

# BEYOND BA22-CE CACHE ENABLED

## 32-bit Embedded Processor

### OVERVIEW

Beyond BA22-CE Cache Enabled Processor is devised for deeply embedded applications that use off-chip instruction and data memories and may run a real-time operating system (RTOS).

Drawing the benefits of top-in-class code density, the BA22-CE offers high performance with great silicon and power efficiency, facilitating fast, adept software development. Appealing business model and technical advantages make this processor a fitting solution for modern applications, including mixed signal embedded processing, internet, networking and telecom among others.

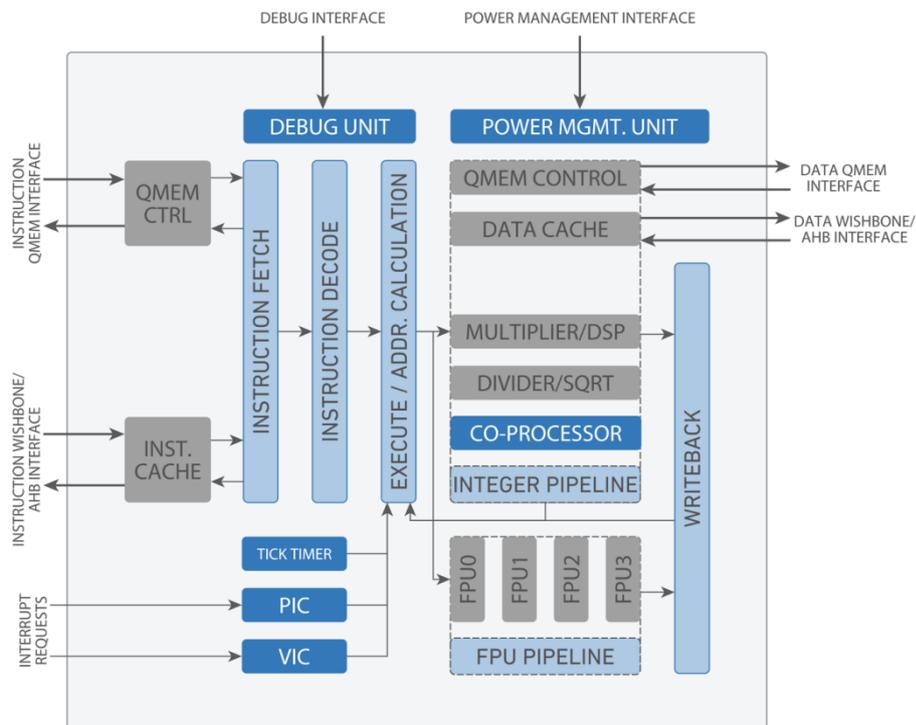
### KEY BENEFITS

- 1.79 DMIPS/MHz; +450 MHz in a 65 nm technology
- Less than 20k gates; 0.05 mW/MHz on 90 nm
- Implementing instruction and data caches to run a real-time operating system

### APPLICATIONS

- Internet, networking and telecom
- Portable and wireless
- Home entertainment consumer electronics

### BLOCK DIAGRAM



## FEATURES

### High Performance 32-bit CPU

- 1.66 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 area & power
  - 32-bit architecture reduces power-draining memory accesses
- 19k gates and as little as 0.05W/MHz on 90nm

#### Fast & Flexible Memory Access

- Harvard-style, separate Instructions and Data caches
- 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

- Conventional target-debug agent with a debug exception handler
- Non-intrusive debug/trace for both CPU and system
- Complex chained watchpoint and breakpoint conditions

### Optional Processor Units

- Programmable Vectored Interrupt Controller
- 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

### Optional Peripherals

- 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 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.

Brnciceva ulica 41G, 1231 Ljubljana-Crnuce, Slovenia, EU  
 Email: [sales@beyondsemi.com](mailto:sales@beyondsemi.com) Tel: +386 5 90 90 100