



# AMD Athlon™ 64 Processor Power and Thermal Data Sheet



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**Table 1: Revision History**

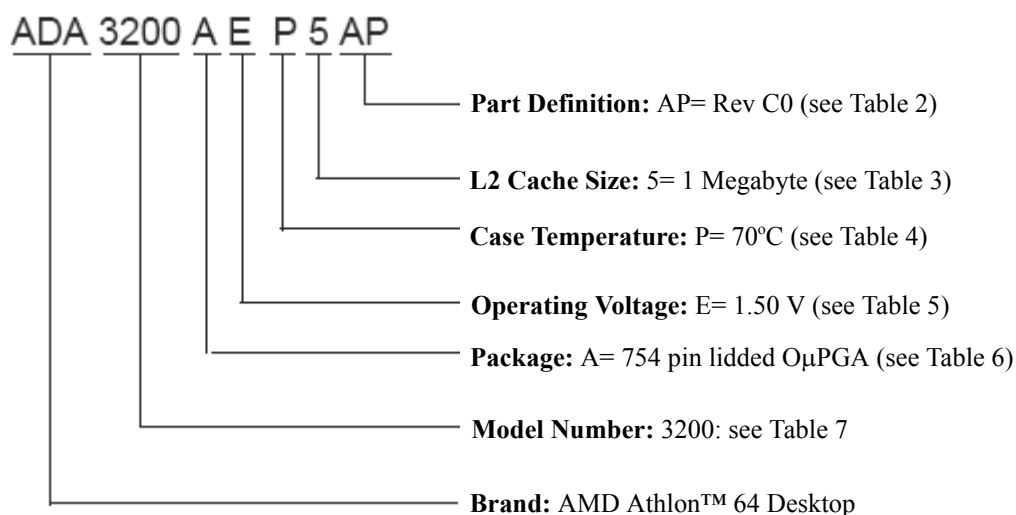
| Date           | Revision | Description                                                                                                                                                                                                                                                |
|----------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| March 2006     | 3.51     | Added three AMD Turion™ 64 Mobile Technology OPNS: TMSMT32BQX4LD, TMSMT34BQX5LD, and TMSMT37BQX5LD.                                                                                                                                                        |
| March 2006     | 3.47     | Added OPNs across all processor brands. Added new Section 5 AMD Athlon™ 64 X2 Dual Core Processor. Added new Section 6 MTOPS.                                                                                                                              |
| October 2004   | 3.43     | Added OPN for model 4000+ desktop                                                                                                                                                                                                                          |
| October 2004   | 3.41     | Added FX-55 OPN. Added desktop OPNs for models 3000+, 3200+, and 3500+. Documented T <sub>CONTROL</sub> max parameter for all OPNs. Removed chapters 3, 4, and 6.                                                                                          |
| August 2004    | 3.37     | Added AMD Sempron™ Processor and Mobile AMD Sempron™ Processor chapters. Removed model 3100+ 62W OPN. Added DTR Model 3700+ OPN.                                                                                                                           |
| July 2004      | 3.29     | Added model 3400+ 62W mobile OPN.                                                                                                                                                                                                                          |
| June 2004      | 3.25     | Added rev CG 89W model 3500+, 3700+, and 3800+ OPNs. Added FX-53 939 pin package OPN. Added one decimal precision to some IDD numbers. Updated document references.                                                                                        |
| May 2004       | 3.21     | Added rev CG 35W models 2700+ and 2800+.                                                                                                                                                                                                                   |
| April 2004     | 3.19     | Removed rev CG 35W OPN.                                                                                                                                                                                                                                    |
| April 2004     | 3.17     | Corrected model number formatting for DTR OPNs.                                                                                                                                                                                                            |
| March 2004     | 3.15     | Added rev CG 35W model 2700+ OPN.                                                                                                                                                                                                                          |
| March 2004     | 3.13     | Added rev CG model 2800+, 3000+, and 3200+ 89W OPNs. Added FX-53 940 pin package OPN. Corrected note for C3 state on all Power/Thermal Specification tables. Added package drawing references for lidless parts in OPN decode section.                     |
| January 2004   | 3.11     | Added rev CG entries for existing rev C0 parts. Corrected Max FID code for model 3200+ 62W mobile OPN. Updated FX-51 Halt/Stop Grant power number. Revised IDD Max and TDP for Intermediate P-state #2 for 754 pin lidless package Rev C0 DTR Model 3200+. |
| January 2004   | 3.07     | Added model 3400+ DT and DTR parts. Added model 2800+, 3000+, and 3200+ 62W Mobile parts.                                                                                                                                                                  |
| December 2003  | 3.06     | Added model 3000+ desktop part.                                                                                                                                                                                                                            |
| November 2003  | 3.05     | General clean up. Updated S3 I/O power for non-FX parts. Fixed mobile OPN example. Added thermal resistance specifications for all OPNs.                                                                                                                   |
| September 2003 | 3.02     | Changed min P-state information to N/A in Table 8, and removed unreleased entries from Table 4 and Table 14.                                                                                                                                               |
| September 2003 | 3.00     | Initial public release.                                                                                                                                                                                                                                    |

# 1 AMD Athlon™ 64 Processor

The following sections contain thermal/power and related BIOS specifications for AMD Athlon™ 64 processors. Each column in the BIOS and thermal/power tables represents a specific Ordering Part Number (OPN). Section 1.1 provides an example of the OPN structure for this processor family.

For all other electrical specifications for the processor, refer to the *AMD Athlon™ 64 Product Data Sheet*, order #24659. For power management BIOS requirements, refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 Processors and AMD Opteron™ Processors*, order #26094.

## 1.1 Ordering Part Number Description



**Figure 1. AMD Athlon™ 64 Processor Ordering Part Number Example**

**Table 2: AMD Athlon™ 64 Processor Part Definition Options**

| Part Definition | Revision | Package Drawing |
|-----------------|----------|-----------------|
| AP              | Rev C0   | Lidded          |
| AR              | Rev CG   | Lidded          |
| AS              | Rev CG   | D1              |
| AW              | Rev CG   | D1              |
| AX              | Rev CG   | Lidded          |
| BI              | Rev D0   | D1              |
| BN              | Rev E4   | D1              |
| BP              | Rev E3   | D2              |
| BW              | Rev E6   | D2              |

**Table 2: AMD Athlon™ 64 Processor Part Definition Options (Continued)**

| Part Definition | Revision | Package Drawing |
|-----------------|----------|-----------------|
| BX              | Rev E6   | Lidded          |
| CF              | Rev E6   | D1              |
| CG              | Rev E4   | D1              |

**Note:** Refer to the *AMD Functional Data Sheet, 754 Pin Package*, order #31410 or *AMD Functional Data Sheet, 939 Pin Package*, order #31411, as appropriate for package drawings.

**Table 3: AMD Athlon™ 64 Processor L2 Cache Size Options**

| OPN Character | Cache Size |
|---------------|------------|
| 3             | 256 KB     |
| 4             | 512 KB     |
| 5             | 1 MB       |

**Table 4: AMD Athlon™ 64 Processor Temperature Options**

| OPN Character | Temperature |
|---------------|-------------|
| A             | Variable    |
| O             | 69°C        |
| P             | 70°C        |
| K             | 65°C        |

**Table 5: AMD Athlon™ 64 Processor Operating Voltage**

| OPN Character | Operating Voltage |
|---------------|-------------------|
| A             | Variable          |
| E             | 1.50 V            |
| I             | 1.40 V            |
| K             | 1.35 V            |

**Table 6: AMD Athlon™ 64 Processor Package Options**

| OPN Character | Package              |
|---------------|----------------------|
| A             | 754 Pin Lidded OμPGA |
| D             | 939 Pin Lidded OμPGA |

**Table 7: AMD Athlon™ 64 Processor Model Number Options**

| Package              | Cache Size | Frequency | Max HyperTransport Frequency | Model Number |
|----------------------|------------|-----------|------------------------------|--------------|
| 754 Pin Lidded OμPGA | 512 KB     | 1800 MHz  | 800 MHz                      | 2800+        |
| 754 Pin Lidded OμPGA | 512 KB     | 2000 MHz  | 800 MHz                      | 3000+        |
| 754 Pin Lidded OμPGA | 1 MB       | 2000 MHz  | 800 MHz                      | 3200+        |
| 754 Pin Lidded OμPGA | 512 KB     | 2200 MHz  | 800 MHz                      | 3200+        |
| 754 Pin Lidded OμPGA | 256 KB     | 2400 MHz  | 800 MHz                      | 3300+        |
| 754 Pin Lidded OμPGA | 1 MB       | 2200 MHz  | 800 MHz                      | 3400+        |
| 754 Pin Lidded OμPGA | 512 KB     | 2400 MHz  | 800 MHz                      | 3400+        |
| 754 Pin Lidded OμPGA | 1 MB       | 2400 MHz  | 800 MHz                      | 3700+        |
| 939 Pin Lidded OμPGA | 512 KB     | 1800 MHz  | 1000 MHz                     | 3000+        |
| 939 Pin Lidded OμPGA | 512 KB     | 2000 MHz  | 1000 MHz                     | 3200+        |
| 939 Pin Lidded OμPGA | 512 KB     | 2200 MHz  | 800 MHz                      | 3400+        |
| 939 Pin Lidded OμPGA | 512 KB     | 2200 MHz  | 1000 MHz                     | 3500+        |
| 939 Pin Lidded OμPGA | 1 MB       | 2200 MHz  | 1000 MHz                     | 3700+        |
| 939 Pin Lidded OμPGA | 512 KB     | 2400 MHz  | 1000 MHz                     | 3800+        |
| 939 Pin Lidded OμPGA | 1 MB       | 2400 MHz  | 1000 MHz                     | 4000+        |

**Table 8: AMD Athlon™ 64 Processor Thermal Profile**

| Thermal Profile                      | A                         | B                         |
|--------------------------------------|---------------------------|---------------------------|
| Thermal Resistance (case to ambient) | 0.34°C/W                  | 0.34°C/W                  |
| Local Ambient Temperature            | 42°C                      | 42°C                      |
|                                      |                           |                           |
| Tcase Max                            | Power (Thermal Profile A) | Power (Thermal Profile B) |
| 49°C                                 | 20.6 W                    | 20.6 W                    |
| 51°C                                 | 26.5 W                    | 26.5 W                    |
| 53°C                                 | 32.4 W                    | 32.4 W                    |
| 55°C                                 | 38.2 W                    | 38.2 W                    |
| 57°C                                 | 44.1 W                    | 44.1 W                    |
| 59°C                                 | 50.0 W                    | 50.0 W                    |
| 61°C                                 | 55.9 W                    | 55.9 W                    |
| 63°C                                 | 61.8 W                    | 61.8 W                    |
| 65°C                                 | 67.6 W                    | 67.0 W                    |
| 67°C                                 | 73.5 W                    | N/A                       |
| 69°C                                 | 79.4 W                    | N/A                       |
| 71°C                                 | 85.3 W                    | N/A                       |

**Note:** The thermal profile is used to define the relationship between Tcase max and device specific Thermal Design Power for Rev E processors specified in this document with 'Variable' indicated by the Case Temperature OPN character.

## 1.2 AMD Athlon™ 64 Processor BIOS Specifications

Table 9 contains the power and thermal related BIOS specifications for this processor family. Each column in the BIOS specification tables represents a specific Ordering Part Number (OPN). Section 1.1 provides an example of the OPN structure for this processor family.

**Table 9: AMD Athlon™ 64 Processor BIOS Specifications**

| Parameter/OPN                         | Notes | ADA2800AEP4AP | ADA3000AEP4AP | ADA3200AEP5AP |
|---------------------------------------|-------|---------------|---------------|---------------|
| Model Number                          |       | 2800+         | 3000+         | 3200+         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           | 04h           | 04h           |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00000F48h     | 00000F48h     | 00000F48h     |
| FID/VID Status MaxVID Field           | 2     | 00h           | 00h           | 00h           |
| FID/VID Status MaxFID Field           | 2     | 0Ah           | 0Ch           | 0Ch           |
| FID/VID Status StartVID Field         | 2     | 02h           | 02h           | 02h           |
| FID/VID Status StartFID Field         | 2     | 0Ah           | 0Ch           | 0Ch           |
| L2 Cache Size                         |       | 512 KB        | 512 KB        | 1 MB          |
| Max HyperTransport™ Frequency         |       | 800 MHz       | 800 MHz       | 800 MHz       |
| <b>Max P-State</b>                    |       | 1800 MHz      | 2000 MHz      | 2000 MHz      |
| VID Code                              |       | 02h           | 02h           | 02h           |
| VID_VDD                               | 3     | 1.500 V       | 1.500 V       | 1.500 V       |
| Thermal Design Power                  | 4     | 89.0 W        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b>        | 5     | N/A           | 1800 MHz      | 1800 MHz      |
| VID Code / VID_VDD                    | 3     |               | 06h   1.400 V | 06h   1.400 V |
| Thermal Design Power                  | 4     |               | 66.0 W        | 66.0 W        |
| <b>Intermediate P-State #2</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #3</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #4</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #5</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #6</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Min P-State</b>                    |       | 800 MHz       | 800 MHz       | 800 MHz       |
| VID Code / VID_VDD                    | 3     | 0Ah   1.300 V | 0Ah   1.300 V | 0Ah   1.300 V |
| Thermal Design Power                  | 4     | 35.0 W        | 35.0 W        | 35.0 W        |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3400AEP5AP |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3400+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00000F48h     |         |
| FID/VID Status MaxVID Field              | 2     | 00h           |         |
| FID/VID Status MaxFID Field              | 2     | 0Eh           |         |
| FID/VID Status StartVID Field            | 2     | 02h           |         |
| FID/VID Status StartFID Field            | 2     | 0Eh           |         |
| L2 Cache Size                            |       | 1 MB          |         |
| Max HyperTransport™ Frequency            |       | 800 MHz       |         |
| <b>Max P-State</b>                       |       | 2200 MHz      |         |
| VID Code                                 |       | 02h           |         |
| VID_VDD                                  | 3     | 1.500 V       |         |
| Thermal Design Power                     | 4     | 89.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 06h           | 1.400 V |
| Thermal Design Power                     | 4     | 70.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 800 MHz       |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     | 35.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                         | Notes | ADA2800AEP4AR |         | ADA3000AEP4AR |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | 2800+         |         | 3000+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           |         | 04h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00000F4Ah     |         | 00000F4Ah     |         |
| FID/VID Status MaxVID Field           | 2     | 00h           |         | 00h           |         |
| FID/VID Status MaxFID Field           | 2     | 0Ah           |         | 0Ch           |         |
| FID/VID Status StartVID Field         | 2     | 02h           |         | 02h           |         |
| FID/VID Status StartFID Field         | 2     | 0Ah           |         | 0Ch           |         |
| L2 Cache Size                         |       | 512 KB        |         | 512 KB        |         |
| Max HyperTransport™ Frequency         |       | 800 MHz       |         | 800 MHz       |         |
| <b>Max P-State</b>                    |       | 1800 MHz      |         | 2000 MHz      |         |
| VID Code                              |       | 02h           |         | 02h           |         |
| VID_VDD                               | 3     | 1.500 V       |         | 1.500 V       |         |
| Thermal Design Power                  | 4     | 89.0 W        |         | 89.0 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         | 06h           | 1.400 V |
| Thermal Design Power                  | 4     |               |         | 66.0 W        |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 22.0 W        |         | 22.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3700AEP5AR |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3700+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00000F4Ah     |         |
| FID/VID Status MaxVID Field              | 2     | 00h           |         |
| FID/VID Status MaxFID Field              | 2     | 10h           |         |
| FID/VID Status StartVID Field            | 2     | 02h           |         |
| FID/VID Status StartFID Field            | 2     | 10h           |         |
| L2 Cache Size                            |       | 1 MB          |         |
| Max HyperTransport™ Frequency            |       | 800 MHz       |         |
| <b>Max P-State</b>                       |       | 2400 MHz      |         |
| VID Code                                 |       | 02h           |         |
| VID_VDD                                  | 3     | 1.500 V       |         |
| Thermal Design Power                     | 4     | 89.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 2200 MHz      |         |
| VID Code / VID_VDD                       | 3     | 06h           | 1.400 V |
| Thermal Design Power                     | 4     | 72.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     | 53.0 W        |         |
| <b>Intermediate P-State #3</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Eh           | 1.200 V |
| Thermal Design Power                     | 4     | 39.0 W        |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 22.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                         | Notes | ADA2800AEP4AX | ADA3000AEP4AX | ADA3200AEP4AX |
|---------------------------------------|-------|---------------|---------------|---------------|
| Model Number                          |       | 2800+         | 3000+         | 3200+         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           | 04h           | 04h           |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00000FC0h     | 00000FC0h     | 00000FC0h     |
| FID/VID Status MaxVID Field           | 2     | 00h           | 00h           | 00h           |
| FID/VID Status MaxFID Field           | 2     | 0Ah           | 0Ch           | 0Eh           |
| FID/VID Status StartVID Field         | 2     | 02h           | 02h           | 02h           |
| FID/VID Status StartFID Field         | 2     | 0Ah           | 0Ch           | 0Eh           |
| L2 Cache Size                         |       | 512 KB        | 512 KB        | 512 KB        |
| Max HyperTransport™ Frequency         |       | 800 MHz       | 800 MHz       | 800 MHz       |
| <b>Max P-State</b>                    |       | 1800 MHz      | 2000 MHz      | 2200 MHz      |
| VID Code                              |       | 02h           | 02h           | 02h           |
| VID_VDD                               | 3     | 1.500 V       | 1.500 V       | 1.500 V       |
| Thermal Design Power                  | 4     | 89.0 W        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b>        | 5     | N/A           | 1800 MHz      | 2000 MHz      |
| VID Code / VID_VDD                    | 3     |               | 06h / 1.400 V | 06h / 1.400 V |
| Thermal Design Power                  | 4     |               | 67.0 W        | 69.0 W        |
| <b>Intermediate P-State #2</b>        | 5     | N/A           | N/A           | 1800 MHz      |
| VID Code / VID_VDD                    | 3     |               |               | 0Ah / 1.300 V |
| Thermal Design Power                  | 4     |               |               | 50.0 W        |
| <b>Intermediate P-State #3</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #4</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #5</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #6</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Min P-State</b>                    |       | 1000 MHz      | 1000 MHz      | 1000 MHz      |
| VID Code / VID_VDD                    | 3     | 12h / 1.100 V | 12h / 1.100 V | 12h / 1.100 V |
| Thermal Design Power                  | 4     | 22.0 W        | 22.0 W        | 22.0 W        |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes   | ADA3400AEP4AX |         |
|------------------------------------------|---------|---------------|---------|
| Model Number                             |         | 3400+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1       | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1       | 0000FC0h      |         |
| FID/VID Status MaxVID Field              | 2       | 00h           |         |
| FID/VID Status MaxFID Field              | 2       | 10h           |         |
| FID/VID Status StartVID Field            | 2       | 02h           |         |
| FID/VID Status StartFID Field            | 2       | 10h           |         |
| L2 Cache Size                            |         | 512 KB        |         |
| Max HyperTransport™ Frequency            |         | 800 MHz       |         |
| <b>Max P-State</b>                       |         | 2400 MHz      |         |
| VID Code                                 |         | 02h           |         |
| VID_VDD                                  | #VALUE! | 1.500 V       |         |
| Thermal Design Power                     | 4       | 89.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5       | 2200 MHz      |         |
| VID Code / VID_VDD                       | 3       | 06h           | 1.400 V |
| Thermal Design Power                     | 4       | 72.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5       | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3       | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4       | 53.0 W        |         |
| <b>Intermediate P-State #3</b>           | 5       | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3       | 0Eh           | 1.200 V |
| Thermal Design Power                     | 4       | 39.0 W        |         |
| <b>Intermediate P-State #4</b>           | 5       | N/A           |         |
| VID Code / VID_VDD                       | 3       |               |         |
| Thermal Design Power                     | 4       |               |         |
| <b>Intermediate P-State #5</b>           | 5       | N/A           |         |
| VID Code / VID_VDD                       | 3       |               |         |
| Thermal Design Power                     | 4       |               |         |
| <b>Intermediate P-State #6</b>           | 5       | N/A           |         |
| VID Code / VID_VDD                       | 3       |               |         |
| Thermal Design Power                     | 4       |               |         |
| <b>Min P-State</b>                       |         | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3       | 12h           | 1.100 V |
| Thermal Design Power                     | 4       | 22.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3500DEP4AS |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3500+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00000F7Ah     |         |
| FID/VID Status MaxVID Field              | 2     | 00h           |         |
| FID/VID Status MaxFID Field              | 2     | 0Eh           |         |
| FID/VID Status StartVID Field            | 2     | 02h           |         |
| FID/VID Status StartFID Field            | 2     | 0Eh           |         |
| L2 Cache Size                            |       | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 2200 MHz      |         |
| VID Code                                 |       | 02h           |         |
| VID_VDD                                  | 3     | 1.500 V       |         |
| Thermal Design Power                     | 4     | 89.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 06h           | 1.400 V |
| Thermal Design Power                     | 4     | 69.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     | 50.0 W        |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 22.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3500DEP4AW |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3500+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 0000FF0h      |         |
| FID/VID Status MaxVID Field              | 2     | 00h           |         |
| FID/VID Status MaxFID Field              | 2     | 0Eh           |         |
| FID/VID Status StartVID Field            | 2     | 02h           |         |
| FID/VID Status StartFID Field            | 2     | 0Eh           |         |
| L2 Cache Size                            |       | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 2200 MHz      |         |
| VID Code                                 |       | 02h           |         |
| VID_VDD                                  | 3     | 1.500 V       |         |
| Thermal Design Power                     | 4     | 89.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 06h           | 1.400 V |
| Thermal Design Power                     | 4     | 69.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     | 50.0 W        |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 22.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                         | Notes | ADA3800DEP4AW |         | ADA4000DEP5AS |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | 3800+         |         | 4000+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           |         | 04h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00000FF0h     |         | 00000F7Ah     |         |
| FID/VID Status MaxVID Field           | 2     | 00h           |         | 00h           |         |
| FID/VID Status MaxFID Field           | 2     | 10h           |         | 10h           |         |
| FID/VID Status StartVID Field         | 2     | 02h           |         | 02h           |         |
| FID/VID Status StartFID Field         | 2     | 10h           |         | 10h           |         |
| L2 Cache Size                         |       | 512 KB        |         | 1 MB          |         |
| Max HyperTransport™ Frequency         |       | 1000 MHz      |         | 1000 MHz      |         |
| <b>Max P-State</b>                    |       | 2400 MHz      |         | 2400 MHz      |         |
| VID Code                              |       | 02h           |         | 02h           |         |
| VID_VDD                               | 3     | 1.500 V       |         | 1.500 V       |         |
| Thermal Design Power                  | 4     | 89.0 W        |         | 89.0 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | 2200 MHz      |         | 2200 MHz      |         |
| VID Code / VID_VDD                    | 3     | 06h           | 1.400 V | 06h           | 1.400 V |
| Thermal Design Power                  | 4     | 72.0 W        |         | 72.0 W        |         |
| <b>Intermediate P-State #2</b>        | 5     | 2000 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 0Ah           | 1.300 V | 0Ah           | 1.300 V |
| Thermal Design Power                  | 4     | 53.0 W        |         | 53.0 W        |         |
| <b>Intermediate P-State #3</b>        | 5     | 1800 MHz      |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     | 0Eh           | 1.200 V | 0Eh           | 1.200 V |
| Thermal Design Power                  | 4     | 39.0 W        |         | 39.0 W        |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 22.0 W        |         | 22.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                         | Notes | ADA3500DAA4BN |         | ADA3700DAA5BN |         | ADA4000DAA5BN |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|---------------|---------|
| Model Number                          |       | 3500+         |         | 3700+         |         | 4000+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           |         | 04h           |         | 04h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020F71h     |         | 00020F71h     |         | 00020F71h     |         |
| FID/VID Status MaxFID Field           | 2     | 0Eh           |         | 0Eh           |         | 10h           |         |
| FID/VID Status StartFID Field         | 2     | 0Eh           |         | 0Eh           |         | 10h           |         |
| L2 Cache Size                         |       | 512 KB        |         | 1 MB          |         | 1 MB          |         |
| Max HyperTransport™ Frequency         |       | 1000 Mhz      |         | 1000 Mhz      |         | 1000 Mhz      |         |
| <b>Max P-State</b>                    |       | 2200 MHz      |         | 2200 MHz      |         | 2400 MHz      |         |
| FID/VID Status MaxVID Field           | 2, 6  | 06h           | 04h     | 06h           | 04h     | 06h           | 04h     |
| FID/VID Status StartVID Field         | 2, 6  | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| VID Code                              |       | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| VID_VDD                               | 3     | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V |
| Thermal Design Power                  | 4     | 67.0 W        |         | 85.3 W        |         | 85.3 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | 2000 MHz      |         | 2000 MHz      |         | 2200 MHz      |         |
| VID Code / VID_VDD                    | 3     | 08h           | 1.350 V | 08h           | 1.350 V | 08h           | 1.350 V |
| Thermal Design Power                  | 4     | 64.7 W        |         | 83.0 W        |         | 83.0 W        |         |
| <b>Intermediate P-State #2</b>        | 5     | 1800 MHz      |         | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 0Ah           | 1.300 V | 0Ah           | 1.300 V | 0Ah           | 1.300 V |
| Thermal Design Power                  | 4     | 54.8 W        |         | 70.4 W        |         | 70.6 W        |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         | 0Ch           | 1.250 V |
| Thermal Design Power                  | 4     |               |         |               |         | 59.6 W        |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 27.5 W        |         | 36.1 W        |         | 35.0 W        |         |

