



AMD Athlon™ 64 Processor Power and Thermal Data Sheet



Publication #	30430	Revision:	3.43
Issue Date:	October 2004		

© 2003, 2004 Advanced Micro Devices, Inc. All rights reserved.

The contents of this document are provided in connection with Advanced Micro Devices, Inc. (“AMD”) products. AMD makes no representations or warranties with respect to the accuracy or completeness of the contents of this publication and reserves the right to make changes to specifications and product descriptions at any time without notice. No license, whether express, implied, arising by estoppel, or otherwise, to any intellectual property rights are granted by this publication. Except as set forth in AMD’s Standard Terms and Conditions of Sale, AMD assumes no liability whatsoever, and disclaims any express or implied warranty, relating to its products including, but not limited to, the implied warranty of merchantability, fitness for a particular purpose, or infringement of any intellectual property right.

AMD’s products are not designed, intended, authorized or warranted for use as components in systems intended for surgical implant into the body, or in other applications intended to support or sustain life, or in any other application in which the failure of AMD’s product could create a situation where personal injury, death, or severe property or environmental damage may occur. AMD reserves the right to discontinue or make changes to its products at any time without notice.

Trademarks

AMD, the AMD Arrow logo, AMD Athlon, AMD Opteron, AMD Sempron, and combinations thereof, are trademarks of Advanced Micro Devices, Inc.

HyperTransport is a licensed trademark of the HyperTransport Technology Consortium.

Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

Contents

Chapter 1	AMD Athlon™ 64 Desktop Processor	6
Chapter 2	AMD Athlon™ 64 FX Desktop Processor	15
Chapter 3	AMD Sempron™ Desktop Processor	21

List of Figures

Figure 1. AMD Athlon™ 64 Processor Ordering Part Number Example	6
Figure 2. AMD Athlon™ 64 FX Processor Ordering Part Number Example	15
Figure 3 AMD Sempron™ Processor Ordering Part Number Example.....	21

List of Tables

Table 1 AMD Athlon™ 64 Processor Part Definition Options	6
Table 2 AMD Athlon™ 64 Processor L2 Cache Size Options.....	7
Table 3. AMD Athlon™ 64 Processor Temperature Options	7
Table 4. AMD Athlon™ 64 Processor Operating Voltage Options	7
Table 5 AMD Athlon™ 64 Processor Package Options.....	7
Table 6. AMD Athlon™ 64 Processor Model Number Options	7
Table 7. AMD Athlon™ 64 Processor Thermal/Power Specifications	8
Table 8 AMD Athlon™ 64 FX Processor Part Definition Options	15
Table 9. AMD Athlon™ 64 FX Processor Temperature Options	16
Table 10. AMD Athlon™ 64 FX Processor Operating Voltage Options	16
Table 11 AMD Athlon™ 64 FX Processor Package Options	16
Table 12. AMD Athlon™ 64 FX Processor Model Number Options	16
Table 13. AMD Athlon™ 64 FX Processor Thermal/Power Specifications	17
Table 14 AMD Sempron™ Processor Part Definition Options.....	21
Table 15 AMD Sempron™ Processor L2 Cache Size Options	22
Table 16 AMD Sempron™ Processor Temperature Options	22
Table 17 AMD Sempron™ Processor Operating Voltage Options	22
Table 18 AMD Sempron™ Processor Package Options	22
Table 19 AMD Sempron™ Processor Model Number Options	22
Table 20 AMD Sempron™ Processor Thermal/Power Specifications.....	23

Revision History

Date	Revision	Description
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 _{CONTROL} 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.

Chapter 1 AMD Athlon™ 64 Desktop Processor

The specifications for the AMD Athlon™ 64 processor are listed in Table 7 on page 8. Each column represents a specific ordering part number (OPN). Figure 1 provides an example of the OPN structure for this processor family.

