BEYOND BA21 LOW-POWER PROCESSOR

OVERVIEW

Designed for deeply-embedded systems or as an auxiliary processor in larger systems, Beyond BA21 Low-Power Embedded Processor (BA21) delivers better performance than most processors of its size while having particularly low power requirements. It is an effective choice for wireless communication, analog peripherals management, or other mixed-signal functions in energy- and cost-sensitive applications.

Binary-compatible with other members of the silicon proven BA2x family of processor cores, BA21 implements relatively simple and extremely compact instruction set, providing the highest code density in its class, without compromises on performance, ease of use, or scalability.

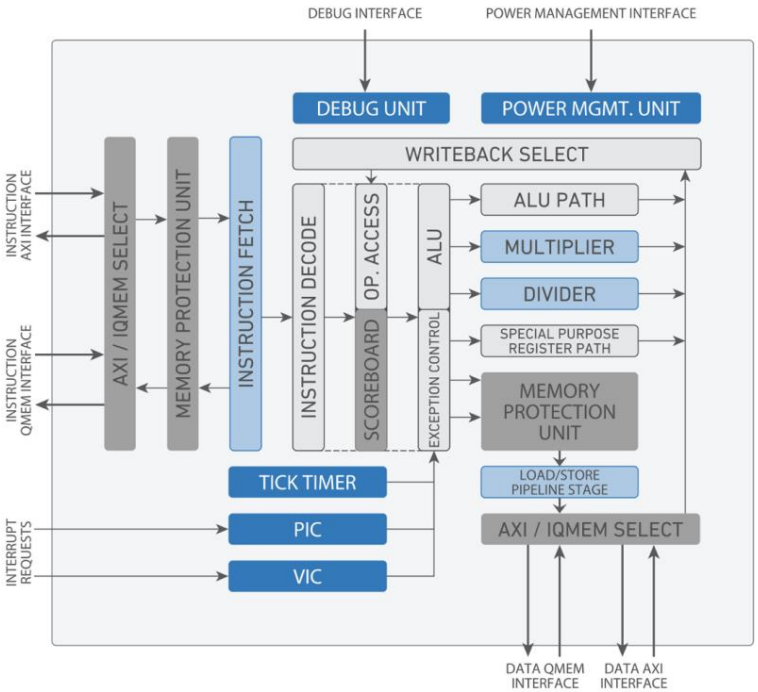
KEY BENEFITS

- 1.49 DMIPS/MHz; 125+ MHz on TSMC 65nm LP
- Small silicon footprint (less than 10k gates)
- Easy debugging and software development
- Competitive licensing options

APPLICATIONS

- Mixed signal embedded processing
- Wireless communications ICs (e.g. Bluetooth, Zigbee, GPS)
- Industrial microcontrollers
- Wireless, battery-powered, or ultra-low-cost devices
- Housekeeping / helper processor

BLOCK DIAGRAM



FEATURES

High Performance 32-bit CPU

- Small silicon footprint (less than 10k gates) for lower leakage and dynamic CPU power
- Two-stage pipeline architecture
- BA2 Extreme Code Density for lower instruction fetching energy
- Advanced power management
  - Dynamic clock gating and power shut-off of unused units
  - Software- and hardware-controlled clock frequency
  - Wake-up on tick timer or external interrupt

Processing Efficiency

- 1.49 DMIPS/MHz
- 125+ MHz on TSMC 65nm LP

Fast & Flexible Memory Access

- Tightly coupled Quick Memory for fast and deterministic access to code and/or data
- AXI-4 interfaces

Preintegrated Subsystems

- Microcontroller peripherals such as GPIO, UART, Real-Time Clock, Timers, I2C, and SPI
- Memory controllers, interconnect IP, and more

Optional Processor Units

- Programmable Vectored Interrupt Controller Unit
- Memory Protection Unit
- Timer unit
- Debug unit
  - Software PC breakpoints
  - Hardware PC breakpoints, hardware data watchpoints
  - Single stepping
  - Debug control by software or external debugger
  - Trace port support
- ROM patching unit
- Floating Point Unit
- Hardware Multiplier/Divider

Easy Software Development

- Non-intrusive JTAG debug/trace for both CPU and system
- Complex chained watchpoint and breakpoint conditions
- BeyondStudio™ complete IDE for Windows or Linux under Eclipse
- Ported libraries and operating systems

THE BA2 INSTRUCTION SET

The BA2 instruction set provides extreme code density without compromises on performance, ease of use, or scalability. It features:

- A linear, 32-bit address space
- Variable length instructions: 16, 24, 32, or 48 bits
- Simple memory addressing modes
- A configurable number of 12 to 32 general purpose registers
- Efficient flow-control, arithmetic, and load/store instructions
- Floating point and DSP extensions

RELATED PRODUCTS

The BA2x Processor Family includes a set of royalty-free, pre-configured products intended for different applications:

- The Beyond BA22-DE 32-bit Deeply Embedded Processor, for deeply embedded applications that use on-chip instruction and data memories.
  The Beyond BA22-EM Embedded Processor, for deeply embedded applications that use off-chip instruction and data memories and that may need to run a real-time operating system (RTOS).

BEYOND SEMICONDUCTOR

Beyond Semiconductor is addressing challenges of systemic complexity in today's electronic devices, empowering its customers to create new experiences for end users.
Initially known for its processor expertise, Beyond quickly gained acceptance among top semiconductor companies and evolved into global company leveraging processing, software and system-wide view competence to provide its customers with effectively designed IP and ASICs.

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