The notes for this table appear on page 29

| Parameter/OPN                         | Notes | ADA3700DKA5CF | ADA4000DKA5CF |
|---------------------------------------|-------|---------------|---------------|
| Model Number                          |       | 3700+         | 4000+         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           | 04h           |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00030F72h     | 00030F72h     |
| FID/VID Status MaxFID Field           | 2     | 0Eh           | 10h           |
| FID/VID Status StartFID Field         | 2     | 0Eh           | 10h           |
| L2 Cache Size                         |       | 1 MB          | 1 MB          |
| Max HyperTransport™ Frequency         |       | 1000 Mhz      | 1000 Mhz      |
| <b>Max P-State</b>                    |       | 2200 MHz      | 2400 MHz      |
| FID/VID Status MaxVID Field           | 2, 6  | 06h           | 06h           |
| FID/VID Status StartVID Field         | 2, 6  | 08h           | 08h           |
| VID Code                              |       | 08h           | 08h           |
| VID_VDD                               | 3     | 1.350 V       | 1.350 V       |
| Thermal Design Power                  | 4     | 85.3 W        | 85.3 W        |
| <b>Intermediate P-State #1</b>        | 5     | 2000 MHz      | 2200 MHz      |
| VID Code / VID_VDD                    | 3     | 08h   1.350 V | 08h   1.350 V |
| Thermal Design Power                  | 4     | 83.0 W        | 83.0 W        |
| <b>Intermediate P-State #2</b>        | 5     | 1800 MHz      | 2000 MHz      |
| VID Code / VID_VDD                    | 3     | 0Ah   1.300 V | 0Ah   1.300 V |
| Thermal Design Power                  | 4     | 70.4 W        | 70.6 W        |
| <b>Intermediate P-State #3</b>        | 5     | N/A           | 1800 MHz      |
| VID Code / VID_VDD                    | 3     |               | 0Ch   1.250 V |
| Thermal Design Power                  | 4     |               | 59.6 W        |
| <b>Intermediate P-State #4</b>        | 5     | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |
| Thermal Design Power                  | 4     |               |               |
| <b>Intermediate P-State #5</b>        | 5     | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |
| Thermal Design Power                  | 4     |               |               |
| <b>Intermediate P-State #6</b>        | 5     | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |
| Thermal Design Power                  | 4     |               |               |
| <b>Min P-State</b>                    |       | 1000 MHz      | 1000 MHz      |
| VID Code / VID_VDD                    | 3     | 12h   1.100 V | 12h   1.100 V |
| Thermal Design Power                  | 4     | 36.1 W        | 35.0 W        |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3800DAA4BP |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3800+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00020FF0h     |         |
| FID/VID Status MaxFID Field              | 2     | 10h           |         |
| FID/VID Status StartFID Field            | 2     | 10h           |         |
| L2 Cache Size                            |       | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 2400 MHz      |         |
| FID/VID Status MaxVID Field              | 2, 6  | 06h           | 04h     |
| FID/VID Status StartVID Field            | 2, 6  | 08h           | 06h     |
| VID Code                                 |       | 08h           | 06h     |
| VID_VDD                                  | 3     | 1.350 V       | 1.400 V |
| Thermal Design Power                     | 4     | 85.3 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 2200 MHz      |         |
| VID Code / VID_VDD                       | 3     | 08h           | 1.350 V |
| Thermal Design Power                     | 4     | 83.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     | 70.6 W        |         |
| <b>Intermediate P-State #3</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ch           | 1.250 V |
| Thermal Design Power                     | 4     | 59.6 W        |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 35.0 W        |         |

The notes for this table appear on page 29

| Parameter/OPN                         | Notes | ADA3000DIK4BI |         | ADA3200DIK4BI |         | ADA3500DIK4BI |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|---------------|---------|
| Model Number                          |       | 3000+         |         | 3200+         |         | 3500+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           |         | 04h           |         | 04h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00010FF0h     |         | 00010FF0h     |         | 00010FF0h     |         |
| FID/VID Status MaxVID Field           | 2     | 04h           |         | 04h           |         | 04h           |         |
| FID/VID Status MaxFID Field           | 2     | 0Ah           |         | 0Ch           |         | 0Eh           |         |
| FID/VID Status StartVID Field         | 2     | 06h           |         | 06h           |         | 06h           |         |
| FID/VID Status StartFID Field         | 2     | 0Ah           |         | 0Ch           |         | 0Eh           |         |
| L2 Cache Size                         |       | 512 KB        |         | 512 KB        |         | 512 KB        |         |
| Max HyperTransport™ Frequency         |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| <b>Max P-State</b>                    |       | 1800 MHz      |         | 2000 MHz      |         | 2200 MHz      |         |
| VID Code                              |       | 06h           |         | 06h           |         | 06h           |         |
| VID_VDD                               | 3     | 1.400 V       |         | 1.400 V       |         | 1.400 V       |         |
| Thermal Design Power                  | 4     | 67.0 W        |         | 67.0 W        |         | 67.0 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         | 08h           | 1.350 V | 08h           | 1.350 V |
| Thermal Design Power                  | 4     |               |         | 56.0 W        |         | 56.0 W        |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         | 0Ah           | 1.300 V |
| Thermal Design Power                  | 4     |               |         |               |         | 46.0 W        |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 21.0 W        |         | 21.0 W        |         | 20.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                         | Notes | ADA3000DAA4BP |         | ADA3200DAA4BP |         | ADA3500DAA4BP |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|---------------|---------|
| Model Number                          |       | 3000+         |         | 3200+         |         | 3500+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 04h           |         | 04h           |         | 04h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020FF0h     |         | 00020FF0h     |         | 00020FF0h     |         |
| FID/VID Status MaxFID Field           | 2     | 0Ah           |         | 0Ch           |         | 0Eh           |         |
| FID/VID Status StartFID Field         | 2     | 0Ah           |         | 0Ch           |         | 0Eh           |         |
| L2 Cache Size                         |       | 512 KB        |         | 512 KB        |         | 512 KB        |         |
| Max HyperTransport™ Frequency         |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| <b>Max P-State</b>                    |       | 1800 MHz      |         | 2000 MHz      |         | 2200 MHz      |         |
| FID/VID Status MaxVID Field           | 2, 6  | 06h           | 04h     | 06h           | 04h     | 06h           | 04h     |
| FID/VID Status StartVID Field         | 2, 6  | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| VID Code                              |       | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| VID_VDD                               | 3     | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V |
| Thermal Design Power                  | 4     | 67.0 W        |         | 67.0 W        |         | 67.0 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         | 08h           | 1.350 V | 08h           | 1.350 V |
| Thermal Design Power                  | 4     |               |         | 64.7 W        |         | 64.7 W        |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         | 0Ah           | 1.300 V |
| Thermal Design Power                  | 4     |               |         |               |         | 54.8 W        |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 29.6 W        |         | 28.6 W        |         | 27.5 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3000DAA4BW |         | ADA3200DAA4BW |         | ADA3500DAA4BW |         |
|------------------------------------------|-------|---------------|---------|---------------|---------|---------------|---------|
| Model Number                             |       | 3000+         |         | 3200+         |         | 3500+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         | 04h           |         | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00020FF2h     |         | 00020FF2h     |         | 00020FF2h     |         |
| FID/VID Status MaxFID Field              | 2     | 0Ah           |         | 0Ch           |         | 0Eh           |         |
| FID/VID Status StartFID Field            | 2     | 0Ah           |         | 0Ch           |         | 0Eh           |         |
| L2 Cache Size                            |       | 512 KB        |         | 512 KB        |         | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 1800 MHz      |         | 2000 MHz      |         | 2200 MHz      |         |
| FID/VID Status MaxVID Field              | 2, 6  | 06h           | 04h     | 06h           | 04h     | 06h           | 04h     |
| FID/VID Status StartVID Field            | 2, 6  | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| VID Code                                 |       | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| VID_VDD                                  | 3     | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V |
| Thermal Design Power                     | 4     | 67.0 W        |         | 67.0 W        |         | 67.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | N/A           |         | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     |               |         | 08h           | 1.350 V | 08h           | 1.350 V |
| Thermal Design Power                     | 4     |               |         | 64.7 W        |         | 64.7 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     |               |         |               |         | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     |               |         |               |         | 54.8 W        |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |               |         |               |         |
| Thermal Design Power                     | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |               |         |               |         |
| Thermal Design Power                     | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |               |         |               |         |
| Thermal Design Power                     | 4     |               |         |               |         |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |               |         |               |         |
| Thermal Design Power                     | 4     |               |         |               |         |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 29.6 W        |         | 28.6 W        |         | 27.5 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3200DKA4CG |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3200+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00030FF2h     |         |
| FID/VID Status MaxFID Field              | 2     | 0Ch           |         |
| FID/VID Status StartFID Field            | 2     | 0Ch           |         |
| L2 Cache Size                            |       | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 2000 MHz      |         |
| FID/VID Status MaxVID Field              | 2, 6  | 06h           |         |
| FID/VID Status StartVID Field            | 2, 6  | 08h           |         |
| VID Code                                 |       | 08h           |         |
| VID_VDD                                  | 3     | 1.350 V       |         |
| Thermal Design Power                     | 4     | 67.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 08h           | 1.350 V |
| Thermal Design Power                     | 4     | 64.7 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 28.6 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3800DAA4BW |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3800+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00020FF2h     |         |
| FID/VID Status MaxFID Field              | 2     | 10h           |         |
| FID/VID Status StartFID Field            | 2     | 10h           |         |
| L2 Cache Size                            |       | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 2400 MHz      |         |
| FID/VID Status MaxVID Field              | 2, 6  | 06h           | 04h     |
| FID/VID Status StartVID Field            | 2, 6  | 08h           | 06h     |
| VID Code                                 |       | 08h           | 06h     |
| VID_VDD                                  | 3     | 1.350 V       | 1.400 V |
| Thermal Design Power                     | 4     | 85.3 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 2200 MHz      |         |
| VID Code / VID_VDD                       | 3     | 08h           | 1.350 V |
| Thermal Design Power                     | 4     | 83.0 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | 2000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4     | 70.6 W        |         |
| <b>Intermediate P-State #3</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ch           | 1.250 V |
| Thermal Design Power                     | 4     | 59.6 W        |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 35.0 W        |         |

The notes for this table appear on page 29.

| Parameter/OPN                            | Notes | ADA3000AIK4BX |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3000+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 04h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00020FC2h     |         |
| FID/VID Status MaxFID Field              | 2     | 0Ch           |         |
| FID/VID Status StartFID Field            | 2     | 0Ch           |         |
| L2 Cache Size                            |       | 512 KB        |         |
| Max HyperTransport™ Frequency            |       | 800 MHz       |         |
| <b>Max P-State</b>                       |       | 2000 MHz      |         |
| FID/VID Status MaxVID Field              | 2, 6  | 04h           |         |
| FID/VID Status StartVID Field            | 2, 6  | 06h           |         |
| VID Code                                 |       | 06h           |         |
| VID_VDD                                  | 3     | 1.400 V       |         |
| Thermal Design Power                     | 4     | 51.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 08h           | 1.350 V |
| Thermal Design Power                     | 4     | 42.8 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 18.9 W        |         |

The notes for this table appear on page 29.

**Notes:**

- 1 CUID extended function 8000\_0001h fields are used by BIOS in uniquely associating a given processor to the P-states that are valid for that processor. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
- 2 FIDVID Status Register, MSR C001\_0042h.
- 3 The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
- 4 Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
- 5 Implementation of this P-state is optional in BIOS.
- 6 StartVID and MaxVID are programmed during device manufacturing with part-specific values for Rev E and later processors, and can have one or more valid options. All valid options for StartVID, MaxVID, and VID\_VDD will be specified for the corresponding OPN. For information on the relationship of StartVID and MaxVID to VID\_VDD refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094. Contact your FAE for more info on TDP specifications.