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

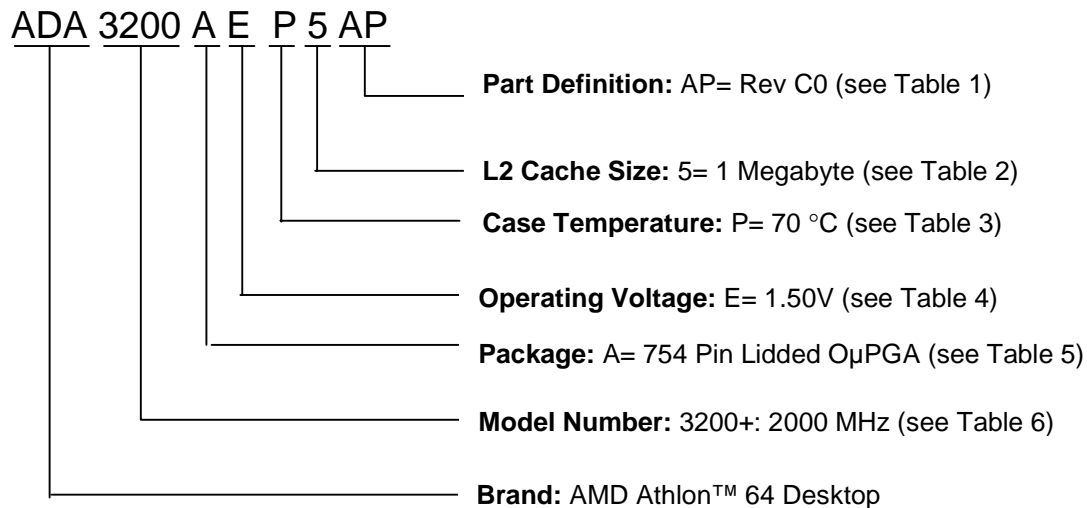


Figure 1 AMD Athlon™ 64 Processor Ordering Part Number Example

Table 1 AMD Athlon™ 64 Processor Part Definition Options

AP	Rev C0
AR	Rev CG
<u>AS</u>	<u>Rev CG</u>
AX	Rev CG
AW	Rev CG

Table 2 AMD Athlon™ 64 Processor L2 Cache Size Options

4	512 KB
5	1 MB

Table 3 AMD Athlon™ 64 Processor Temperature Options

P	70°C
---	------

Table 4 AMD Athlon™ 64 Processor Operating Voltage Options

E	1.50V
---	-------

Table 5 AMD Athlon™ 64 Processor Package Options

A	754 Pin Lidded O μ PGA
D	939 Pin Lidded O μ PGA

Table 6 AMD Athlon™ 64 Processor Model Number Options

Package	Cache Size	Frequency	Model Number
754 Pin Lidded O μ PGA	512 KB	1800 MHz	2800+
754 Pin Lidded O μ PGA	512 KB	2000 MHz	3000+
754 Pin Lidded O μ PGA	1 MB	2000 MHz	3200+
754 Pin Lidded O μ PGA	512 KB	2200 MHz	3200+
754 Pin Lidded O μ PGA	1 MB	2200 MHz	3400+
754 Pin Lidded O μ PGA	512 KB	2400 MHz	3400+
754 Pin Lidded O μ PGA	1 MB	2400 MHz	3700+
939 Pin Lidded O μ PGA	512 KB	2200 MHz	3500+
939 Pin Lidded O μ PGA	512 KB	2400 MHz	3800+
<u>939 Pin Lidded OμPGA</u>	<u>1 MB</u>	<u>2400 MHz</u>	<u>4000+</u>

Table 7 AMD Athlon™ 64 Processor Thermal/Power Specifications

Parameter/OPN	ADA3000AEP4AP	ADA3200AEP5AP	ADA3400AEP5AP
Model Number	3000+	3200+	3400+
CPUID 8000_0001h EAX [31:0] ⁷	00000F48h	00000F48h	00000F48h
FID/VID Status MaxVID Field ⁸	00h	00h	00h
FID/VID Status MaxFID Field ⁸	0Ch	0Ch	0Eh
FID/VID Status StartVID Field ⁸	02h	02h	02h
FID/VID Status StartFID Field ⁸	0Ch	0Ch	0Eh
L2 Cache Size	512 KB	1 MB	1MB
T _{CASE} Max ¹¹	70°C	70°C	70°C
T _{CONTROL} Max ¹²	70°C	70°C	70°C
Max P-State	2000 MHz	2000 MHz	2200MHz
VID_VDD	1.50 V	1.50 V	1.50 V
IDD Max	57.8 A	57.8 A	57.8 A
Thermal Design Power ¹	89 W	89 W	89 W
Thermal Resistance (case to ambient) ⁹	0.31°C/W	0.31°C/W	0.31°C/W
Intermediate P-State #1	1800 MHz	1800 MHz	2000 MHz
VID_VDD	1.40 V	1.40 V	1.40 V
IDD Max	45.6 A	45.6 A	48.4 A
Thermal Design Power ¹	66 W	66 W	70W
Min P-State	800 MHz	800 MHz	800 MHz
VID_VDD	1.30 V	1.30 V	1.30 V
IDD Max	25.2 A	25.2 A	25.2 A
Thermal Design Power ¹	35 W	35 W	35 W
Halt/Stop Grant at Max P-State²			
IDDC1 Max	32.5 A	32.5 A	32.5 A
I/O Power ⁵	2.2 W	2.2 W	2.2 W
Halt/Stop Grant at Min P-State³			
IDDC1 Max	10.5 A	10.5 A	10.5 A
I/O Power ⁵	2.2 W	2.2 W	2.2 W
S3⁴			
I/O Power ^{4,6}	600mW	600mW	600mW

