

# AMD Athlon™ 64 X2 Dual-Core Processor Product Data Sheet



- **Compatible with Existing 32-Bit Code Base**
    - Including support for SSE, SSE2, SSE3\*, MMX™, 3DNow!™ technology and legacy x86 instructions
    - \*SSE3 supported by Rev E and later processors.
    - Runs existing operating systems and drivers
    - Local APIC on-chip
  - **AMD64 Technology**
    - AMD64 technology instruction set extensions
    - 64-bit integer registers, 48-bit virtual addresses, 40-bit physical addresses
    - Eight additional 64-bit integer registers (16 total)
    - Eight additional 128-bit SSE/SSE2/SSE3 registers (16 total)
  - **Dual-Core Architecture**
    - Discrete L1 and L2 cache structures for each core
  - **HyperTransport™ Technology to I/O Devices**
    - One 16-bit link supporting speeds up to 1 GHz (2000 MT/s) or 4 Gigabytes/s in each direction
  - **64-Kbyte 2-Way Associative ECC-Protected L1 Data Caches**
    - Two 64-bit operations per cycle, 3-cycle latency
  - **64-Kbyte 2-Way Associative Parity-Protected L1 Instruction Caches**
    - With advanced branch prediction
  - **16-Way Associative ECC-Protected L2 Caches**
    - Exclusive cache architecture—storage in addition to L1 caches
    - Up to 1 Mbyte per L2 cache
  - **Machine Check Architecture**
    - Includes hardware scrubbing of major ECC-protected arrays
  - **Power Management**
    - Multiple low-power states including C1E\*
    - \*C1E supported by Rev. G or later processors.
    - System Management Mode (SMM)
    - ACPI-compliant, including support for processor performance states
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- ## 939-Pin Package Specific Features
- **Refer to the *AMD Functional Data Sheet, 939-Pin Package, order# 31411*, for functional, electrical, and mechanical details of 939-pin package processors.**
  - **Electrical Interfaces**
    - HyperTransport™ technology: LVDS-like differential, unidirectional
    - DDR SDRAM: SSTL\_2 per JEDEC specification
    - Clock, reset, and test signals also use DDR SDRAM-like electrical specifications
  - **Packaging**
    - 939-pin lidded micro PGA
    - 1.27-mm pin pitch
    - 31x31-row pin array
    - 40mm x 40mm organic substrate
    - Organic C4 die attach
  - **Integrated Memory Controller**
    - Low-latency, high-bandwidth
    - 144-bit DDR SDRAM at 100, 133, 166, and 200 MHz
    - Supports up to four unbuffered DIMMs
    - ECC checking with double-bit detect and single-bit correct

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## Socket AM2 Specific Features

- Refer to the *Socket AM2 Processor Functional Data Sheet*, order# 31117, for functional and mechanical details of socket AM2 processors.
- Refer to the *AMD NPT 0Fh Family Processor Electrical Data Sheet*, order# 31119, for electrical details of socket AM2 processors.
- **Electrical Interfaces**
  - HyperTransport™ technology: LVDS-like differential, unidirectional
  - DDR2 SDRAM: SSTL\_1.8 per JEDEC specification
  - Clock, reset, and test signals also use DDR2 SDRAM-like electrical specifications
- **Packaging**
  - Lidded micro PGA
  - 31x31 grid array
  - 1.27-mm pin pitch
  - Compliant with RoHS (EU Directive 2002/95/EC) with lead used only in small amounts in specifically exempted applications
- **Integrated Memory Controller**
  - Low-latency, high-bandwidth
  - 144-bit DDR2 SDRAM controller operating at up to 400 MHz
  - Supports up to four unbuffered DIMMs
  - ECC checking with double-bit detect and single-bit correct

## Revision History

Date	Revision	Description
January 2007	3.10	Fourth Public release. Added support for the C1E low-power state in Rev. G or later processors.
September 2006	3.08	Third Public release. Added RoHS compliance statement. Added asterisk note to SSE3.
June 2006	3.02	Public release. <ul style="list-style-type: none"> <li>• Added Socket AM2 Specific Features</li> <li>• Created heading for 939-Pin Package Specific Features</li> <li>• Placed Electrical Interfaces, Packaging, and Integrated Memory Controller bullets under the new 939-Pin Package Specific Features heading.</li> </ul>
May 2005	3.00	Initial public release.

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