### 1.3 AMD Athlon™ 64 Processor Thermal/Power Specifications

Table 10 contains the power and thermal specifications for this processor family. Each column in the thermal/power specification tables represents a specific Ordering Part Number (OPN). Section 1.1 provides an example of the OPN structure for this processor family.

**Table 10: AMD Athlon™ 64 Processor Thermal/Power Specifications**

| Parameter/OPN                  | Notes    | ADA2800AEP4AP | ADA3000AEP4AP | ADA3200AEP5AP |
|--------------------------------|----------|---------------|---------------|---------------|
| Tcase Max                      | 1        | 70°C          | 70°C          | 70°C          |
| Tcontrol Max                   | 2        | 70°C          | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      | 0.31°C/W      | 0.31°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      | 2000 MHz      | 2000 MHz      |
| VID_VDD                        | 3        | 1.500 V       | 1.500 V       | 1.500 V       |
| IDD Max                        |          | 57.8 A        | 57.8 A        | 57.8 A        |
| Thermal Design Power           | 4        | 89.0 W        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | 1800 MHz      | 1800 MHz      |
| VID_VDD                        | 3        |               | 1.400 V       | 1.400 V       |
| IDD Max                        |          |               | 45.6 A        | 45.6 A        |
| Thermal Design Power           | 4        |               | 66.0 W        | 66.0 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Min P-State</b>             |          | 800 MHz       | 800 MHz       | 800 MHz       |
| VID_VDD                        | 3        | 1.300 V       | 1.300 V       | 1.300 V       |
| IDD Max                        |          | 25.2 A        | 25.2 A        | 25.2 A        |
| Thermal Design Power           | 4        | 35.0 W        | 35.0 W        | 35.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |               |
| IDDC1 Max @ Max P-State        | 5        | 32.5 A        | 32.5 A        | 32.5 A        |
| IDDC1 Max @ Min P-State        | 6        | 10.5 A        | 10.5 A        | 10.5 A        |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |               |
| I/O Power                      | 7, 9, 12 | 600 mW        | 600 mW        | 600 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3400AEP5AP |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 70°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2200 MHz      |
| VID_VDD                        | 3        | 1.500 V       |
| IDD Max                        |          | 57.8 A        |
| Thermal Design Power           | 4        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 2000 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 48.4 A        |
| Thermal Design Power           | 4        | 70.0 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 800 MHz       |
| VID_VDD                        | 3        | 1.300 V       |
| IDD Max                        |          | 25.2 A        |
| Thermal Design Power           | 4        | 35.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 32.5 A        |
| IDDC1 Max @ Min P-State        | 6        | 10.5 A        |
| I/O Power                      | 8, 12    | 2.2 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 600 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA2800AEP4AR | ADA3000AEP4AR |
|--------------------------------|----------|---------------|---------------|
| Tcase Max                      | 1        | 70°C          | 70°C          |
| Tcontrol Max                   | 2        | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      | 0.31°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      | 2000 MHz      |
| VID_VDD                        | 3        | 1.500 V       | 1.500 V       |
| IDD Max                        |          | 57.8 A        | 57.8 A        |
| Thermal Design Power           | 4        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | 1800 MHz      |
| VID_VDD                        | 3        |               | 1.400 V       |
| IDD Max                        |          |               | 45.6 A        |
| Thermal Design Power           | 4        |               | 66.0 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 18.0 A        | 18.0 A        |
| Thermal Design Power           | 4        | 22.0 W        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         | 7.0 A         |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3700AEP5AR |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 70°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2400 MHz      |
| VID_VDD                        | 3        | 1.500 V       |
| IDD Max                        |          | 57.8 A        |
| Thermal Design Power           | 4        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 2200 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 50.0 A        |
| Thermal Design Power           | 4        | 72.0 W        |
| <b>Intermediate P-State #2</b> | 11       | 2000 MHz      |
| VID_VDD                        | 3        | 1.300 V       |
| IDD Max                        |          | 39.0 A        |
| Thermal Design Power           | 4        | 53.0 W        |
| <b>Intermediate P-State #3</b> | 11       | 1800 MHz      |
| VID_VDD                        | 3        | 1.200 V       |
| IDD Max                        |          | 31.0 A        |
| Thermal Design Power           | 4        | 39.0 W        |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 18.0 A        |
| Thermal Design Power           | 4        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         |
| I/O Power                      | 8, 12    | 2.2 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA2800AEP4AX | ADA3000AEP4AX | ADA3200AEP4AX |
|--------------------------------|----------|---------------|---------------|---------------|
| T <sub>case</sub> Max          | 1        | 70°C          | 70°C          | 70°C          |
| T <sub>control</sub> Max       | 2        | 70°C          | 70°C          | 70°C          |
| T <sub>ambient</sub>           |          | 42°C          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      | 0.31°C/W      | 0.31°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      | 2000 MHz      | 2200 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.500 V       | 1.500 V       | 1.500 V       |
| IDD Max                        |          | 57.8 A        | 57.8 A        | 57.8 A        |
| Thermal Design Power           | 4        | 89.0 W        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | 1800 MHz      | 2000 MHz      |
| VID <sub>_VDD</sub>            | 3        |               | 1.400 V       | 1.400 V       |
| IDD Max                        |          |               | 46.0 A        | 48.0 A        |
| Thermal Design Power           | 4        |               | 67.0 W        | 69.0 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           | 1800 MHz      |
| VID <sub>_VDD</sub>            | 3        |               |               | 1.300 V       |
| IDD Max                        |          |               |               | 37.0 A        |
| Thermal Design Power           | 4        |               |               | 50.0 W        |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      | 1000 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.100 V       | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 18.0 A        | 18.0 A        | 18.0 A        |
| Thermal Design Power           | 4        | 22.0 W        | 22.0 W        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        | 30.0 A        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         | 7.0 A         | 7.0 A         |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3400AEP4AX |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 70°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2400 MHz      |
| VID_VDD                        | 3        | 1.500 V       |
| IDD Max                        |          | 57.9 A        |
| Thermal Design Power           | 4        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 2200 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 49.9 A        |
| Thermal Design Power           | 4        | 72.0 W        |
| <b>Intermediate P-State #2</b> | 11       | 2000 MHz      |
| VID_VDD                        | 3        | 1.300 V       |
| IDD Max                        |          | 39.1 A        |
| Thermal Design Power           | 4        | 53.0 W        |
| <b>Intermediate P-State #3</b> | 11       | 1800 MHz      |
| VID_VDD                        | 3        | 1.200 V       |
| IDD Max                        |          | 30.7 A        |
| Thermal Design Power           | 4        | 39.0 W        |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 18.0 A        |
| Thermal Design Power           | 4        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         |
| I/O Power                      | 8, 12    | 2.2 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3500DEP4AS |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 70°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2200 MHz      |
| VID_VDD                        | 3        | 1.500 V       |
| IDD Max                        |          | 57.4 A        |
| Thermal Design Power           | 4        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 2000 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 47.2 A        |
| Thermal Design Power           | 4        | 69.0 W        |
| <b>Intermediate P-State #2</b> | 11       | 1800 MHz      |
| VID_VDD                        | 3        | 1.300 V       |
| IDD Max                        |          | 36.2 A        |
| Thermal Design Power           | 4        | 50.0 W        |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 17.4 A        |
| Thermal Design Power           | 4        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         |
| I/O Power                      | 8, 12    | 2.9 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3500DEP4AW |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 70°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2200 MHz      |
| VID_VDD                        | 3        | 1.500 V       |
| IDD Max                        |          | 57.4 A        |
| Thermal Design Power           | 4        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 2000 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 47.2 A        |
| Thermal Design Power           | 4        | 69.0 W        |
| <b>Intermediate P-State #2</b> | 11       | 1800 MHz      |
| VID_VDD                        | 3        | 1.300 V       |
| IDD Max                        |          | 36.2 A        |
| Thermal Design Power           | 4        | 50.0 W        |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 17.4 A        |
| Thermal Design Power           | 4        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         |
| I/O Power                      | 8, 12    | 2.9 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3800DEP4AW | ADA4000DEP5AS |
|--------------------------------|----------|---------------|---------------|
| Tcase Max                      | 1        | 70°C          | 70°C          |
| Tcontrol Max                   | 2        | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2400 MHz      | 2400 MHz      |
| VID_VDD                        | 3        | 1.500 V       | 1.500 V       |
| IDD Max                        |          | 57.4 A        | 57.4 A        |
| Thermal Design Power           | 4        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 2200 MHz      | 2200 MHz      |
| VID_VDD                        | 3        | 1.400 V       | 1.400 V       |
| IDD Max                        |          | 49.4 A        | 49.4 A        |
| Thermal Design Power           | 4        | 72.0 W        | 72.0 W        |
| <b>Intermediate P-State #2</b> | 11       | 2000 MHz      | 2000 MHz      |
| VID_VDD                        | 3        | 1.300 V       | 1.300 V       |
| IDD Max                        |          | 38.5 A        | 38.5 A        |
| Thermal Design Power           | 4        | 53.0 W        | 53.0 W        |
| <b>Intermediate P-State #3</b> | 11       | 1800 MHz      | 1800 MHz      |
| VID_VDD                        | 3        | 1.200 V       | 1.200 V       |
| IDD Max                        |          | 30.1 A        | 30.1 A        |
| Thermal Design Power           | 4        | 39.0 W        | 39.0 W        |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 17.4 A        | 17.4 A        |
| Thermal Design Power           | 4        | 22.0 W        | 22.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         | 7.0 A         |
| I/O Power                      | 8, 12    | 2.9 W         | 2.9 W         |
| <b>S3</b>                      | 7        |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3500DAA4BN     | ADA3700DAA5BN     | ADA4000DAA5BN     |
|--------------------------------|----------|-------------------|-------------------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 65°C      | 49°C to 71°C      | 49°C to 71°C      |
| Tcontrol Max                   | 2        | 70°C              | 70°C              | 70°C              |
| Tambient                       |          | 42°C              | 42°C              | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.34°C/W          | 0.34°C/W          | 0.34°C/W          |
| Thermal Profile                | 14       | B                 | A                 | A                 |
| <b>Max P-State</b>             |          | 2200 MHz          | 2200 MHz          | 2400 MHz          |
| VID_VDD                        | 3        | 1.350 V   1.400 V | 1.350 V   1.400 V | 1.350 V   1.400 V |
| IDD Max                        |          | 47.5 A            | 60.0 A            | 60.0 A            |
| Thermal Design Power           | 4        | 67.0 W            | 85.3 W            | 85.3 W            |
| <b>Intermediate P-State #1</b> | 11       | 2000 MHz          | 2000 MHz          | 2200 MHz          |
| VID_VDD                        | 3        | 1.350 V           | 1.350 V           | 1.350 V           |
| IDD Max                        |          | 45.8 A            | 59.3 A            | 59.3 A            |
| Thermal Design Power           | 4        | 64.7 W            | 83.0 W            | 83.0 W            |
| <b>Intermediate P-State #2</b> | 11       | 1800 MHz          | 1800 MHz          | 2000 MHz          |
| VID_VDD                        | 3        | 1.300 V           | 1.300 V           | 1.300 V           |
| IDD Max                        |          | 39.9 A            | 51.9 A            | 52.1 A            |
| Thermal Design Power           | 4        | 54.8 W            | 70.4 W            | 70.6 W            |
| <b>Intermediate P-State #3</b> | 11       | N/A               | N/A               | 1800 MHz          |
| VID_VDD                        | 3        |                   |                   | 1.250 V           |
| IDD Max                        |          |                   |                   | 45.4 A            |
| Thermal Design Power           | 4        |                   |                   | 59.6 W            |
| <b>Intermediate P-State #4</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Min P-State</b>             |          | 1000 MHz          | 1000 MHz          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           | 1.100 V           | 1.100 V           |
| IDD Max                        |          | 22.4 A            | 30.2 A            | 29.2 A            |
| Thermal Design Power           | 4        | 27.5 W            | 36.1 W            | 35.0 W            |
| <b>Halt/Stop Grant</b>         |          |                   |                   |                   |
| IDDC1 Max @ Max P-State        | 5        | 19.3 A            | 34.8 A            | 34.8 A            |
| IDDC1 Max @ Min P-State        | 6        | 4.2 A             | 7.1 A             | 7.1 A             |
| I/O Power                      | 8, 12    | 2.9 W             | 2.9 W             | 2.9 W             |
| <b>S3</b>                      | 7        |                   |                   |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            | 500 mW            | 500 mW            |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3700DKA5CF | ADA4000DKA5CF |
|--------------------------------|----------|---------------|---------------|
| Tcase Max                      | 1, 13    | 49°C to 71°C  | 49°C to 71°C  |
| Tcontrol Max                   | 2        | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.34°C/W      | 0.34°C/W      |
| Thermal Profile                | 14       | A             | A             |
| <b>Max P-State</b>             |          | 2200 MHz      | 2400 MHz      |
| VID_VDD                        | 3        | 1.350 V       | 1.350 V       |
| IDD Max                        |          | 60.0 A        | 60.0 A        |
| Thermal Design Power           | 4        | 85.3 W        | 85.3 W        |
| <b>Intermediate P-State #1</b> | 11       | 2000 MHz      | 2200 MHz      |
| VID_VDD                        | 3        | 1.350 V       | 1.350 V       |
| IDD Max                        |          | 59.3 A        | 59.3 A        |
| Thermal Design Power           | 4        | 83.0 W        | 83.0 W        |
| <b>Intermediate P-State #2</b> | 11       | 1800 MHz      | 2000 MHz      |
| VID_VDD                        | 3        | 1.300 V       | 1.300 V       |
| IDD Max                        |          | 51.9 A        | 52.1 A        |
| Thermal Design Power           | 4        | 70.4 W        | 70.6 W        |
| <b>Intermediate P-State #3</b> | 11       | N/A           | 1800 MHz      |
| VID_VDD                        | 3        |               | 1.250 V       |
| IDD Max                        |          |               | 45.4 A        |
| Thermal Design Power           | 4        |               | 59.6 W        |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 30.2 A        | 29.2 A        |
| Thermal Design Power           | 4        | 36.1 W        | 35.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |
| IDDC1 Max @ Max P-State        | 5        | 34.8 A        | 34.8 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.1 A         | 7.1 A         |
| I/O Power                      | 8, 12    | 2.9 W         | 2.9 W         |
| <b>S3</b>                      | 7        |               |               |
| I/O Power                      | 7, 9, 12 | 500 mW        | 500 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3800DAA4BP     |
|--------------------------------|----------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 71°C      |
| Tcontrol Max                   | 2        | 70°C              |
| Tambient                       |          | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.34°C/W          |
| Thermal Profile                | 14       | A                 |
| <b>Max P-State</b>             |          | 2400 MHz          |
| VID_VDD                        | 3        | 1.350 V   1.400 V |
| IDD Max                        |          | 60.0 A            |
| Thermal Design Power           | 4        | 85.3 W            |
| <b>Intermediate P-State #1</b> | 11       | 2200 MHz          |
| VID_VDD                        | 3        | 1.350 V           |
| IDD Max                        |          | 59.3 A            |
| Thermal Design Power           | 4        | 83.0 W            |
| <b>Intermediate P-State #2</b> | 11       | 2000 MHz          |
| VID_VDD                        | 3        | 1.300 V           |
| IDD Max                        |          | 52.1 A            |
| Thermal Design Power           | 4        | 70.6 W            |
| <b>Intermediate P-State #3</b> | 11       | 1800 MHz          |
| VID_VDD                        | 3        | 1.250 V           |
| IDD Max                        |          | 45.4 A            |
| Thermal Design Power           | 4        | 59.6 W            |
| <b>Intermediate P-State #4</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4        |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4        |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4        |                   |
| <b>Min P-State</b>             |          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           |
| IDD Max                        |          | 29.2 A            |
| Thermal Design Power           | 4        | 35.0 W            |
| <b>Halt/Stop Grant</b>         |          |                   |
| IDDC1 Max @ Max P-State        | 5        | 34.8 A            |
| IDDC1 Max @ Min P-State        | 6        | 7.1 A             |
| I/O Power                      | 8, 12    | 2.9 W             |
| <b>S3</b>                      | 7        |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3000DIK4BI | ADA3200DIK4BI | ADA3500DIK4BI |
|--------------------------------|----------|---------------|---------------|---------------|
| T <sub>case</sub> Max          | 1        | 65°C          | 65°C          | 65°C          |
| T <sub>control</sub> Max       | 2        | 70°C          | 70°C          | 70°C          |
| T <sub>ambient</sub>           |          | 42°C          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.34°C/W      | 0.34°C/W      | 0.34°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      | 2000 MHz      | 2200 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.400 V       | 1.400 V       | 1.400 V       |
| IDD Max                        | 9        | 45.8 A        | 45.8 A        | 45.8 A        |
| Thermal Design Power           | 4, 9     | 67.0 W        | 67.0 W        | 67.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | 1800 MHz      | 2000 MHz      |
| VID <sub>_VDD</sub>            | 3        |               | 1.350 V       | 1.350 V       |
| IDD Max                        |          |               | 39.3 A        | 39.3 A        |
| Thermal Design Power           | 4        |               | 56.0 W        | 56.0 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           | 1800 MHz      |
| VID <sub>_VDD</sub>            | 3        |               |               | 1.300 V       |
| IDD Max                        |          |               |               | 33.2 A        |
| Thermal Design Power           | 4        |               |               | 46.0 W        |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      | 1000 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.100 V       | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 16.5 A        | 16.5 A        | 15.5 A        |
| Thermal Design Power           | 4        | 21.0 W        | 21.0 W        | 20.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |               |
| IDDC1 Max @ Max P-State        | 5        | 36.8 A        | 36.8 A        | 36.8 A        |
| IDDC1 Max @ Min P-State        | 6        | 9.3 A         | 9.3 A         | 9.3 A         |
| I/O Power                      | 8, 12    | 2.9 W         | 2.9 W         | 2.9 W         |
| <b>S3</b>                      | 7        |               |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        | 750 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3000DAA4BP     | ADA3200DAA4BP     | ADA3500DAA4BP     |
|--------------------------------|----------|-------------------|-------------------|-------------------|
| T <sub>case</sub> Max          | 1, 13    | 49°C to 65°C      | 49°C to 65°C      | 49°C to 65°C      |
| T <sub>control</sub> Max       | 2        | 70°C              | 70°C              | 70°C              |
| T <sub>ambient</sub>           |          | 42°C              | 42°C              | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.34°C/W          | 0.34°C/W          | 0.34°C/W          |
| Thermal Profile                | 14       | B                 | B                 | B                 |
| <b>Max P-State</b>             |          | 1800 MHz          | 2000 MHz          | 2200 MHz          |
| VID_VDD                        | 3        | 1.350 V   1.400 V | 1.350 V   1.400 V | 1.350 V   1.400 V |
| IDD Max                        |          | 47.5 A            | 47.5 A            | 47.5 A            |
| Thermal Design Power           | 4        | 67.0 W            | 67.0 W            | 67.0 W            |
| <b>Intermediate P-State #1</b> | 11       | N/A               | 1800 MHz          | 2000 MHz          |
| VID_VDD                        | 3        |                   | 1.350 V           | 1.350 V           |
| IDD Max                        |          |                   | 45.8 A            | 45.8 A            |
| Thermal Design Power           | 4        |                   | 64.7 W            | 64.7 W            |
| <b>Intermediate P-State #2</b> | 11       | N/A               | N/A               | 1800 MHz          |
| VID_VDD                        | 3        |                   |                   | 1.300 V           |
| IDD Max                        |          |                   |                   | 39.9 A            |
| Thermal Design Power           | 4        |                   |                   | 54.8 W            |
| <b>Intermediate P-State #3</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #4</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Min P-State</b>             |          | 1000 MHz          | 1000 MHz          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           | 1.100 V           | 1.100 V           |
| IDD Max                        |          | 24.3 A            | 23.4 A            | 22.4 A            |
| Thermal Design Power           | 4        | 29.6 W            | 28.6 W            | 27.5 W            |
| <b>Halt/Stop Grant</b>         |          |                   |                   |                   |
| IDDC1 Max @ Max P-State        | 5        | 19.3 A            | 19.3 A            | 19.3 A            |
| IDDC1 Max @ Min P-State        | 6        | 4.2 A             | 4.2 A             | 4.2 A             |
| I/O Power                      | 8, 12    | 2.9 W             | 2.9 W             | 2.9 W             |
| <b>S3</b>                      | 7        |                   |                   |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            | 500 mW            | 500 mW            |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3000DAA4BW     | ADA3200DAA4BW     | ADA3500DAA4BW     |
|--------------------------------|----------|-------------------|-------------------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 65°C      | 49°C to 65°C      | 49°C to 65°C      |
| Tcontrol Max                   | 2        | 70°C              | 70°C              | 70°C              |
| Tambient                       |          | 42°C              | 42°C              | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.34°C/W          | 0.34°C/W          | 0.34°C/W          |
| Thermal Profile                | 14       | B                 | B                 | B                 |
| <b>Max P-State</b>             |          | 1800 MHz          | 2000 MHz          | 2200 MHz          |
| VID_VDD                        | 3        | 1.350 V   1.400 V | 1.350 V   1.400 V | 1.350 V   1.400 V |
| IDD Max                        |          | 47.5 A            | 47.5 A            | 47.5 A            |
| Thermal Design Power           | 4        | 67.0 W            | 67.0 W            | 67.0 W            |
| <b>Intermediate P-State #1</b> | 11       | N/A               | 1800 MHz          | 2000 MHz          |
| VID_VDD                        | 3        |                   | 1.350 V           | 1.350 V           |
| IDD Max                        |          |                   | 45.8 A            | 45.8 A            |
| Thermal Design Power           | 4        |                   | 64.7 W            | 64.7 W            |
| <b>Intermediate P-State #2</b> | 11       | N/A               | N/A               | 1800 MHz          |
| VID_VDD                        | 3        |                   |                   | 1.300 V           |
| IDD Max                        |          |                   |                   | 39.9 A            |
| Thermal Design Power           | 4        |                   |                   | 54.8 W            |
| <b>Intermediate P-State #3</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #4</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4        |                   |                   |                   |
| <b>Min P-State</b>             |          | 1000 MHz          | 1000 MHz          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           | 1.100 V           | 1.100 V           |
| IDD Max                        |          | 24.3 A            | 23.4 A            | 22.4 A            |
| Thermal Design Power           | 4        | 29.6 W            | 28.6 W            | 27.5 W            |
| <b>Halt/Stop Grant</b>         |          |                   |                   |                   |
| IDDC1 Max @ Max P-State        | 5        | 19.3 A            | 25.8 A            | 25.8 A            |
| IDDC1 Max @ Min P-State        | 6        | 4.2 A             | 8.0 A             | 8.0 A             |
| I/O Power                      | 8, 12    | 2.9 W             | 2.9 W             | 2.9 W             |
| <b>S3</b>                      | 7        |                   |                   |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            | 500 mW            | 500 mW            |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3200DKA4CG |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1, 13    | 49°C to 65°C  |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.34°C/W      |
| Thermal Profile                | 14       | B             |
| <b>Max P-State</b>             |          | 2000 MHz      |
| VID_VDD                        | 3        | 1.350 V       |
| IDD Max                        |          | 47.5 A        |
| Thermal Design Power           | 4        | 67.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 1800 MHz      |
| VID_VDD                        | 3        | 1.350 V       |
| IDD Max                        |          | 45.8 A        |
| Thermal Design Power           | 4        | 64.7 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 23.4 A        |
| Thermal Design Power           | 4        | 28.6 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 25.8 A        |
| IDDC1 Max @ Min P-State        | 6        | 8.0 A         |
| I/O Power                      | 8, 12    | 2.9 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 500 mW        |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3800DAA4BW     |
|--------------------------------|----------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 71°C      |
| Tcontrol Max                   | 2        | 70°C              |
| Tambient                       |          | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.34°C/W          |
| Thermal Profile                | 14       | A                 |
| <b>Max P-State</b>             |          | 2400 MHz          |
| VID_VDD                        | 3        | 1.350 V   1.400 V |
| IDD Max                        |          | 60.0 A            |
| Thermal Design Power           | 4        | 85.3 W            |
| <b>Intermediate P-State #1</b> | 11       | 2200 MHz          |
| VID_VDD                        | 3        | 1.350 V           |
| IDD Max                        |          | 59.3 A            |
| Thermal Design Power           | 4        | 83.0 W            |
| <b>Intermediate P-State #2</b> | 11       | 2000 MHz          |
| VID_VDD                        | 3        | 1.300 V           |
| IDD Max                        |          | 52.1 A            |
| Thermal Design Power           | 4        | 70.6 W            |
| <b>Intermediate P-State #3</b> | 11       | 1800 MHz          |
| VID_VDD                        | 3        | 1.250 V           |
| IDD Max                        |          | 45.4 A            |
| Thermal Design Power           | 4        | 59.6 W            |
| <b>Intermediate P-State #4</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4        |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4        |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4        |                   |
| <b>Min P-State</b>             |          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           |
| IDD Max                        |          | 29.2 A            |
| Thermal Design Power           | 4        | 35.0 W            |
| <b>Halt/Stop Grant</b>         |          |                   |
| IDDC1 Max @ Max P-State        | 5        | 34.8 A            |
| IDDC1 Max @ Min P-State        | 6        | 7.1 A             |
| I/O Power                      | 8, 12    | 2.9 W             |
| <b>S3</b>                      | 7        |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            |