Parameter/OPN	ADA3000AEP4AR	ADA3200AEP5AR	ADA3400AEP5AR
Model Number	3000+	3200+	3400+
CPUID 8000_0001h EAX [31:0] ⁷	00000F4Ah	00000F4Ah	00000F4Ah
FID/VID Status MaxVID Field ⁸	00h	00h	00h
FID/VID Status MaxFID Field ⁸	0Ch	0Ch	0Eh
FID/VID Status StartVID Field ⁸	02h	02h	02h
FID/VID Status StartFID Field ⁸	0Ch	0Ch	0Eh
L2 Cache Size	512 KB	1 MB	1MB
T _{CASE} Max ¹¹	70°C	70°C	70°C
T _{CONTROL} Max ¹²	70°C	70°C	70°C
Max P-State	2000 MHz	2000 MHz	2200MHz
VID_VDD	1.50 V	1.50 V	1.50 V
IDD Max	57.8 A	57.8 A	57.8 A
Thermal Design Power ¹	89 W	89 W	89 W
Thermal Resistance (case-to-ambient) ⁹	0.31°C/W	0.31°C/W	0.31°C/W
Intermediate P-State #1	1800 MHz	1800 MHz	2000 MHz
VID_VDD	1.40 V	1.40 V	1.40 V
IDD Max	45.6 A	45.6 A	47.7 A
Thermal Design Power ¹	66 W	66 W	69 W
Intermediate P-State #2	N/A	N/A	1800 MHz
VID_VDD	N/A	N/A	1.30 V
IDD Max	N/A	N/A	36.8 A
Thermal Design Power ¹	N/A	N/A	50 W
Min P-State	1000 MHz	1000 MHz	1000 MHz
VID_VDD	1.10 V	1.10 V	1.10 V
IDD Max	18.0 A	18.0 A	18.0 A
Thermal Design Power ¹	22 W	22 W	22 W
Halt/Stop Grant at Max P-State²			
IDDC1 Max	30.0 A	30.0 A	30.0 A
I/O Power ⁵	2.2 W	2.2 W	2.2 W
Halt/Stop Grant at Min P-State³			
IDDC1 Max	7.0 A	7.0 A	7.0 A
I/O Power ⁵	2.2 W	2.2 W	2.2 W
S3⁴			
I/O Power ^{4,6}	160 mW	160 mW	160 mW

Parameter/OPN	ADA3700AEP5AR
Model Number	3700+
CPUID 8000_0001h EAX [31:0] ⁷	00000F4Ah
FID/VID Status MaxVID Field ⁸	00h
FID/VID Status MaxFID Field ⁸	10h
FID/VID Status StartVID Field ⁸	02h
FID/VID Status StartFID Field ⁸	10h
L2 Cache Size	1 MB
T _{CASE} Max ¹¹	70°C
T _{CONTROL} Max ¹²	70°C
Max P-State	2400 MHz
VID_VDD	1.50 V
IDD Max	57.8 A
Thermal Design Power ¹	89 W
Thermal Resistance (case-to-ambient) ⁹	0.31°C/W
Intermediate P-State #1	2200 MHz
VID_VDD	1.40
IDD Max	50.0 A
Thermal Design Power ¹	72 W
Intermediate P-State #2	2000 MHz
VID_VDD	1.30 V
IDD Max	39.0 A
Thermal Design Power ¹	53 W
Intermediate P-State #2	1800 MHz
VID_VDD	1.20 V
IDD Max	31.0 A
Thermal Design Power ¹	39 W
Min P-State	1000 MHz
VID_VDD	1.10 V
IDD Max	18.0 A
Thermal Design Power ¹	22 W
Halt/Stop Grant at Max P-State²	
IDDC1 Max	30.0 A
I/O Power ⁵	2.2 W
Halt/Stop Grant at Min P-State³	
IDDC1 Max	7.0 A
I/O Power ⁵	2.2 W
S3⁴	
I/O Power ^{4,6}	160 mW

