

AMD Opteron™ 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
 - Runs existing operating systems and drivers
 - Local APIC on the 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)
- **Multi-Core Architecture**
 - Single-core or dual-core options
 - Discrete L1 and L2 cache structures for each core
- **64-Kbyte 2-Way Associative ECC-Protected L1 Data Cache**
 - Two 64-bit operations per cycle, 3-cycle latency
- **64-Kbyte 2-Way Associative Parity-Protected L1 Instruction Cache**
 - With advanced branch prediction
- **1024-Kbyte (1-Mbyte) 16-Way Associative ECC-Protected L2 Cache**
 - 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
 - System Management Mode (SMM)
 - ACPI compliant, including support for processor performance states

940-Pin Package Specific Features

- **Refer to the *AMD Functional Data Sheet, 940-Pin Package, order# 31412, for functional, electrical, and mechanical details of 940-pin 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**
 - 940-pin lidded ceramic or organic micro PGA
 - 1.27-mm pin pitch
 - 31 x 31 row pin array
 - 40 mm x 40 mm ceramic or organic substrate
 - Ceramic or organic C4 die attach
- **Integrated Memory Controller**
 - Low-latency, high-bandwidth
 - 144-bit DDR SDRAM at 100, 133, 166, and 200 MHz (200 MHz supported by Rev C0 and later)
 - Supports up to eight registered DIMMs
 - ECC checking with double-bit detect and single-bit correct
- **HyperTransport™ Technology to I/O Devices**
 - Three links, 16-bits in each direction, each supports up to 2000 MT/s or 4.0 GB/s in each direction (2000MT/s supported by Rev E and later)
 - Each link on uniprocessor (UP) models supports connections to I/O devices.
 - Each link on dual-processor (DP) models supports connections to I/O devices, and any one of the three available links may connect to another DP or MP processor.
 - Each link on multiprocessor (MP) models supports connections to I/O devices or other DP or MP processors.

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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
 - 31 x 31 row pin array
 - 40 mm x 40 mm 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
- **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

Socket AM2 Processor 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
 - 31 x 31 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 333 MHz
 - Supports up to four unbuffered DIMMs
 - ECC checking with double-bit detect and single-bit correct
- **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

Socket F (1207) Processor Specific Features

- **Refer to the *Socket F (1207) Processor Functional Data Sheet*, order# 31118 for functional and mechanical details of socket F (1207) processors.**
- **Refer to the *AMD NPT 0Fh Family Processor Electrical Data Sheet*, order# 31119 for electrical details of socket F (1207) processors.**
- **Electrical Interfaces**
 - HyperTransport™ technology: LVDS-Like differential, unidirectional
 - DDR2 SDRAM: SSTL_2 per JEDEC specification
 - Clock, reset, and test signals also use DDR2 SDRAM-like electrical specifications
- **Packaging**
 - Lidded Land Grid Array package
 - 35 x 35 grid array
 - 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 at up to 333 MHz
 - Supports up to eight registered DIMMs
 - ECC checking with double-bit detect and single-bit correct
 - On-line spare feature provides single-rank DRAM redundancy
- **HyperTransport™ Technology to I/O Devices**
 - Three links, 16-bits in each direction, each supports up to 2000 MT/s or 4.0 GB/s in each direction (2000MT/s supported by Rev E and later)
 - Each link on uniprocessor (UP) models supports connections to I/O devices.
 - Each link on dual-processor (DP) models supports connections to I/O devices, and any one of the three available links may connect to another DP or MP processor.
 - Each link on multiprocessor (MP) models supports connections to I/O devices or other DP or MP processors.

Revision History

| Date | Revision | Description |
|-------------|----------|---|
| March 2007 | 3.23 | Public release. <ul style="list-style-type: none"> • Corrected typo. • Updated reference to <i>Socket F (1207) Processor Functional Data Sheet</i>. |
| August 2006 | 3.19 | Public release. Added RoHS compliance statement to Socket AM2 and Socket F (1207) specific features sections. |
| July 2006 | 3.17 | Public release. |
| June 2005 | 3.13 | Formatting changes. Updated with Rev E features. |

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