The notes for this table appear on page 48.

| Parameter/OPN                  | Notes    | ADA3000AIK4BX |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1, 13    | 65°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      |
| Thermal Profile                | 14       | N/A           |
| <b>Max P-State</b>             |          | 2000 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 34.9 A        |
| Thermal Design Power           | 4        | 51.0 W        |
| <b>Intermediate P-State #1</b> | 11       | 1800 MHz      |
| VID_VDD                        | 3        | 1.350 V       |
| IDD Max                        |          | 30.1 A        |
| Thermal Design Power           | 4        | 42.8 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 15.2 A        |
| Thermal Design Power           | 4        | 18.9 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 19.3 A        |
| IDDC1 Max @ Min P-State        | 6        | 4.2 A         |
| I/O Power                      | 8, 12    | 2.2 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 500 mW        |

The notes for this table appear on page 48.

**Notes:**

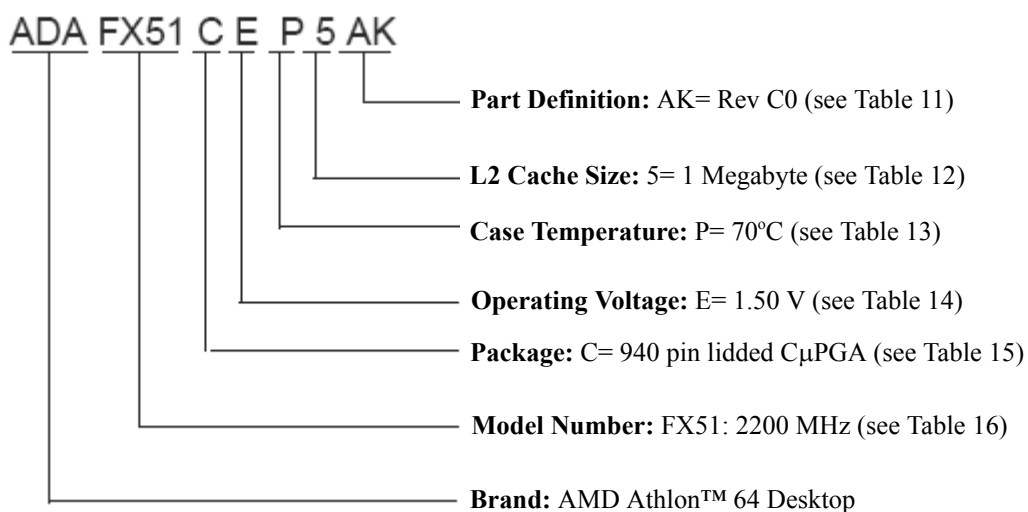
1. Tcase max is the maximum case temperature specification which is a physical value in degrees Celsius. This value is programmed into Rev D and later processors. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. Tcontrol max (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. Tcontrol max represents the value at which the processor has reached Tcase max when measuring the thermal diode with a dual sourcing current temperature sensor. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
3. The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
4. Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
5. Assumes Tcase max, max P-state VID\_VDD, clock divider set to 32.
6. Assumes 50°C, min P-state VID\_VDD, clock divider set to 32.
7. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tri-stated except CKE pins. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
8. Thermal Design Power dissipated by the processor VDDIO, VTT, VLDT, and VDDA power planes only.
9. Thermal Design Power dissipated by the processor VDDIO and VTT power planes only.
10. Refer to the AMD Athlon™ 64 Processor Desktop Power Roadmap, order #26882, for IDD Max and Thermal Design Power requirements for future processor revisions.
11. Implementation of this P-state is optional in BIOS.
12. Assumes VDDIO = 2.6 V and VTT = VDDIO / 2. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
13. Tcase max is programmed during device manufacturing with part-specific values for Rev E and later processors, and can be any valid Tcase max value in the range specified for the corresponding OPN.
14. Thermal Design Power (TDP) and IDD max for Rev E and later processors are the limits at the highest Tcase max in the specified range for the corresponding OPN. Products will conform to the TDP and IDD Max limits at all valid voltages. The relationship of Tcase max and Thermal Profile to TDP for a specific device is defined in Table 8.

## 2 AMD Athlon™ 64 FX Processor

The following sections contain thermal/power and related BIOS specifications for AMD Athlon™ 64 FX processors. Each column in the BIOS and thermal/power tables represents a specific Ordering Part Number (OPN). Section 2.1 provides an example of the OPN structure for this processor family.

For all other electrical specifications for the processor, refer to the *AMD Athlon™ 64 FX Product Data Sheet*, order #30431. For power management BIOS requirements, refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 Processors and AMD Opteron™ Processors*, order #26094.

### 2.1 Ordering Part Number Description



**Figure 2. AMD Athlon™ 64 FX Processor Ordering Part Number Example**

**Table 11: AMD Athlon™ 64 FX Processor Part Definition Options**

| Part Definition | Revision |
|-----------------|----------|
| AK              | Rev C0   |
| AS              | Rev CG   |
| AT              | Rev CG   |
| BN              | Rev E4   |

**Table 12: AMD Athlon™ 64 FX Processor L2 Cache Size Options**

| OPN Character | Cache Size |
|---------------|------------|
| 5             | 1 MB       |

**Table 13: AMD Athlon™ 64 FX Processor Temperature Options**

| OPN Character | Temperature |
|---------------|-------------|
| P             | 70°C        |
| I             | 63°C        |
| A             | Variable    |

**Table 14: AMD Athlon™ 64 FX Processor Operating Voltage**

| OPN Character | Operating Voltage |
|---------------|-------------------|
| E             | 1.50 V            |
| A             | Variable          |

**Table 15: AMD Athlon™ 64 FX Processor Package Options**

| OPN Character | Package              |
|---------------|----------------------|
| C             | 940 Pin Lidded CμPGA |
| D             | 939 Pin Lidded OμPGA |

**Table 16: AMD Athlon™ 64 FX Processor Model Number Options**

| Model Number | Frequency |
|--------------|-----------|
| FX51         | 2200 MHz  |
| FX53         | 2400 MHz  |
| FX55         | 2600 MHz  |
| FX57         | 2800 MHz  |

**Table 17: AMD Athlon™ 64 FX Processor Thermal Profile**

| Thermal Profile                         | G                            |
|-----------------------------------------|------------------------------|
| Thermal Resistance<br>(case to ambient) | 0.22°C/W                     |
| Local Ambient<br>Temperature            | 40°C                         |
|                                         |                              |
| Tcase Max                               | Power<br>(Thermal Profile G) |
| 49°C                                    | 40.9 W                       |
| 51°C                                    | 50.0 W                       |
| 53°C                                    | 59.1 W                       |
| 55°C                                    | 68.2 W                       |
| 57°C                                    | 77.3 W                       |
| 59°C                                    | 86.4 W                       |
| 61°C                                    | 95.5 W                       |
| 63°C                                    | 104.0 W                      |
| 65°C                                    | N/A                          |
| 67°C                                    | N/A                          |
| 69°C                                    | N/A                          |
| 71°C                                    | N/A                          |

## 2.2 AMD Athlon™ 64 FX Processor BIOS Specifications

Table 18 contains the power and thermal related BIOS specifications for this processor family. Each column in the BIOS specification tables represents a specific Ordering Part Number (OPN). Section 2.1 provides an example of the OPN structure for this processor family.

**Table 18: AMD Athlon™ 64 FX Processor BIOS Specifications**

| Parameter/OPN                         | Notes | ADAFX51CEP5AK |         | ADAFX53CEP5AT |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | FX51          |         | FX53          |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 24h           |         | 24h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00000F58h     |         | 00000F5Ah     |         |
| FID/VID Status MaxVID Field           | 2     | 00h           |         | 00h           |         |
| FID/VID Status MaxFID Field           | 2     | 2Ah           |         | 2Ah           |         |
| FID/VID Status StartVID Field         | 2     | 02h           |         | 02h           |         |
| FID/VID Status StartFID Field         | 2     | 0Eh           |         | 10h           |         |
| L2 Cache Size                         |       | 1 MB          |         | 1 MB          |         |
| <b>Max P-State</b>                    |       | 2200 MHz      |         | 2400 MHz      |         |
| VID Code / VID_VDD                    | 3     | 02h           | 1.500 V | 02h           | 1.500 V |
| Thermal Design Power                  | 4     | 89.0 W        |         | 89.0 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Min P-State</b>                    |       | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |

The notes for this table appear on page 55.

| Parameter/OPN                         | Notes | ADAFX53DEP5AS |         | ADAFX55DEI5AS |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | FX53          |         | FX55          |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 24h           |         | 24h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00000F7Ah     |         | 00000F7Ah     |         |
| FID/VID Status MaxVID Field           | 2     | 00h           |         | 00h           |         |
| FID/VID Status MaxFID Field           | 2     | 2Ah           |         | 2Ah           |         |
| FID/VID Status StartVID Field         | 2     | 02h           |         | 02h           |         |
| FID/VID Status StartFID Field         | 2     | 10h           |         | 12h           |         |
| L2 Cache Size                         |       | 1 MB          |         | 1 MB          |         |
| <b>Max P-State</b>                    |       | 2400 MHz      |         | 2600 MHz      |         |
| VID Code / VID_VDD                    | 3     | 02h           | 1.500 V | 02h           | 1.500 V |
| Thermal Design Power                  | 4     | 89.0 W        |         | 104.0 W       |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Min P-State</b>                    |       | 1200 MHz      |         | 1200 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 25.0 W        |         | 25.0 W        |         |

The notes for this table appear on page 55.

| Parameter/OPN                         | Notes | ADAFX55DAA5BN |         | ADAFX57DAA5BN |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | FX55          |         | FX57          |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 24h           |         | 24h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020F71h     |         | 00020F71h     |         |
| FID/VID Status MaxFID Field           | 2     | 2Ah           |         | 2Ah           |         |
| FID/VID Status StartFID Field         | 2     | 12h           |         | 14h           |         |
| L2 Cache Size                         |       | 1 MB          |         | 1 MB          |         |
| Max HyperTransport Frequency          |       | 1000 Mhz      |         | 1000 Mhz      |         |
| <b>Max P-State</b>                    |       | 2600 MHz      |         | 2800 MHz      |         |
| FID/VID Status MaxVID Field           | 2, 6  | 06h           | 04h     | 06h           | 04h     |
| FID/VID Status StartVID Field         | 2, 6  | 08h           | 06h     | 08h           | 06h     |
| VID Code                              |       | 08h           | 06h     | 08h           | 06h     |
| VID_VDD                               | 3     | 1.350 V       | 1.400 V | 1.350 V       | 1.400 V |
| Thermal Design Power                  | 4     | 104.0 W       |         | 104.0 W       |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Min P-State</b>                    |       | 1200 MHz      |         | 1200 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 42.2 W        |         | 43.4 W        |         |

The notes for this table appear on page 55.

**Notes:**

- 1 CPUID extended function 8000\_0001h fields are used by BIOS in uniquely associating a given processor to the P-states that are valid for that processor. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
- 2 FIDVID Status Register, MSR C001\_0042h.
- 3 The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
- 4 Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
- 5 Implementation of this P-state is optional in BIOS.
- 6 StartVID and MaxVID are programmed during device manufacturing with part-specific values for Rev E and later processors, and can have one or more valid options. All valid options for StartVID, MaxVID, and VID\_VDD will be specified for the corresponding OPN. For information on the relationship of StartVID and MaxVID to VID\_VDD refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094. Contact your FAE for more info on TDP specifications.
- 7 Thermal Design Power (TDP) specifications for dual core processors assume equivalent P-states (Voltage and frequency) and equivalent Tcase conditions for both cores. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094, for details on P-state operation for dual core processors.