Parameter/OPN	ADA2800AEP4AX	ADA3000AEP4AX	ADA3200AEP4AX
Model Number	2800+	3000+	3200+
CPUID 8000_0001h EAX [31:0] ⁷	00000FC0h	00000FC0h	00000FC0h
FID/VID Status MaxVID Field ⁸	00h	00h	00h
FID/VID Status MaxFID Field ⁸	0Ah	0Ch	0Eh
FID/VID Status StartVID Field ⁸	02h	02h	02h
FID/VID Status StartFID Field ⁸	0Ah	0Ch	0Eh
L2 Cache Size	512 KB	512 KB	512 KB
T _{CASE} Max ¹¹	70°C	70°C	70°C
T _{CONTROL} Max ¹²	70°C	70°C	70°C
Max P-State	1800 MHz	2000 MHz	2200 MHz
VID_VDD	1.50 V	1.50 V	1.50 V
IDD Max	57.8	57.8 A	57.8 A
Thermal Design Power ¹	89 W	89 W	89 W
Thermal Resistance (case-to-ambient) ⁹	0.31°C/W	0.31°C/W	0.31°C/W
Intermediate P-State #1	N/A	1800 MHz	2000 MHz
VID_VDD	N/A	1.40 V	1.40 V
IDD Max	N/A	46 A	48 A
Thermal Design Power ¹	N/A	67 W	69 W
Intermediate P-State #2	N/A	N/A	1800 MHz
VID_VDD	N/A	N/A	1.30 V
IDD Max	N/A	N/A	37 A
Thermal Design Power ¹	N/A	N/A	50 W
Min P-State	1000 MHz	1000 MHz	1000 MHz
VID_VDD	1.10V	1.10 V	1.10 V
IDD Max	18.0A	18.0 A	18.0 A
Thermal Design Power ¹	22W	22 W	22 W
Halt/Stop Grant at Max P-State²			
IDDC1 Max	30.0 A	30.0 A	30.0 A
I/O Power ⁵	2.2 W	2.2 W	2.2 W
Halt/Stop Grant at Min P-State³			
IDDC1 Max	7.0 A	7.0 A	7.0 A
I/O Power ⁵	2.2 W	2.2 W	2.2 W
S3⁴			
I/O Power ^{4,6}	160 mW	160 mW	160 mW

Parameter/OPN	ADA3500DEP4AW	ADA3800DEP4AW	<u>ADA4000DEP5AS</u>
Model Number	3500+	3800+	<u>4000+</u>
CPUID 8000_0001h EAX [31:0] ⁷	00000FF0h	00000FF0h	<u>00000F7Ah</u>
FID/VID Status MaxVID Field ⁸	00h	00h	<u>00h</u>
FID/VID Status MaxFID Field ⁸	0Eh	10h	<u>10h</u>
FID/VID Status StartVID Field ⁸	02h	02h	<u>02h</u>
FID/VID Status StartFID Field ⁸	0Eh	10h	<u>10h</u>
L2 Cache Size	512 KB	512 KB	<u>1 MB</u>
T _{CASE} Max ¹¹	70°C	70°C	<u>70°C</u>
T _{CONTROL} Max ¹²	70°C	70°C	<u>70°C</u>
Max P-State	2200 MHz	2400 MHz	<u>2400 MHz</u>
VID_VDD	1.50 V	1.50 V	<u>1.50 V</u>
IDD Max	57.4 A	57.4 A	<u>57.4 A</u>
Thermal Design Power ¹	89 W	89 W	<u>89 W</u>
Thermal Resistance (case-to-ambient) ⁹	0.31°C/W	0.31°C/W	<u>0.31°C/W</u>
Intermediate P-State #1	2000 MHz	2200 MHz	<u>2200 MHz</u>
VID_VDD	1.40 V	1.40 V	<u>1.40 V</u>
IDD Max	47.2 A	49.4 A	<u>49.4 A</u>
Thermal Design Power ¹	69 W	72 W	<u>72 W</u>
Intermediate P-State #2	1800 MHz	2000 MHz	<u>2000 MHz</u>
VID_VDD	1.30 V	1.30 V	<u>1.30 V</u>
IDD Max	36.2 A	38.5 A	<u>38.5 A</u>
Thermal Design Power ¹	50 W	53 W	<u>53 W</u>
Intermediate P-State #3	N/A	1800 MHz	<u>1800 MHz</u>
VID_VDD	N/A	1.20 V	<u>1.20 V</u>
IDD Max	N/A	30.1 A	<u>30.1 A</u>
Thermal Design Power ¹	N/A	39 W	<u>39 W</u>
Min P-State	1000 MHz	1000 MHz	<u>1000 MHz</u>
VID_VDD	1.10 V	1.10 V	<u>1.10 V</u>
IDD Max	17.4 A	17.4 A	<u>17.4 A</u>
Thermal Design Power ¹	22 W	22 W	<u>22 W</u>
Halt/Stop Grant at Max P-State²			
IDDC1 Max	30.0 A	30.0 A	<u>30.0 A</u>
I/O Power ⁵	2.9 W	2.9 W	<u>2.9 W</u>
Halt/Stop Grant at Min P-State³			
IDDC1 Max	7.0 A	7.0 A	<u>7.0 A</u>
I/O Power ⁵	2.9 W	2.9 W	<u>2.9 W</u>
S3⁴			
I/O Power ^{4,6}	400mW	400 mW	<u>400 mW</u>

