BEYOND

SEMICONDUCTOR

BEYOND BA22-DE DEEPLY EMBEDDED

32-bit Processor

OVERVIEW

Efficiently designed for deeply embedded applications that use on chip instructions and data memories, Beyond BA22-DE Deeply Embedded Processor is an excellent alternative to 8- and 16-bit microcontrollers, where performance of the IP core is a substantial characteristic.

Highly configurable to allow variety of size/performance trade-offs, BA22-DE can be used as microcontroller in variety of applications, ranging from mixed signal processing, portable and wireless, or automotive.
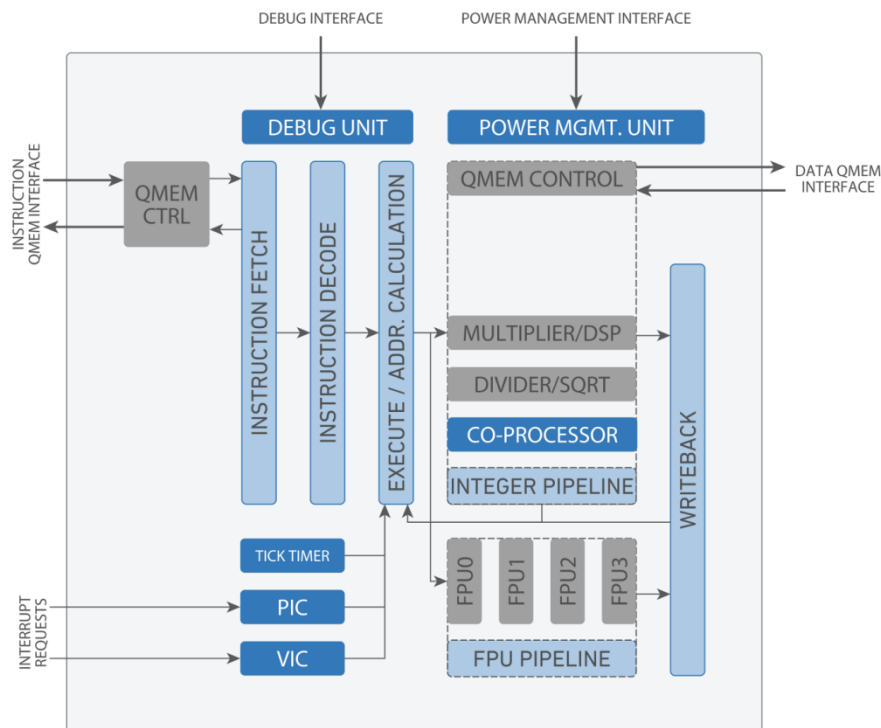
KEY BENEFITS

- 1.79 DMIPS/MHz, +450 MHz in 65 nm
- Small silicon footprint (15k gates) and low as 0.05 mW/Mhz on 90 nm
- Variable length instruction encoding, additionally contributing to lesser die area and power consumption

APPLICATIONS

- Security
- Ethernet & IP Packet Handling
- Housekeeping
- Portable and wireless

BLOCK DIAGRAM

FEATURES

High Performance 32-bit CPU

- 2.3 DMIPS/MHz
- Variable length (16/24/32/48 bits) instruction encoding
- Single-cycle execution on most instructions
- Fast and precise internal interrupt response
- Custom user instructions

Small Silicon Footprint & Low Power Consumption

- Industry-leading code density
  - Compact code minimizes instruction memory area & power
  - 32-bit architecture reduces power-draining memory accesses
- 15k gates and low as 0.05mW/MHz on 90nm

Fast & Flexible Memory Access

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

Efficient Power Management

- Further reduces power consumption by 2x to 100x using dynamic clock gating for individual units
- Software controlled clock frequency in slow and idle modes
- Interrupt wake-up in doze and sleep modes

Advanced Debug Capability

- Non-intrusive debug/trace for both CPU and system
- Complex chained watchpoint and breakpoint conditions

Optional Processor Units

- Programmable Vectored Interrupt Controller Unit
- Timer Unit
- Debug Unit
  - MDB support
  - Trace port support
- ROM patching Unit
- Floating Point Unit
- Hardware Multiplier/Divider

Integrated Peripherals

- Standard:32 bit tick timer, programmable interrupt controller with 32 maskable interrupt sources
- Options include:
  - AMBA bus infrastructure
  - Microcontroller peripherals such as GPIO, UART, Real-Time Clock, and Timers
  - Serial communication cores such as I2C and SPI
  - Memory controllers, interconnect IP and more

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 BA2™ Processor Family includes a set of royalty-free, pre-configured products intended for different applications:

- BA22-DE Deeply Embedded Processor, for deeply embedded applications that use on-chip instruction and data memories.
- BA22-AP Basic Application Processor, for embedded applications that may need to run a full OS.
  BA25 Advanced Application Processor, for demanding systems running applications on general purpose operating systems such as Linux and Android.

BEYOND **EE**
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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