## 2.3 AMD Athlon™ 64 FX Processor Thermal/Power Specifications

Table 19 contains the power and thermal specifications for this processor family. Each column in the thermal/power specification tables represents a specific Ordering Part Number (OPN). Section 2.1 on page 49 provides an example of the OPN structure for this processor family.

**Table 19: AMD Athlon™ 64 FX Processor Thermal/Power Specifications**

| Parameter/OPN                  | Notes    | ADAFX51CEP5AK | ADAFX53CEP5AT |
|--------------------------------|----------|---------------|---------------|
| Tcase Max                      | 1        | 70°C          | 70°C          |
| Tcontrol Max                   | 2        | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      | 0.31°C/W      |
| <b>Max P-State</b>             |          | 2200 MHz      | 2400 MHz      |
| VID_VDD                        | 3        | 1.500 V       | 1.500 V       |
| IDD Max                        |          | 57.4 A        | 57.4 A        |
| Thermal Design Power           | 4        | 89.0 W        | 89.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Min P-State</b>             |          | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Halt/Stop Grant</b>         |          |               |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | N/A           | N/A           |
| I/O Power                      | 8, 12    | 2.9 W         | 2.9 W         |
| <b>S3</b>                      | 7        |               |               |
| I/O Power                      | 7, 9, 12 | 1.4 W         | 750 mW        |

The notes for this table appear on page 59.

| Parameter/OPN                  | Notes    | ADAFX53DEP5AS | ADAFX55DEI5AS |
|--------------------------------|----------|---------------|---------------|
| T <sub>case</sub> Max          | 1        | 70°C          | 63°C          |
| T <sub>control</sub> Max       | 2        | 70°C          | 63°C          |
| T <sub>ambient</sub>           |          | 42°C          | 40°C          |
| Thermal Resistance (case-amb)  |          | 0.31°C/W      | 0.22°C/W      |
| <b>Max P-State</b>             |          | 2400 MHz      | 2600 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.500 V       | 1.500 V       |
| IDD Max                        |          | 57.4 A        | 67.4 A        |
| Thermal Design Power           | 4        | 89.0 W        | 104.0 W       |
| <b>Intermediate P-State #1</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Min P-State</b>             |          | 1200 MHz      | 1200 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 20.1 A        | 20.1 A        |
| Thermal Design Power           | 4        | 25.0 W        | 25.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        | 32.1 A        |
| IDDC1 Max @ Min P-State        | 6        | N/A           | N/A           |
| I/O Power                      | 8, 12    | 2.9 W         | 2.9 W         |
| <b>S3</b>                      | 7        |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        |

The notes for this table appear on page 59.

| Parameter/OPN                  | Notes    | ADAFX55DAA5BN     | ADAFX57DAA5BN     |
|--------------------------------|----------|-------------------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 63°C      | 49°C to 63°C      |
| Tcontrol Max                   | 2        | 70°C              | 70°C              |
| Tambient                       |          | 40°C              | 40°C              |
| Thermal Resistance (case-amb)  |          | 0.22°C/W          | 0.22°C/W          |
| Thermal Profile                | 14       | G                 | G                 |
| <b>Max P-State</b>             |          | 2600 MHz          | 2800 MHz          |
| VID_VDD                        | 3        | 1.350 V   1.400 V | 1.350 V   1.400 V |
| IDD Max                        |          | 74.9 A            | 74.9 A            |
| Thermal Design Power           | 4        | 104.0 W           | 104.0 W           |
| <b>Intermediate P-State #1</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4        |                   |                   |
| <b>Intermediate P-State #2</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4        |                   |                   |
| <b>Intermediate P-State #3</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4        |                   |                   |
| <b>Intermediate P-State #4</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4        |                   |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4        |                   |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4        |                   |                   |
| <b>Min P-State</b>             |          | 1200 MHz          | 1200 MHz          |
| VID_VDD                        | 3        | 1.100 V           | 1.100 V           |
| IDD Max                        |          | 35.7 A            | 36.8 A            |
| Thermal Design Power           | 4        | 42.2 W            | 43.4 W            |
| <b>Halt/Stop Grant</b>         |          |                   |                   |
| IDDC1 Max @ Max P-State        | 5        | 34.8 A            | 34.8 A            |
| IDDC1 Max @ Min P-State        | 6        | 7.1 A             | 7.1 A             |
| I/O Power                      | 8, 12    | 2.9 W             | 2.9 W             |
| <b>S3</b>                      | 7        |                   |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            | 500 mW            |

The notes for this table appear on page 59.

**Notes:**

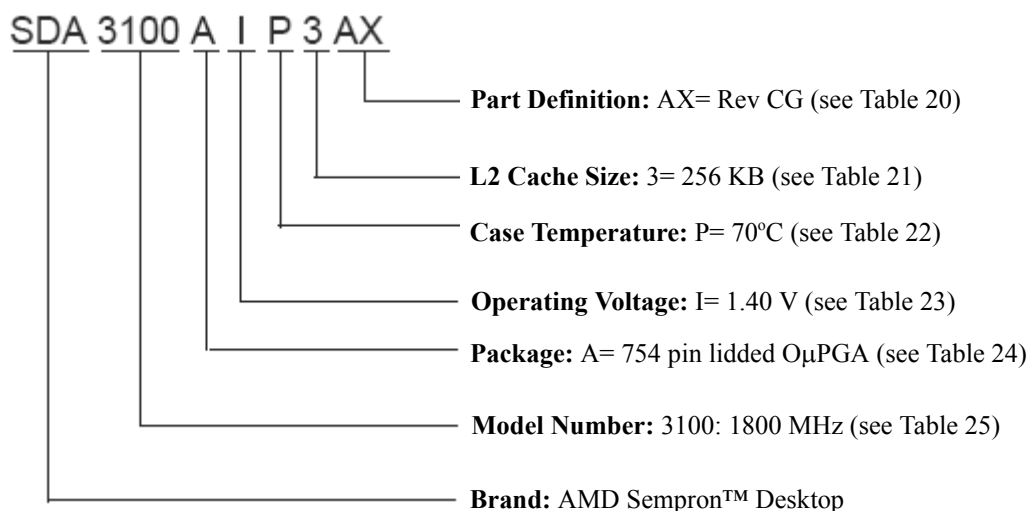
1. Tcase max is the maximum case temperature specification which is a physical value in degrees Celsius. This value is programmed into Rev D and later processors. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. Tcontrol max (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. Tcontrol max represents the value at which the processor has reached Tcase max when measuring the thermal diode with a dual sourcing current temperature sensor. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
3. The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
4. Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
5. Assumes Tcase max, max P-state VID\_VDD, clock divider set to 32.
6. Assumes 50°C, min P-state VID\_VDD, clock divider set to 32.
7. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tri-stated except CKE pins. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
8. Thermal Design Power dissipated by the processor VDDIO, VTT, VLDT, and VDDA power planes only.
9. Thermal Design Power dissipated by the processor VDDIO and VTT power planes only.
10. Refer to the AMD Athlon™ 64 Processor Desktop Power Roadmap, order #26882, for IDD Max and Thermal Design Power requirements for future processor revisions.
11. Implementation of this P-state is optional in BIOS.
12. Assumes VDDIO = 2.6 V and VTT = VDDIO / 2. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
13. Tcase max is programmed during device manufacturing with part-specific values for Rev E and later processors, and can be any valid Tcase max value in the range specified for the corresponding OPN.
14. Thermal Design Power (TDP) and IDD max for Rev E and later processors are the limits at the highest Tcase max in the specified range for the corresponding OPN. Products will conform to the TDP and IDD Max limits at all valid voltages. The relationship of Tcase max and Thermal Profile to TDP for a specific device is defined in Table 17.

### 3 AMD Sempron™ Processor

The following sections contain thermal/power and related BIOS specifications for AMD Sempron™ processors. Each column in the BIOS and thermal/power tables represents a specific Ordering Part Number (OPN). Section 3.1 provides an example of the OPN structure for this processor family.

For all other electrical specifications for the processor, refer to the *AMD Sempron™ Product Data Sheet*, order #31804. For power management BIOS requirements, refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 Processors and AMD Opteron™ Processors*, order #26094.

#### 3.1 Ordering Part Number Description



**Figure 3. AMD Sempron™ Processor Ordering Part Number Example**

**Table 20: AMD Sempron™ Processor Part Definition Options**

| Part Definition | Revision | Package Drawing |
|-----------------|----------|-----------------|
| AX              | Rev CG   | Lidded          |
| BA              | Rev D0   | Lidded          |
| BX              | Rev E6   | Lidded          |

**Table 21: AMD Sempron™ Processor L2 Cache Size Options**

| OPN Character | Cache Size |
|---------------|------------|
| 3             | 256 KB     |
| 2             | 128 KB     |

**Table 22: AMD Sempron™ Processor Temperature Options**

| OPN Character | Temperature |
|---------------|-------------|
| P             | 70°C        |
| O             | 69°C        |

**Table 23: AMD Sempron™ Processor Operating Voltage**

| OPN Character | Operating Voltage |
|---------------|-------------------|
| I             | 1.40 V            |

**Table 24: AMD Sempron™ Processor Package Options**

| OPN Character | Package              |
|---------------|----------------------|
| A             | 754 Pin Lidded OμPGA |

**Table 25: AMD Sempron™ Processor Model Number Options**

| Package              | Cache Size | Frequency | Model Number |
|----------------------|------------|-----------|--------------|
| 754 Pin Lidded OμPGA | 128 KB     | 1600 MHz  | 2600+        |
| 754 Pin Lidded OμPGA | 256 KB     | 1600 MHz  | 2800+        |
| 754 Pin Lidded OμPGA | 128 KB     | 1800 MHz  | 3000+        |
| 754 Pin Lidded OμPGA | 256 KB     | 1800 MHz  | 3100+        |
| 754 Pin Lidded OμPGA | 128 KB     | 2000 MHz  | 3300+        |
| 754 Pin Lidded OμPGA | 256 KB     | 1400 MHz  | 2500+        |
| 754 Pin Lidded OμPGA | 256 KB     | 2000 MHz  | 3400+        |

## 3.2 AMD Sempron™ Processor BIOS Specifications

Table 26 contains the power and thermal related BIOS specifications for this processor family. Each column in the BIOS specification tables represents a specific Ordering Part Number (OPN). Section 3.1 on page 60 provides an example of the OPN structure for this processor family.

**Table 26: AMD Sempron™ Processor BIOS Specifications**

| Parameter/OPN                            | Notes | SDA3100AIP3AX |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3100+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 22h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00000FC0h     |         |
| FID/VID Status MaxVID Field              | 2     | 04h           |         |
| FID/VID Status MaxFID Field              | 2     | 0Ah           |         |
| FID/VID Status StartVID Field            | 2     | 06h           |         |
| FID/VID Status StartFID Field            | 2     | 0Ah           |         |
| L2 Cache Size                            |       | 256 KB        |         |
| <b>Max P-State</b>                       |       | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 06h           | 1.400 V |
| Thermal Design Power                     | 4     | 62.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4     | 20.0 W        |         |

The notes for this table appear on page 67.

| Parameter/OPN                         | Notes | SDA2600AIO2BA | SDA2800AIO3BA | SDA3000AIO2BA |
|---------------------------------------|-------|---------------|---------------|---------------|
| Model Number                          |       | 2600+         | 2800+         | 3000+         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 22h           | 22h           | 22h           |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00010FC0h     | 00010FC0h     | 00010FC0h     |
| FID/VID Status MaxVID Field           | 2     | 04h           | 04h           | 04h           |
| FID/VID Status MaxFID Field           | 2     | 08h           | 08h           | 0Ah           |
| FID/VID Status StartVID Field         | 2     | 06h           | 06h           | 06h           |
| FID/VID Status StartFID Field         | 2     | 08h           | 08h           | 0Ah           |
| L2 Cache Size                         |       | 128 KB        | 256 KB        | 128 KB        |
| <b>Max P-State</b>                    |       | 1600 MHz      | 1600 MHz      | 1800 MHz      |
| VID Code / VID_VDD                    | 3     | 06h 1.400 V   | 06h 1.400 V   | 06h 1.400 V   |
| Thermal Design Power                  | 4     | 59.0 W        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #2</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #3</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #4</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #5</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #6</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Min P-State</b>                    |       | N/A           | N/A           | 1000 MHz      |
| VID Code / VID_VDD                    | 3     |               |               | 12h 1.100 V   |
| Thermal Design Power                  | 4     |               |               | 19.0 W        |

The notes for this table appear on page 67.

| Parameter/OPN                         | Notes | SDA3100AIO3BA |         | SDA3300AIO2BA |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | 3100+         |         | 3300+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 22h           |         | 22h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00010FC0h     |         | 00010FC0h     |         |
| FID/VID Status MaxVID Field           | 2     | 04h           |         | 04h           |         |
| FID/VID Status MaxFID Field           | 2     | 0Ah           |         | 0Ch           |         |
| FID/VID Status StartVID Field         | 2     | 06h           |         | 06h           |         |
| FID/VID Status StartFID Field         | 2     | 0Ah           |         | 0Ch           |         |
| L2 Cache Size                         |       | 256 KB        |         | 128 KB        |         |
| <b>Max P-State</b>                    |       | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 06h           | 1.400 V | 06h           | 1.400 V |
| Thermal Design Power                  | 4     | 59.0 W        |         | 59.0 W        |         |
| <b>Intermediate P-State #1</b>        | 5     | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         | 08h           | 1.350 V |
| Thermal Design Power                  | 4     |               |         | 48.8 W        |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4     |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4     | 19.0 W        |         | 18.0 W        |         |

The notes for this table appear on page 67.

| Parameter/OPN                            | Notes | SDA2500AIO3BX |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 2500+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 26h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00020FC2h     |         |
| FID/VID Status MaxVID Field              | 2     | 04h           |         |
| FID/VID Status MaxFID Field              | 2     | 06h           |         |
| FID/VID Status StartVID Field            | 2     | 06h           |         |
| FID/VID Status StartFID Field            | 2     | 06h           |         |
| L2 Cache Size                            |       | 256 KB        |         |
| <b>Max P-State</b>                       |       | 1400 MHz      |         |
| VID Code / VID_VDD                       | 3     | 06h           | 1.400 V |
| Thermal Design Power                     | 4     | 59.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |
| <b>Min P-State</b>                       |       | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4     |               |         |

The notes for this table appear on page 67.

| Parameter/OPN                         | Notes | SDA2600AIO2BX | SDA2800AIO3BX | SDA3000AIO2BX |
|---------------------------------------|-------|---------------|---------------|---------------|
| Model Number                          |       | 2600+         | 2800+         | 3000+         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 26h           | 26h           | 26h           |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020FC2h     | 00020FC2h     | 00020FC2h     |
| FID/VID Status MaxVID Field           | 2     | 04h           | 04h           | 04h           |
| FID/VID Status MaxFID Field           | 2     | 08h           | 08h           | 0Ah           |
| FID/VID Status StartVID Field         | 2     | 06h           | 06h           | 06h           |
| FID/VID Status StartFID Field         | 2     | 08h           | 08h           | 0Ah           |
| L2 Cache Size                         |       | 128 KB        | 256 KB        | 128 KB        |
| <b>Max P-State</b>                    |       | 1600 MHz      | 1600 MHz      | 1800 MHz      |
| VID Code / VID_VDD                    | 3     | 06h 1.400 V   | 06h 1.400 V   | 06h 1.400 V   |
| Thermal Design Power                  | 4     | 59.0 W        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #2</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #3</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #4</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #5</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #6</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Min P-State</b>                    |       | N/A           | N/A           | 1000 MHz      |
| VID Code / VID_VDD                    | 3     |               |               | 12h 1.100 V   |
| Thermal Design Power                  | 4     |               |               | 21.7 W        |

The notes for this table appear on page 67.

| Parameter/OPN                         | Notes | SDA3100AIO3BX | SDA3300AIO2BX | SDA3400AIO3BX |
|---------------------------------------|-------|---------------|---------------|---------------|
| Model Number                          |       | 3100+         | 3300+         | 3400+         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 26h           | 26h           | 26h           |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020FC2h     | 00020FC2h     | 00020FC2h     |
| FID/VID Status MaxVID Field           | 2     | 04h           | 04h           | 04h           |
| FID/VID Status MaxFID Field           | 2     | 0Ah           | 0Ch           | 0Ch           |
| FID/VID Status StartVID Field         | 2     | 06h           | 06h           | 06h           |
| FID/VID Status StartFID Field         | 2     | 0Ah           | 0Ch           | 0Ch           |
| L2 Cache Size                         |       | 256 KB        | 128 KB        | 256 KB        |
| <b>Max P-State</b>                    |       | 1800 MHz      | 2000 MHz      | 2000 MHz      |
| VID Code / VID_VDD                    | 3     | 06h   1.400 V | 06h   1.400 V | 06h   1.400 V |
| Thermal Design Power                  | 4     | 59.0 W        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b>        | 5     | N/A           | 1800 MHz      | 1800 MHz      |
| VID Code / VID_VDD                    | 3     |               | 08h   1.350 V | 08h   1.350 V |
| Thermal Design Power                  | 4     |               | 49.6 W        | 49.6 W        |
| <b>Intermediate P-State #2</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #3</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #4</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #5</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Intermediate P-State #6</b>        | 5     | N/A           | N/A           | N/A           |
| VID Code / VID_VDD                    | 3     |               |               |               |
| Thermal Design Power                  | 4     |               |               |               |
| <b>Min P-State</b>                    |       | 1000 MHz      | 1000 MHz      | 1000 MHz      |
| VID Code / VID_VDD                    | 3     | 12h   1.100 V | 12h   1.100 V | 12h   1.100 V |
| Thermal Design Power                  | 4     | 21.7 W        | 20.7 W        | 20.7 W        |

The notes for this table appear on page 67.

#### Notes:

- CPUID extended function 8000\_0001h fields are used by BIOS in uniquely associating a given processor to the P-states that are valid for that processor. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
- FIDVID Status Register, MSR C001\_0042h.
- The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
- Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
- Implementation of this P-state is optional in BIOS.

### 3.3 AMD Sempron™ Processor Thermal/Power Specifications

Table 27 contains the power and thermal specifications for this processor family. Each column in the thermal/power specification tables represents a specific Ordering Part Number (OPN). Section 3.1 on page 60 provides an example of the OPN structure for this processor family.

