaller form factors, reduced costs, and greater system reliability. The 12-bit ADC integrated in the Blackfin ADSP-BF50x provides the precise data conversion required to accurately model the state of a motor so that the corresponding position/speed can be accurately estimated.

UPS Applications

Blackfin ADSP-BF50x processors are optimized to ensure precise, fluctuation-free power control for UPS systems, providing the native intelligence to accurately analyze load variations and predict incidents of sudden load changes and dropouts in real time. Equipped with two 3-phase PWM units for advanced power switching, Blackfin ADSP-BF50x processors enable UPS systems to dynamically respond to nonlinear loads under various loading conditions, while providing native control capabilities for functions such as startup/shutdown control and voltage regulation.

Renewable Energy Inverter Applications

Blackfin ADSP-BF50x processors are ideally suited to execute the complex algorithms that enable inverters to convert variable dc output into "clean" current and regulate power flow into the commercial electrical grid and/or local electrical networks fed by residential and municipal photovoltaic (PV) cell arrays and wind turbines. With the signal processing performance to ensure ultraefficient energy extraction and transmission, advanced power switching control functionality, and support for anti-islanding and maximum power point tracker (MPPT) capabilities, Blackfin ADSP-BF50x processors are optimized for renewable energy and smart grid infrastructure.

ADI Blackfin Fixed-Point Digital Signal Processors

Analog Devices' 16-/32-bit fixed-point Blackfin digital signal processors are designed specifically to meet the computational demands and power constraints of today's embedded industrial, automotive, audio, video, and consumer electronics applications. Blackfin processors deliver breakthrough performance and power efficiency with a RISC programming model, combining advanced signal processing functionality with the ease of use attributes found in general-purpose microcontrollers. This combination of processing attributes enables Blackfin processors to perform equally well in both signal processing and control processing applications—in many cases eliminating the requirement for separate heterogeneous processors. This capability greatly simplifies both the hardware and software design implementation tasks.

Comprehensive Development and Support Ecosystem

Analog Devices software and hardware development tools are designed to provide easier and more robust methods for engineers to develop and optimize systems, simplifying product development processes and reducing time to market. The Blackfin processor family leverages familiar development tools, including the VisualDSP++® integrated development and debug environment (IDDE) and the EZ-KIT Lite® evaluation and application prototyping platform. A rich third-party software support network further enables developers to design more intelligent and efficient solutions for the industrial market.

For more information about ADI's full portfolio of digital signal processors, software, development tools, and support, visit www.analog.com.

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