**Table 27: AMD Sempron™ Processor Thermal/Power Specifications**

| Parameter/OPN                  | Notes    | SDA3100AIP3AX |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 70°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 42.7 A        |
| Thermal Design Power           | 4        | 62.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #2</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       |
| IDD Max                        |          | 16.2 A        |
| Thermal Design Power           | 4        | 20.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 30.0 A        |
| IDDC1 Max @ Min P-State        | 6        | 7.0 A         |
| I/O Power                      | 8, 12    | 2.2 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 750 mW        |

The notes for this table appear on page 74.

| Parameter/OPN                  | Notes    | SDA2600AIO2BA | SDA2800AIO3BA | SDA3000AIO2BA |
|--------------------------------|----------|---------------|---------------|---------------|
| Tcase Max                      | 1        | 69°C          | 69°C          | 69°C          |
| Tcontrol Max                   | 2        | 70°C          | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      | 0.45°C/W      | 0.45°C/W      |
| <b>Max P-State</b>             |          | 1600 MHz      | 1600 MHz      | 1800 MHz      |
| VID_VDD                        | 3        | 1.400 V       | 1.400 V       | 1.400 V       |
| IDD Max                        |          | 40.6 A        | 40.6 A        | 40.6 A        |
| Thermal Design Power           | 4        | 59.0 W        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Min P-State</b>             |          | N/A           | N/A           | 1000 MHz      |
| VID_VDD                        | 3        |               |               | 1.100 V       |
| IDD Max                        |          |               |               | 15.2 A        |
| Thermal Design Power           | 4        |               |               | 19.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |               |
| IDDC1 Max @ Max P-State        | 5        | 29.2 A        | 29.2 A        | 29.2 A        |
| IDDC1 Max @ Min P-State        | 6        | N/A           | N/A           | 5.8 A         |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        | 750 mW        |

The notes for this table appear on page 74.

| Parameter/OPN                  | Notes    | SDA3100AIO3BA | SDA3300AIO2BA |
|--------------------------------|----------|---------------|---------------|
| T <sub>case</sub> Max          | 1        | 69°C          | 69°C          |
| T <sub>control</sub> Max       | 2        | 70°C          | 70°C          |
| T <sub>ambient</sub>           |          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      | 0.45°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      | 2000 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.400 V       | 1.400 V       |
| IDD Max                        |          | 40.6 A        | 40.6 A        |
| Thermal Design Power           | 4        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | 1800 MHz      |
| VID <sub>_VDD</sub>            | 3        |               | 1.350 V       |
| IDD Max                        |          |               | 34.5 A        |
| Thermal Design Power           | 4        |               | 48.8 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           |
| VID <sub>_VDD</sub>            | 3        |               |               |
| IDD Max                        |          |               |               |
| Thermal Design Power           | 4        |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      |
| VID <sub>_VDD</sub>            | 3        | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 15.2 A        | 14.4 A        |
| Thermal Design Power           | 4        | 19.0 W        | 18.0 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |
| IDDC1 Max @ Max P-State        | 5        | 29.2 A        | 28.7 A        |
| IDDC1 Max @ Min P-State        | 6        | 5.8 A         | 5.6 A         |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |
| I/O Power                      | 7, 9, 12 | 750 mW        | 750 mW        |

The notes for this table appear on page 74.

| Parameter/OPN                  | Notes    | SDA2500AIO3BX |
|--------------------------------|----------|---------------|
| Tcase Max                      | 1        | 69°C          |
| Tcontrol Max                   | 2        | 70°C          |
| Tambient                       |          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      |
| <b>Max P-State</b>             |          | 1400 MHz      |
| VID_VDD                        | 3        | 1.400 V       |
| IDD Max                        |          | 40.6 A        |
| Thermal Design Power           | 4        | 59.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #2</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Min P-State</b>             |          | N/A           |
| VID_VDD                        | 3        |               |
| IDD Max                        |          |               |
| Thermal Design Power           | 4        |               |
| <b>Halt/Stop Grant</b>         |          |               |
| IDDC1 Max @ Max P-State        | 5        | 21.6 A        |
| IDDC1 Max @ Min P-State        | 6        | N/A           |
| I/O Power                      | 8, 12    | 2.2 W         |
| <b>S3</b>                      | 7        |               |
| I/O Power                      | 7, 9, 12 | 500 mW        |

The notes for this table appear on page 74.

| Parameter/OPN                  | Notes    | SDA2600AIO2BX | SDA2800AIO3BX | SDA3000AIO2BX |
|--------------------------------|----------|---------------|---------------|---------------|
| Tcase Max                      | 1        | 69°C          | 69°C          | 69°C          |
| Tcontrol Max                   | 2        | 70°C          | 70°C          | 70°C          |
| Tambient                       |          | 42°C          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      | 0.45°C/W      | 0.45°C/W      |
| <b>Max P-State</b>             |          | 1600 MHz      | 1600 MHz      | 1800 MHz      |
| VID_VDD                        | 3        | 1.400 V       | 1.400 V       | 1.400 V       |
| IDD Max                        |          | 40.6 A        | 40.6 A        | 40.6 A        |
| Thermal Design Power           | 4        | 59.0 W        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Min P-State</b>             |          | N/A           | N/A           | 1000 MHz      |
| VID_VDD                        | 3        |               |               | 1.100 V       |
| IDD Max                        |          |               |               | 17.7 A        |
| Thermal Design Power           | 4        |               |               | 21.7 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |               |
| IDDC1 Max @ Max P-State        | 5        | 21.6 A        | 21.6 A        | 21.6 A        |
| IDDC1 Max @ Min P-State        | 6        | N/A           | N/A           | 4.6 A         |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |               |
| I/O Power                      | 7, 9, 12 | 500 mW        | 500 mW        | 500 mW        |

The notes for this table appear on page 74.

| Parameter/OPN                  | Notes    | SDA3100AIO3BX | SDA3300AIO2BX | SDA3400AIO3BX |
|--------------------------------|----------|---------------|---------------|---------------|
| T <sub>case</sub> Max          | 1        | 69°C          | 69°C          | 69°C          |
| T <sub>control</sub> Max       | 2        | 70°C          | 70°C          | 70°C          |
| T <sub>ambient</sub>           |          | 42°C          | 42°C          | 42°C          |
| Thermal Resistance (case-amb)  |          | 0.45°C/W      | 0.45°C/W      | 0.45°C/W      |
| <b>Max P-State</b>             |          | 1800 MHz      | 2000 MHz      | 2000 MHz      |
| VID_VDD                        | 3        | 1.400 V       | 1.400 V       | 1.400 V       |
| IDD Max                        |          | 40.6 A        | 40.6 A        | 40.6 A        |
| Thermal Design Power           | 4        | 59.0 W        | 59.0 W        | 59.0 W        |
| <b>Intermediate P-State #1</b> | 11       | N/A           | 1800 MHz      | 1800 MHz      |
| VID_VDD                        | 3        |               | 1.350 V       | 1.350 V       |
| IDD Max                        |          |               | 35.1 A        | 35.1 A        |
| Thermal Design Power           | 4        |               | 49.6 W        | 49.6 W        |
| <b>Intermediate P-State #2</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #3</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #4</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #5</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Intermediate P-State #6</b> | 11       | N/A           | N/A           | N/A           |
| VID_VDD                        | 3        |               |               |               |
| IDD Max                        |          |               |               |               |
| Thermal Design Power           | 4        |               |               |               |
| <b>Min P-State</b>             |          | 1000 MHz      | 1000 MHz      | 1000 MHz      |
| VID_VDD                        | 3        | 1.100 V       | 1.100 V       | 1.100 V       |
| IDD Max                        |          | 17.7 A        | 16.8 A        | 16.8 A        |
| Thermal Design Power           | 4        | 21.7 W        | 20.7 W        | 20.7 W        |
| <b>Halt/Stop Grant</b>         |          |               |               |               |
| IDDC1 Max @ Max P-State        | 5        | 21.6 A        | 21.6 A        | 21.6 A        |
| IDDC1 Max @ Min P-State        | 6        | 4.6 A         | 4.6 A         | 4.6 A         |
| I/O Power                      | 8, 12    | 2.2 W         | 2.2 W         | 2.2 W         |
| <b>S3</b>                      | 7        |               |               |               |
| I/O Power                      | 7, 9, 12 | 500 mW        | 500 mW        | 500 mW        |

The notes for this table appear on page 74.

**Notes:**

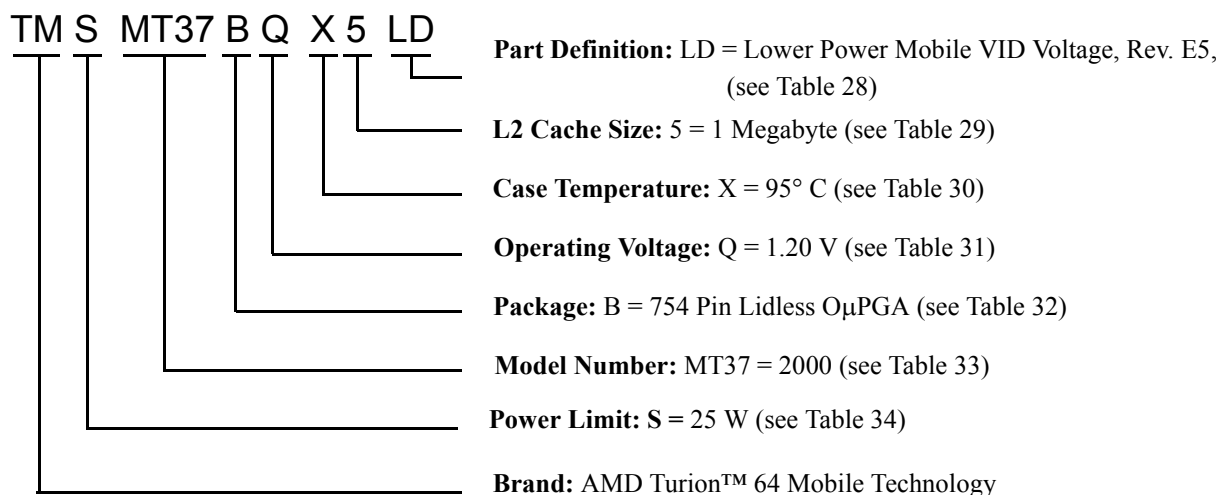
1. Tcase max is the maximum case temperature specification which is a physical value in degrees Celsius. This value is programmed into Rev D and later processors. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. Tcontrol max (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. Tcontrol max represents the value at which the processor has reached Tcase max when measuring the thermal diode with a dual sourcing current temperature sensor. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
3. The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
4. Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
5. Assumes Tcase max, max P-state VID\_VDD, clock divider set to 32.
6. Assumes 50°C, min P-state VID\_VDD, clock divider set to 32.
7. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tri-stated except CKE pins. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
8. Thermal Design Power dissipated by the processor VDDIO, VTT, VLDT, and VDDA power planes only.
9. Thermal Design Power dissipated by the processor VDDIO and VTT power planes only.
10. Refer to the AMD Athlon™ 64 Processor Desktop Power Roadmap, order #26882, for IDD Max and Thermal Design Power requirements for future processor revisions.
11. Implementation of this P-state is optional in BIOS.
12. Assumes VDDIO = 2.6 V and VTT = VDDIO / 2. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.

## 4 AMD Turion™ 64 Mobile Technology

The following sections contain AMD Turion™ 64 Mobile Technology thermal/power and related BIOS specifications for processors. Each column in the BIOS and thermal/power tables represents a specific Ordering Part Number (OPN). Section 4.1 provides an example of the OPN structure for this processor family.

For all other electrical specifications for the processor, refer to the *AMD Turion™ 64 Mobile Technology Product Data Sheet*, order #32816. For power management BIOS requirements, refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 Processors and AMD Opteron™ Processors*, order #26094.

### 4.1 Ordering Part Number Description



**Figure 4. AMD Turion™ 64 Mobile Technology Ordering Part Number Example**

**Table 28: AMD Turion™ 64 Mobile Technology Part Definition Options**

| Part Definition | VID Voltage      | Revision | Package Drawing |
|-----------------|------------------|----------|-----------------|
| LD              | Low Power Mobile | Rev E5   | B4              |

**Note:** Refer to the *AMD Functional Data Sheet, 754 Pin Package*, order #31410, for package drawings. Refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 Processors and AMD Opteron™ Processors*, order #26094, for information on translating VID Codes to Standard or Low Power Mobile Voltages.

**Table 29: AMD Turion™ 64 Mobile Technology L2 Cache Size Options**

| OPN Character | Cache Size |
|---------------|------------|
| 5             | 1 MB       |
| 4             | 512 KB     |

**Table 30: AMD Turion™ 64 Mobile Technology Temperature Options**

| OPN Character | Temperature |
|---------------|-------------|
| X             | 95°C        |

**Table 31: AMD Turion™ 64 Mobile Technology Operating Voltage**

| OPN Character | Operating Voltage |
|---------------|-------------------|
| Q             | 1.20 V            |

**Table 32: AMD Turion™ 64 Mobile Technology Package Options**

| OPN Character | Package               |
|---------------|-----------------------|
| B             | 754 Pin Lidless OμPGA |

**Table 33: AMD Turion™ 64 Mobile Technology Model Number Options**

| Cache Size | Frequency | Model Number | Power Limit |
|------------|-----------|--------------|-------------|
| 512 KB     | 1800 MHz  | MT32         | 25W         |
| 1 MB       | 1800 MHz  | MT34         | 25W         |
| 1 MB       | 2000 MHz  | MT37         | 25W         |

**Table 34: AMD Turion™ 64 Mobile Technology Power Limit**

| OPN Character | Power Limit |
|---------------|-------------|
| S             | 25 W        |

## 4.2 AMD Turion™ 64 Mobile Technology BIOS Specifications

Table 35 contains the power and thermal related BIOS specifications for this processor family. Each column in the BIOS specification tables represents a specific Ordering Part Number (OPN). Section 4.1 on page 75 provides an example of the OPN structure for this processor family.

**Table 35: AMD Turion™ 64 Mobile Technology BIOS Specifications**

| Parameter/OPN                            | Notes   | TMSMT32BQX4LD |         |
|------------------------------------------|---------|---------------|---------|
| Model Number                             |         | MT32          |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1       | 0Bh           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1       | 00020F42h     |         |
| FID/VID Status MaxVID Field              | 2       | 08h           |         |
| FID/VID Status MaxFID Field              | 2       | 0Ah           |         |
| FID/VID Status StartVID Field            | 2       | 16h           |         |
| FID/VID Status StartFID Field            | 2       | 00h           |         |
| AltVID Code / VID_VDD                    | 3, 4, 5 | 18h           | 0.850 V |
| L2 Cache Size                            |         | 512 KB        |         |
| Max P-State                              |         | 1800 MHz      |         |
| VID Code / VID_VDD                       | 4, 5    | 0Ah           | 1.200 V |
| Thermal Design Power                     | 6       | 24.0 W        |         |
| Intermediate P-State #1                  | 7       | 1600 MHz      |         |
| VID Code / VID_VDD                       | 4, 5    | 0Ch           | 1.150 V |
| Thermal Design Power                     | 6       | 19.9 W        |         |
| Intermediate P-State #2                  | 7       | N/A           |         |
| VID Code / VID_VDD                       | 4, 5    |               |         |
| Thermal Design Power                     | 6       |               |         |
| Intermediate P-State #3                  | 7       | N/A           |         |
| VID Code / VID_VDD                       | 4, 5    |               |         |
| Thermal Design Power                     | 6       |               |         |
| Intermediate P-State #4                  | 7       | N/A           |         |
| VID Code / VID_VDD                       | 4, 5    |               |         |
| Thermal Design Power                     | 6       |               |         |
| Intermediate P-State #5                  | 7       | N/A           |         |
| VID Code / VID_VDD                       | 4, 5    |               |         |
| Thermal Design Power                     | 6       |               |         |
| Intermediate P-State #6                  | 7       | N/A           |         |
| VID Code / VID_VDD                       | 4, 5    |               |         |
| Thermal Design Power                     | 6       |               |         |
| Min P-State                              |         | 800 MHz       |         |
| VID Code / VID_VDD                       | 4, 5    | 16h           | 0.900 V |
| Thermal Design Power                     | 6       | 7.7 W         |         |

The notes for this table appear on page 79.

| Parameter/OPN                         | Notes   | TMS MT34BQX5LD |         | TMS MT37BQX5LD |         |
|---------------------------------------|---------|----------------|---------|----------------|---------|
| Model Number                          |         | MT34           |         | MT37           |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1       | 0Bh            |         | 0Bh            |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1       | 00020F42h      |         | 00020F42h      |         |
| FID/VID Status MaxVID Field           | 2       | 08h            |         | 08h            |         |
| FID/VID Status MaxFID Field           | 2       | 0Ah            |         | 0Ch            |         |
| FID/VID Status StartVID Field         | 2       | 16h            |         | 16h            |         |
| FID/VID Status StartFID Field         | 2       | 00h            |         | 00h            |         |
| AltVID Code / VID_VDD                 | 3, 4, 5 | 18h            | 0.850 V | 18h            | 0.850 V |
| L2 Cache Size                         |         | 1 MB           |         | 1 MB           |         |
| Max P-State                           |         | 1800 MHz       |         | 2000 MHz       |         |
| VID Code / VID_VDD                    | 4, 5    | 0Ah            | 1.200 V | 0Ah            | 1.200 V |
| Thermal Design Power                  | 6       | 24.0 W         |         | 25.0 W         |         |
| Intermediate P-State #1               | 7       | 1600 MHz       |         | 1800 MHz       |         |
| VID Code / VID_VDD                    | 4, 5    | 0Ch            | 1.150 V | 0Ch            | 1.150 V |
| Thermal Design Power                  | 6       | 19.9 W         |         | 20.9 W         |         |
| Intermediate P-State #2               | 7       | N/A            |         | 1600 MHz       |         |
| VID Code / VID_VDD                    | 4, 5    |                |         | 0Eh            | 1.100 V |
| Thermal Design Power                  | 6       |                |         | 17.5 W         |         |
| Intermediate P-State #3               | 7       | N/A            |         | N/A            |         |
| VID Code / VID_VDD                    | 4, 5    |                |         |                |         |
| Thermal Design Power                  | 6       |                |         |                |         |
| Intermediate P-State #4               | 7       | N/A            |         | N/A            |         |
| VID Code / VID_VDD                    | 4, 5    |                |         |                |         |
| Thermal Design Power                  | 6       |                |         |                |         |
| Intermediate P-State #5               | 7       | N/A            |         | N/A            |         |
| VID Code / VID_VDD                    | 4, 5    |                |         |                |         |
| Thermal Design Power                  | 6       |                |         |                |         |
| Intermediate P-State #6               | 7       | N/A            |         | N/A            |         |
| VID Code / VID_VDD                    | 4, 5    |                |         |                |         |
| Thermal Design Power                  | 6       |                |         |                |         |
| Min P-State                           |         | 800 MHz        |         | 800 MHz        |         |
| VID Code / VID_VDD                    | 4, 5    | 16h            | 0.900 V | 16h            | 0.900 V |
| Thermal Design Power                  | 6       | 7.9 W          |         | 7.9 W          |         |

The notes for this table appear on page 79.

**Notes:**

1. CUID extended function 8000\_0001h fields are used by BIOS in uniquely associating a given processor to the P-states that are valid for that processor. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. FIDVID Status Register, MSR C001\_0042h.
3. BIOS programs the AltVID setting into Function 3: Offset D8h. Not all systems are AltVID capable. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094 for further details.
4. The VID\_VDD voltage for Low Power Mobile parts corresponds to 0 load (0 Amp IDD) conditions for the VID[4:0] requested VDD supply level. Refer to the AMD Functional Data Sheet, 754 Pin Package, order #31410, for details.
5. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order #26094, for information on translating VID Codes to Standard or Low Power Mobile Voltages.
6. Thermal Design Power (TDP) for Low Power Mobile parts is measured under the conditions of T<sub>die</sub> Max, IDD Max, and VDD=VDD<sub>dc</sub> Typ, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA. Contact your Field Application Engineer for more information on TDP specifications.
7. Implementation of this P-state is optional in BIOS.

### 4.3 AMD Turion™ 64 Mobile Technology Thermal/Power Specifications

Table 36 on page 81 contains the power and thermal specifications for this processor family. Each column in the thermal/power specification tables represents a specific Ordering Part Number (OPN). Section 4.1 on page 75 provides an example of the OPN structure for this processor family.

**Table 36: AMD Turion™ 64 Mobile Technology Thermal/Power Specifications**

| Parameter/OPN                    | Notes     | TMSMT32BQX4LD |         |
|----------------------------------|-----------|---------------|---------|
| Tdie Max                         |           | 95°C          |         |
| Tambient / Trise                 |           | 35°C          | 10°C    |
| Thermal Resistance (die-amb)     |           | 2.08°C/W      |         |
| <b>Max P-State</b>               |           | 1800 MHz      |         |
| VID_VDD / VDD_dc Typ             | 1, 2      | 1.200 V       | 1.166 V |
| IDD Max                          |           | 18.70 A       |         |
| Thermal Design Power             | 3         | 24.0 W        |         |
| <b>Intermediate P-State #1</b>   | 12        | 1600 MHz      |         |
| VID_VDD / VDD_dc Typ             | 1, 2      | 1.150 V       | 1.121 V |
| IDD Max                          |           | 15.79 A       |         |
| Thermal Design Power             | 3         | 19.9 W        |         |
| <b>Intermediate P-State #2</b>   | 12        | N/A           |         |
| VID_VDD / VDD_dc Typ             | 1, 2      |               |         |
| IDD Max                          |           |               |         |
| Thermal Design Power             | 3         |               |         |
| <b>Intermediate P-State #3</b>   | 12        | N/A           |         |
| VID_VDD / VDD_dc Typ             | 1, 2      |               |         |
| IDD Max                          |           |               |         |
| Thermal Design Power             | 3         |               |         |
| <b>Intermediate P-State #4</b>   | 12        | N/A           |         |
| VID_VDD / VDD_dc Typ             | 1, 2      |               |         |
| IDD Max                          |           |               |         |
| Thermal Design Power             | 3         |               |         |
| <b>Intermediate P-State #5</b>   | 12        | N/A           |         |
| VID_VDD / VDD_dc Typ             | 1, 2      |               |         |
| IDD Max                          |           |               |         |
| Thermal Design Power             | 3         |               |         |
| <b>Intermediate P-State #6</b>   | 12        | N/A           |         |
| VID_VDD / VDD_dc Typ             | 1, 2      |               |         |
| IDD Max                          |           |               |         |
| Thermal Design Power             | 3         |               |         |
| <b>Min P-State</b>               |           | 800 MHz       |         |
| VID_VDD / VDD_dc Typ             | 1, 2      | 0.900 V       | 0.889 V |
| IDD Max                          |           | 6.19 A        |         |
| Thermal Design Power             | 3         | 7.9 W         |         |
| <b>Halt/Stop Grant</b>           |           |               |         |
| IDDC1 Max @ Max P-State          | 4         | 6.10 A        |         |
| IDDC1 Max @ Min P-State          | 5         | 1.46 A        |         |
| I/O Power                        | 10, 13    | 2.2 W         |         |
| <b>C3/S1 Min P-State VID_VDD</b> | 6         |               |         |
| IDDC3 Max                        |           | 0.83 A        |         |
| I/O Power                        | 10, 13    | 360 mW        |         |
| <b>C3/S1 AltVID</b>              | 7         |               |         |
| VID_VDD                          | 8         | 0.850 V       |         |
| IDDC3 Max                        |           | 0.64 A        |         |
| I/O Power                        | 10, 13    | 360 mW        |         |
| <b>S3</b>                        | 9         |               |         |
| I/O Power                        | 9, 11, 13 | 250 mW        |         |

The notes for this table appear on page 83.

| Parameter/OPN                            | Notes     | TMS MT34BQX5LD |         | TMS MT37BQX5LD |         |
|------------------------------------------|-----------|----------------|---------|----------------|---------|
| T <sub>die</sub> Max                     |           | 95°C           |         | 95°C           |         |
| T <sub>ambient</sub> / T <sub>rise</sub> |           | 35°C           | 10°C    | 35°C           | 10°C    |
| Thermal Resistance (die-amb)             |           | 2.08°C/W       |         | 2.00°C/W       |         |
| <b>Max P-State</b>                       |           | 1800 MHz       |         | 2000 MHz       |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      | 1.200 V        | 1.166 V | 1.200 V        | 1.164 V |
| IDD Max                                  |           | 18.70 A        |         | 19.58 A        |         |
| Thermal Design Power                     | 3         | 24.0 W         |         | 25.0 W         |         |
| <b>Intermediate P-State #1</b>           | 12        | 1600 MHz       |         | 1800 MHz       |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      | 1.150 V        | 1.121 V | 1.150 V        | 1.119 V |
| IDD Max                                  |           | 15.79 A        |         | 16.70 A        |         |
| Thermal Design Power                     | 3         | 19.9 W         |         | 20.9 W         |         |
| <b>Intermediate P-State #2</b>           | 12        | N/A            |         | 1600 MHz       |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      |                |         | 1.100 V        | 1.074 V |
| IDD Max                                  |           |                |         | 14.25 A        |         |
| Thermal Design Power                     | 3         |                |         | 17.5 W         |         |
| <b>Intermediate P-State #3</b>           | 12        | N/A            |         | N/A            |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      |                |         |                |         |
| IDD Max                                  |           |                |         |                |         |
| Thermal Design Power                     | 3         |                |         |                |         |
| <b>Intermediate P-State #4</b>           | 12        | N/A            |         | N/A            |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      |                |         |                |         |
| IDD Max                                  |           |                |         |                |         |
| Thermal Design Power                     | 3         |                |         |                |         |
| <b>Intermediate P-State #5</b>           | 12        | N/A            |         | N/A            |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      |                |         |                |         |
| IDD Max                                  |           |                |         |                |         |
| Thermal Design Power                     | 3         |                |         |                |         |
| <b>Intermediate P-State #6</b>           | 12        | N/A            |         | N/A            |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      |                |         |                |         |
| IDD Max                                  |           |                |         |                |         |
| Thermal Design Power                     | 3         |                |         |                |         |
| <b>Min P-State</b>                       |           | 800 MHz        |         | 800 MHz        |         |
| VID_VDD / VDD_dc Typ                     | 1, 2      | 0.900 V        | 0.888 V | 0.900 V        | 0.888 V |
| IDD Max                                  |           | 6.42 A         |         | 6.42 A         |         |
| Thermal Design Power                     | 3         | 7.9 W          |         | 7.9 W          |         |
| <b>Halt/Stop Grant</b>                   |           |                |         |                |         |
| IDDC1 Max @ Max P-State                  | 4         | 6.10 A         |         | 6.10 A         |         |
| IDDC1 Max @ Min P-State                  | 5         | 1.46 A         |         | 1.46 A         |         |
| I/O Power                                | 10, 13    | 2.2 W          |         | 2.2 W          |         |
| <b>C3/S1 Min P-State VID_VDD</b>         | 6         |                |         |                |         |
| IDDC3 Max                                |           | 0.83 A         |         | 0.83 A         |         |
| I/O Power                                | 10, 13    | 360 mW         |         | 360 mW         |         |
| <b>C3/S1 AltVID</b>                      | 7         |                |         |                |         |
| VID_VDD                                  | 8         | 0.850 V        |         | 0.850 V        |         |
| IDDC3 Max                                |           | 0.64 A         |         | 0.64 A         |         |
| I/O Power                                | 10, 13    | 360 mW         |         | 360 mW         |         |
| <b>S3</b>                                | 9         |                |         |                |         |
| I/O Power                                | 9, 11, 13 | 250 mW         |         | 250 mW         |         |

The notes for this table appear on page 83.

**Notes:**

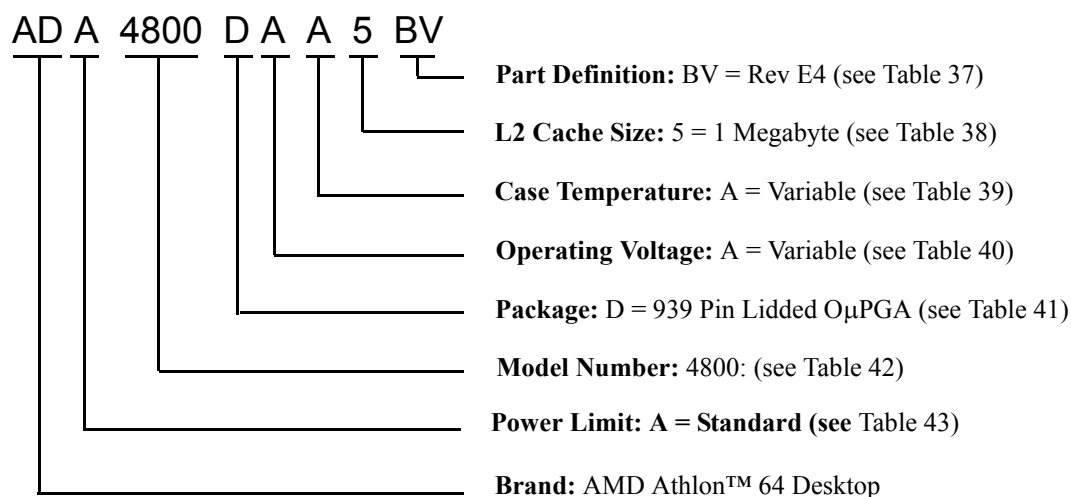
1. The VID\_VDD voltage for Low Power Mobile parts corresponds to 0 load (0 Amp IDD) conditions for the VID[4:0] requested VDD supply level. Refer to the AMD Functional Data Sheet, 754 Pin Package, order #31410, for details.
2. The VDD\_dc Typical Voltage is calculated using the following formula:  $VDD\_dc\ Typ = VID\_VDD - 1.83\ mV/A * IDD\ Max$ . Refer to the AMD Functional Data Sheet, 754 Pin Package, order# 31410, for complete VDD specifications.
3. Thermal Design Power (TDP) for Low Power Mobile parts is measured under the conditions of Tdie Max, IDD Max, and VDD=VDD\_dc Typ, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA. Contact your Field Application Engineer for more information on TDP specifications.
4. Assumes Tdie max, max P-state VDD\_dc Typ +25 mV, clock divider set to 512.
5. Assumes 50°C, min P-state VID\_VDD, clock divider set to 512.
6. Assumes 35°C, min P-state VID\_VDD, clock divider set to 512, HyperTransport™ links disconnected, memory in self-refresh mode, DDR SDRAM interface tri-stated except clocks and CKE pins.
7. Assumes 35°C, AltVID, clock divider set to 512, HyperTransport™ links disconnected, memory in self-refresh mode, DDR SDRAM interface tri-stated except CKE pins. Not all systems are AltVID capable. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094 for further details.
8. BIOS programs the AltVID setting into Function 3: Offset D8h. Not all systems are AltVID capable. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094 for further details.
9. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tri-stated except CKE pins.
10. Thermal Design Power dissipated by the processor VDDIO, VTT, VLDT, and VDDA power planes only.
11. Thermal Design Power dissipated by the processor VDDIO and VTT power planes only.
12. Implementation of this P-state is optional in BIOS.
13. Assumes VDDIO = 2.5 V and VTT = VDDIO / 2. Refer to the AMD Functional Data Sheet, 754 Pin Package, order# 31410 for complete VDDIO and VTT power supply specifications.

## 5 AMD Athlon™ 64 X2 Dual Core Processor

The following sections contain thermal/power and related BIOS specifications for AMD Athlon™ 64 X2 Dual Core processors. Each column in the BIOS and thermal/power tables represents a specific Ordering Part Number (OPN). Section 5.1 provides an example of the OPN structure for this processor family.

For power management BIOS requirements, refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 Processors and AMD Opteron™ Processors*, order #26094.

### 5.1 Ordering Part Number Description



**Figure 5. AMD Athlon™ 64 X2 Dual Core Processor Ordering Part Number Example**

**Table 37: AMD Athlon™ 64 X2 Dual Core Processor Part Definition Options**

| Part Definition | Revision | Package Drawing |
|-----------------|----------|-----------------|
| BV              | Rev E4   | Lidded          |
| CD              | Rev E6   | Lidded          |

*Note: Refer to AMD Functional Data Sheet, 939 Pin Package, order #31411 for package drawings.*

**Table 38: AMD Athlon™ 64 X2 Dual Core Processor L2 Cache Size Options**

| OPN Character | Cache Size |
|---------------|------------|
| 5             | 1 MB       |
| 6             | 2 MB       |

**Table 39: AMD Athlon™ 64 X2 Dual Core Processor Temperature Options**

| OPN Character | Temperature |
|---------------|-------------|
| A             | Variable    |

**Table 40: AMD Athlon™ 64 X2 Dual Core Processor Operating Voltage**

| OPN Character | Operating Voltage |
|---------------|-------------------|
| A             | Variable          |

**Table 41: AMD Athlon™ 64 X2 Dual Core Processor Package Options**

| OPN Character | Package              |
|---------------|----------------------|
| D             | 939 Pin Lidded OμPGA |

**Table 42: AMD Athlon™ 64 X2 Dual Core Processor Model Number Options**

| Package              | Cache Size | Frequency | Model Number |
|----------------------|------------|-----------|--------------|
| 939 Pin Lidded OμPGA | 2 MB       | 2200 MHz  | 4400+        |
| 939 Pin Lidded OμPGA | 2 MB       | 2400 MHz  | 4800+        |
| 939 Pin Lidded OμPGA | 1 MB       | 2000 MHz  | 3800+        |
| 939 Pin Lidded OμPGA | 1 MB       | 2200 MHz  | 4200+        |
| 939 Pin Lidded OμPGA | 1 MB       | 2400 MHz  | 4600+        |

**Table 43: AMD Athlon™ 64 X2 Dual Core Processor Power Limit**

| OPN Character | Power Limit |
|---------------|-------------|
| A             | Standard    |

**Table 44: AMD Athlon™ 64 X2 Dual Core Processor Thermal Profile**

| Thermal Profile                      | O                         | P                         |
|--------------------------------------|---------------------------|---------------------------|
| Thermal Resistance (case to ambient) | 0.20°C/W                  | 0.32°C/W                  |
| Local Ambient Temperature            | 42°C                      | 42°C                      |
|                                      |                           |                           |
| Tcase Max                            | Power (Thermal Profile O) | Power (Thermal Profile P) |
| 49°C                                 | 35.0 W                    | 21.9 W                    |
| 51°C                                 | 45.0 W                    | 28.1 W                    |
| 53°C                                 | 55.0 W                    | 34.4 W                    |
| 55°C                                 | 65.0 W                    | 40.6 W                    |
| 57°C                                 | 75.0 W                    | 46.9 W                    |
| 59°C                                 | 85.0 W                    | 53.1 W                    |
| 61°C                                 | 95.0 W                    | 59.4 W                    |
| 63°C                                 | 105.0 W                   | 65.6 W                    |
| 65°C                                 | 110.0 W                   | 71.9 W                    |
| 67°C                                 | N/A                       | 78.1 W                    |
| 69°C                                 | N/A                       | 84.4 W                    |
| 71°C                                 | N/A                       | 89.0 W                    |

*Note: The thermal profile is used to define the relationship between Tcase max and device specific Thermal Design Power for Rev E processors specified in this document with 'Variable' indicated by the Case Temperature OPN character.*

## 5.2 AMD Athlon™ 64 X2 Dual Core Processor BIOS Specifications

Table 45 contains the power and thermal related BIOS specifications for this processor family. Each column in the BIOS specification tables represents a specific Ordering Part Number (OPN). Section 5.1 provides an example of the OPN structure for this processor family.

**Table 45: AMD Athlon™ 64 X2 Dual Core Processor BIOS Specifications**

| Parameter/OPN                         | Notes | ADA4400DAA6CD |         | ADA4800DAA6CD |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|
| Model Number                          |       | 4400+         |         | 4800+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 05h           |         | 05h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020F32h     |         | 00020F32h     |         |
| FID/VID Status MaxFID Field           | 2     | 0Eh           |         | 10h           |         |
| FID/VID Status StartFID Field         | 2     | 0Eh           |         | 10h           |         |
| L2 Cache Size                         |       | 2 MB          |         | 2 MB          |         |
| Max HyperTransport Frequency          |       | 1000 MHz      |         | 1000 MHz      |         |
| <b>Max P-State</b>                    |       | 2200 MHz      |         | 2400 MHz      |         |
| FID/VID Status MaxVID Field           | 2, 6  | 08h           | 06h     | 08h           | 06h     |
| FID/VID Status StartVID Field         | 2, 6  | 0Ah           | 08h     | 0Ah           | 08h     |
| VID Code                              |       | 0Ah           | 08h     | 0Ah           | 08h     |
| VID_VDD                               | 3     | 1.300 V       | 1.350 V | 1.300 V       | 1.350 V |
| Thermal Design Power                  | 4, 7  | 110.0 W       |         | 110.0 W       |         |
| <b>Intermediate P-State #1</b>        | 5     | 2000 MHz      |         | 2200 MHz      |         |
| VID Code / VID_VDD                    | 3     | 0Ah           | 1.300 V | 0Ah           | 1.300 V |
| Thermal Design Power                  | 4, 7  | 105.6 W       |         | 105.6 W       |         |
| <b>Intermediate P-State #2</b>        | 5     | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 0Ch           | 1.250 V | 0Ch           | 1.250 V |
| Thermal Design Power                  | 4, 7  | 89.1 W        |         | 89.1 W        |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         | 0Eh           | 1.200 V |
| Thermal Design Power                  | 4, 7  |               |         | 74.8 W        |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4, 7  |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4, 7  |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |
| Thermal Design Power                  | 4, 7  |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4, 7  | 49.0 W        |         | 46.6 W        |         |

The notes for this table appear on page 90.

| Parameter/OPN                         | Notes | ADA3800DAA5BV |         | ADA4200DAA5BV |         | ADA4600DAA5BV |         |
|---------------------------------------|-------|---------------|---------|---------------|---------|---------------|---------|
| Model Number                          |       | 3800+         |         | 4200+         |         | 4600+         |         |
| CPUID 8000_0001h EBX [11:6] (BrandID) | 1     | 05h           |         | 05h           |         | 05h           |         |
| CPUID 8000_0001h EAX [31:0] (CPUID)   | 1     | 00020FB1h     |         | 00020FB1h     |         | 00020FB1h     |         |
| FID/VID Status MaxFID Field           | 2     | 0Ch           |         | 0Eh           |         | 10h           |         |
| FID/VID Status StartFID Field         | 2     | 0Ch           |         | 0Eh           |         | 10h           |         |
| L2 Cache Size                         |       | 1 MB          |         | 1 MB          |         | 1 MB          |         |
| Max HyperTransport™ Frequency         |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| <b>Max P-State</b>                    |       | 2000 MHz      |         | 2200 MHz      |         | 2400 MHz      |         |
| FID/VID Status MaxVID Field           | 2, 6  | 08h           | 06h     | 08h           | 06h     | 08h           | 06h     |
| FID/VID Status StartVID Field         | 2, 6  | 0Ah           | 08h     | 0Ah           | 08h     | 0Ah           | 08h     |
| VID Code                              |       | 0Ah           | 08h     | 0Ah           | 08h     | 0Ah           | 08h     |
| VID_VDD                               | 3     | 1.300 V       | 1.350 V | 1.300 V       | 1.350 V | 1.300 V       | 1.350 V |
| Thermal Design Power                  | 4, 7  | 89.0 W        |         | 89.0 W        |         | 110.0 W       |         |
| <b>Intermediate P-State #1</b>        | 5     | 1800 MHz      |         | 2000 MHz      |         | 2200 MHz      |         |
| VID Code / VID_VDD                    | 3     | 0Ah           | 1.300 V | 0Ah           | 1.300 V | 0Ah           | 1.300 V |
| Thermal Design Power                  | 4, 7  | 84.6 W        |         | 84.6 W        |         | 105.6 W       |         |
| <b>Intermediate P-State #2</b>        | 5     | N/A           |         | 1800 MHz      |         | 2000 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         | 0Ch           | 1.250 V | 0Ch           | 1.250 V |
| Thermal Design Power                  | 4, 7  |               |         | 70.9 W        |         | 89.1 W        |         |
| <b>Intermediate P-State #3</b>        | 5     | N/A           |         | N/A           |         | 1800 MHz      |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         | 0Eh           | 1.200 V |
| Thermal Design Power                  | 4, 7  |               |         |               |         | 74.8 W        |         |
| <b>Intermediate P-State #4</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4, 7  |               |         |               |         |               |         |
| <b>Intermediate P-State #5</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4, 7  |               |         |               |         |               |         |
| <b>Intermediate P-State #6</b>        | 5     | N/A           |         | N/A           |         | N/A           |         |
| VID Code / VID_VDD                    | 3     |               |         |               |         |               |         |
| Thermal Design Power                  | 4, 7  |               |         |               |         |               |         |
| <b>Min P-State</b>                    |       | 1000 MHz      |         | 1000 MHz      |         | 1000 MHz      |         |
| VID Code / VID_VDD                    | 3     | 12h           | 1.100 V | 12h           | 1.100 V | 12h           | 1.100 V |
| Thermal Design Power                  | 4, 7  | 40.1 W        |         | 37.6 W        |         | 46.6 W        |         |

The notes for this table appear on page 90.

| Parameter/OPN                            | Notes | ADA3800DAA5CD |         |
|------------------------------------------|-------|---------------|---------|
| Model Number                             |       | 3800+         |         |
| CPUID 8000_0001h EBX [11:6]<br>(BrandID) | 1     | 05h           |         |
| CPUID 8000_0001h EAX [31:0]<br>(CPUID)   | 1     | 00020F32h     |         |
| FID/VID Status MaxFID Field              | 2     | 0Ch           |         |
| FID/VID Status StartFID Field            | 2     | 0Ch           |         |
| L2 Cache Size                            |       | 1 MB          |         |
| Max HyperTransport Frequency             |       | 1000 MHz      |         |
| <b>Max P-State</b>                       |       | 2000 MHz      |         |
| FID/VID Status MaxVID Field              | 2, 6  | 08h           | 06h     |
| FID/VID Status StartVID Field            | 2, 6  | 0Ah           | 08h     |
| VID Code                                 |       | 0Ah           | 08h     |
| VID_VDD                                  | 3     | 1.300 V       | 1.350 V |
| Thermal Design Power                     | 4, 7  | 89.0 W        |         |
| <b>Intermediate P-State #1</b>           | 5     | 1800 MHz      |         |
| VID Code / VID_VDD                       | 3     | 0Ah           | 1.300 V |
| Thermal Design Power                     | 4, 7  | 84.6 W        |         |
| <b>Intermediate P-State #2</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4, 7  |               |         |
| <b>Intermediate P-State #3</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4, 7  |               |         |
| <b>Intermediate P-State #4</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4, 7  |               |         |
| <b>Intermediate P-State #5</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4, 7  |               |         |
| <b>Intermediate P-State #6</b>           | 5     | N/A           |         |
| VID Code / VID_VDD                       | 3     |               |         |
| Thermal Design Power                     | 4, 7  |               |         |
| <b>Min P-State</b>                       |       | 1000 MHz      |         |
| VID Code / VID_VDD                       | 3     | 12h           | 1.100 V |
| Thermal Design Power                     | 4, 7  | 40.1 W        |         |

The notes for this table appear on page 90.

**Notes:**

- 1 CUID extended function 8000\_0001h fields are used by BIOS in uniquely associating a given processor to the P-states that are valid for that processor. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
- 2 FIDVID Status Register, MSR C001\_0042h.
- 3 The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
- 4 Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
- 5 Implementation of this P-state is optional in BIOS.
- 6 StartVID and MaxVID are programmed during device manufacturing with part-specific values for Rev E and later processors, and can have one or more valid options. All valid options for StartVID, MaxVID, and VID\_VDD will be specified for the corresponding OPN. For information on the relationship of StartVID and MaxVID to VID\_VDD refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094. Contact your FAE for more info on TDP specifications.
- 7 Thermal Design Power (TDP) specifications for dual core processors assume equivalent P-states (Voltage and frequency) and equivalent Tcase conditions for both cores. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094, for details on P-state operation for dual core processors.

### 5.3 AMD Athlon™ 64 X2 Dual Core Processor Thermal/Power Specifications

Table 46 on page 91 contains the power and thermal specifications for this processor family. Each column in the thermal/power specification tables represents a specific Ordering Part Number (OPN). Section 5.1 provides an example of the OPN structure for this processor family.

**Table 46: AMD Athlon™ 64 X2 Dual Core Processor Thermal/Power Specifications**

| Parameter/OPN                  | Notes    | ADA4400DAA6CD     | ADA4800DAA6CD     |
|--------------------------------|----------|-------------------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 65°C      | 49°C to 65°C      |
| Tcontrol Max                   | 2        | 70°C              | 70°C              |
| Tambient                       |          | 42°C              | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.20°C/W          | 0.20°C/W          |
| Thermal Profile                | 14       | O                 | O                 |
| <b>Max P-State</b>             |          | 2200 MHz          | 2400 MHz          |
| VID_VDD                        | 3        | 1.300 V   1.350 V | 1.300 V   1.350 V |
| IDD Max                        |          | 80.0 A            | 80.0 A            |
| Thermal Design Power           | 4, 15    | 110.0 W           | 110.0 W           |
| <b>Intermediate P-State #1</b> | 11       | 2000 MHz          | 2200 MHz          |
| VID_VDD                        | 3        | 1.300 V           | 1.300 V           |
| IDD Max                        |          | 79.0 A            | 79.0 A            |
| Thermal Design Power           | 4, 15    | 105.6 W           | 105.6 W           |
| <b>Intermediate P-State #2</b> | 11       | 1800 MHz          | 2000 MHz          |
| VID_VDD                        | 3        | 1.250 V           | 1.250 V           |
| IDD Max                        |          | 69.0 A            | 69.0 A            |
| Thermal Design Power           | 4, 15    | 89.1 W            | 89.1 W            |
| <b>Intermediate P-State #3</b> | 11       | N/A               | 1800 MHz          |
| VID_VDD                        | 3        |                   | 1.200 V           |
| IDD Max                        |          |                   | 59.9 A            |
| Thermal Design Power           | 4, 15    |                   | 74.8 W            |
| <b>Intermediate P-State #4</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4, 15    |                   |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4, 15    |                   |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |
| IDD Max                        |          |                   |                   |
| Thermal Design Power           | 4, 15    |                   |                   |
| <b>Min P-State</b>             |          | 1000 MHz          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           | 1.100 V           |
| IDD Max                        |          | 41.9 A            | 39.7 A            |
| Thermal Design Power           | 4, 15    | 49.0 W            | 46.6 W            |
| <b>Halt/Stop Grant</b>         |          |                   |                   |
| IDDC1 Max @ Max P-State        | 5, 16    | 44.5 A            | 44.5 A            |
| IDDC1 Max @ Min P-State        | 6, 16    | 10.9 A            | 10.9 A            |
| I/O Power                      | 8, 12    | 2.9 W             | 2.9 W             |
| <b>S3</b>                      | 7        |                   |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            | 500 mW            |

The notes for this table appear on page 94.

| Parameter/OPN                  | Notes    | ADA3800DAA5BV     | ADA4200DAA5BV     | ADA4600DAA5BV     |
|--------------------------------|----------|-------------------|-------------------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 71°C      | 49°C to 71°C      | 49°C to 65°C      |
| Tcontrol Max                   | 2        | 70°C              | 70°C              | 70°C              |
| Tambient                       |          | 42°C              | 42°C              | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.32°C/W          | 0.32°C/W          | 0.20°C/W          |
| Thermal Profile                | 14       | P                 | P                 | O                 |
| <b>Max P-State</b>             |          | 2000 MHz          | 2200 MHz          | 2400 MHz          |
| VID_VDD                        | 3        | 1.300 V   1.350 V | 1.300 V   1.350 V | 1.300 V   1.350 V |
| IDD Max                        |          | 66.2 A            | 66.2 A            | 80.0 A            |
| Thermal Design Power           | 4, 15    | 89.0 W            | 89.0 W            | 110.0 W           |
| <b>Intermediate P-State #1</b> | 11       | 1800 MHz          | 2000 MHz          | 2200 MHz          |
| VID_VDD                        | 3        | 1.300 V           | 1.300 V           | 1.300 V           |
| IDD Max                        |          | 62.8 A            | 62.8 A            | 79.0 A            |
| Thermal Design Power           | 4, 15    | 84.6 W            | 84.6 W            | 105.6 W           |
| <b>Intermediate P-State #2</b> | 11       | N/A               | 1800 MHz          | 2000 MHz          |
| VID_VDD                        | 3        |                   | 1.250 V           | 1.250 V           |
| IDD Max                        |          |                   | 54.4 A            | 69.0 A            |
| Thermal Design Power           | 4, 15    |                   | 70.9 W            | 89.1 W            |
| <b>Intermediate P-State #3</b> | 11       | N/A               | N/A               | 1800 MHz          |
| VID_VDD                        | 3        |                   |                   | 1.200 V           |
| IDD Max                        |          |                   |                   | 59.9 A            |
| Thermal Design Power           | 4, 15    |                   |                   | 74.8 W            |
| <b>Intermediate P-State #4</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4, 15    |                   |                   |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4, 15    |                   |                   |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               | N/A               | N/A               |
| VID_VDD                        | 3        |                   |                   |                   |
| IDD Max                        |          |                   |                   |                   |
| Thermal Design Power           | 4, 15    |                   |                   |                   |
| <b>Min P-State</b>             |          | 1000 MHz          | 1000 MHz          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           | 1.100 V           | 1.100 V           |
| IDD Max                        |          | 33.8 A            | 31.5 A            | 39.7 A            |
| Thermal Design Power           | 4, 15    | 40.1 W            | 37.6 W            | 46.6 W            |
| <b>Halt/Stop Grant</b>         |          |                   |                   |                   |
| IDDC1 Max @ Max P-State        | 5, 16    | 28.7 A            | 27.9 A            | 44.5 A            |
| IDDC1 Max @ Min P-State        | 6, 16    | 7.1 A             | 7.0 A             | 10.9 A            |
| I/O Power                      | 8, 12    | 2.9 W             | 2.9 W             | 2.9 W             |
| <b>S3</b>                      | 7        |                   |                   |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            | 500 mW            | 500 mW            |

The notes for this table appear on page 94.

| Parameter/OPN                  | Notes    | ADA3800DAA5CD     |
|--------------------------------|----------|-------------------|
| Tcase Max                      | 1, 13    | 49°C to 71°C      |
| Tcontrol Max                   | 2        | 70°C              |
| Tambient                       |          | 42°C              |
| Thermal Resistance (case-amb)  |          | 0.34°C/W          |
| Thermal Profile                | 14       | P                 |
| <b>Max P-State</b>             |          | 2000 MHz          |
| VID_VDD                        | 3        | 1.300 V   1.350 V |
| IDD Max                        |          | 66.2 A            |
| Thermal Design Power           | 4, 15    | 89.0 W            |
| <b>Intermediate P-State #1</b> | 11       | 1800 MHz          |
| VID_VDD                        | 3        | 1.300 V           |
| IDD Max                        |          | 62.8 A            |
| Thermal Design Power           | 4, 15    | 84.6 W            |
| <b>Intermediate P-State #2</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4, 15    |                   |
| <b>Intermediate P-State #3</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4, 15    |                   |
| <b>Intermediate P-State #4</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4, 15    |                   |
| <b>Intermediate P-State #5</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4, 15    |                   |
| <b>Intermediate P-State #6</b> | 11       | N/A               |
| VID_VDD                        | 3        |                   |
| IDD Max                        |          |                   |
| Thermal Design Power           | 4, 15    |                   |
| <b>Min P-State</b>             |          | 1000 MHz          |
| VID_VDD                        | 3        | 1.100 V           |
| IDD Max                        |          | 33.8 A            |
| Thermal Design Power           | 4, 15    | 40.1 W            |
| <b>Halt/Stop Grant</b>         |          |                   |
| IDDC1 Max @ Max P-State        | 5, 16    | 28.7 A            |
| IDDC1 Max @ Min P-State        | 6, 16    | 7.1 A             |
| I/O Power                      | 8, 12    | 2.9 W             |
| <b>S3</b>                      | 7        |                   |
| I/O Power                      | 7, 9, 12 | 500 mW            |

The notes for this table appear on page 94.

**Notes:**

1. Tcase max is the maximum case temperature specification which is a physical value in degrees Celsius. This value is programmed into Rev D and later processors. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. Tcontrol max (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. Tcontrol max represents the value at which the processor has reached Tcase max when measuring the thermal diode with a dual sourcing current temperature sensor. Refer to the appropriate functional data sheet, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
3. The VID\_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
4. Thermal Design Power (TDP) is measured under the conditions of Tcase Max, IDD Max, and VDD=VID\_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
5. Assumes Tcase max, max P-state VID\_VDD, clock divider set to 32.
6. Assumes 50°C, min P-state VID\_VDD, clock divider set to 32.
7. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tri-stated except CKE pins. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
8. Thermal Design Power dissipated by the processor VDDIO, VTT, VLDT, and VDDA power planes only.
9. Thermal Design Power dissipated by the processor VDDIO and VTT power planes only.
10. Refer to the AMD Athlon™ 64 Processor Desktop Power Roadmap, order #26882, for IDD Max and Thermal Design Power requirements for future processor revisions.
11. Implementation of this P-state is optional in BIOS.
12. Assumes VDDIO = 2.6 V and VTT = VDDIO / 2. Refer to the appropriate functional data sheet for complete VDDIO and VTT power supply specifications.
13. Tcase max is programmed during device manufacturing with part-specific values for Rev E and later processors, and can be any valid Tcase max value in the range specified for the corresponding OPN.
14. Thermal Design Power (TDP) and IDD max for Rev E and later processors are the limits at the highest Tcase max in the specified range for the corresponding OPN. Products will conform to the TDP and IDD Max limits at all valid voltages. The relationship of Tcase max and Thermal Profile to TDP for a specific device is defined in Table 44.
15. Thermal Design Power (TDP) specifications for dual core processors assume equivalent P-states (Voltage and frequency) and equivalent Tcase conditions for both cores. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094, for details on P-state operation for dual core processors.
16. IDDC1 specifications for dual core processors assume equivalent Voltage, clock divisor, and Tcase conditions for both cores.

## 6 MTOPS

Table 47 shows the Composite Theoretical Performance (CTP) calculations ("Calculations") for AMD Athlon™ 64, AMD Athlon™ 64 FX, AMD Athlon™ 64 X2 Dual Core and AMD Sempron™ microprocessors. The Calculations are stated in Millions of Theoretical Operations Per Second (MTOPS) and are based upon a formula in the United States Department of Commerce Export Administration Regulations 15 CFR 774 (Advisory Note 4 for Category 4).

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**Table 47: Composite Theoretical Performance (CTP) Calculations**

| Frequency | MTOPS<br>Single-Core | MTOPS<br>Dual-Core |
|-----------|----------------------|--------------------|
| 800       | 2,467                | 4,667              |
| 1000      | 3,084                | 5,834              |
| 1200      | 3,700                | 7,000              |
| 1400      | 4,317                | 8,167              |
| 1600      | 4,934                | 9,334              |
| 1800      | 5,550                | 10,500             |
| 2000      | 6,167                | 11,667             |
| 2200      | 6,784                | 12,834             |
| 2400      | 7,400                | 14,000             |
| 2600      | 8,017                | 15,167             |
| 2800      | 8,634                | 16,334             |
| 3000      | 9,250                | 17,500             |