Parameter/OPN	ADA3000DIK4BI	ADA3200DIK4BI	ADA3500DIK4BI
Model Number	3000+	3200+	3500+
CPUID 8000_0001h EAX [31:0] ⁷	00010FF0h	00010FF0h	00010FF0h
FID/VID Status MaxVID Field ⁸	04h	04h	04h
FID/VID Status MaxFID Field ⁸	0Ah	0Ch	0Eh
FID/VID Status StartVID Field ⁸	06h	06h	06h
FID/VID Status StartFID Field ⁸	0Ah	0Ch	0Eh
L2 Cache Size	512 KB	512 KB	512 KB
Max HyperTransport™ Frequency	1000 MHz	1000 MHz	1000 MHz
T _{CASE} Max ¹¹	65°C	65°C	65°C
T _{CONTROL} Max ¹²	70°C	70°C	70°C
Max P-State	1800 MHz	2000 MHz	2200 MHz
VID_VDD	1.40V	1.40 V	1.40 V
IDD Max ¹⁰	45.8 A	45.8 A	45.8 A
Thermal Design Power ^{1,10}	67.0 W	67.0 W	67.0 W
Thermal Resistance (case-to-ambient) ⁹	0.34°C/W	0.34°C/W	0.34°C/W
Intermediate P-State #1	N/A	1800 MHz	2000 MHz
VID_VDD	N/A	1.35 V	1.35 V
IDD Max	N/A	39.3 A	39.3 A
Thermal Design Power ¹	N/A	56 W	56 W
Intermediate P-State #2	N/A	N/A	1800 MHz
VID_VDD	N/A	N/A	1.30 V
IDD Max	N/A	N/A	33.2 A
Thermal Design Power ¹	N/A	N/A	46 W
Min P-State	1000 MHz	1000 MHz	1000 MHz
VID_VDD	1.10 V	1.10 V	1.10 V
IDD Max	16.5 A	16.5 A	15.5 A
Thermal Design Power ¹	21 W	21 W	20 W
Halt/Stop Grant at Max P-State²			
IDDC1 Max	36.8 A	36.8 A	36.8 A
I/O Power ⁵	2.9 W	2.9 W	2.9 W
Halt/Stop Grant at Min P-State³			
IDDC1 Max	9.3 A	9.3 A	9.3 A
I/O Power ⁵	2.9 W	2.9 W	2.9 W
S3⁴			
I/O Power ^{4,6}	400 mW	400 mW	400 mW

Notes:

1. Thermal Design Power (TDP) is measured under the conditions of T_{CASE} Max, IDD Max, and VDD=VID_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
2. Assumes t_{CASE} max, VDD, clock divider set to 32.
3. Assumes 50°C, VDD nom, clock divider set to 32.
4. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tristated except CKE pins.
5. Thermal Design Power for VDDIO, VTT, VLDT, and VDDA power planes only.
6. Thermal Design Power for VDDIO and VTT power planes only.
7. CPUID extended function 8000_0001h fields are used by the 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

8. FIDVID Status Register, MSR C001_0042h.
9. Ambient temperature into heat sink (internal ambient) assumed to be 42°C.
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. $T_{\text{CASE max}}$ 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.
12. $T_{\text{CONTROL max}}$ (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. $T_{\text{CONTROL max}}$ represents the value at which the processor has reached $T_{\text{CASE max}}$ 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. Temperature is in degrees Celsius on the T_{CONTROL} scale.

Chapter 2 AMD Athlon™ 64 FX Desktop Processor

The specifications for the AMD Athlon™ 64 FX processor are listed in Table 13 on page 17. Each column represents a specific ordering part number (OPN). Figure 2 provides an example of the OPN structure for this processor family.

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

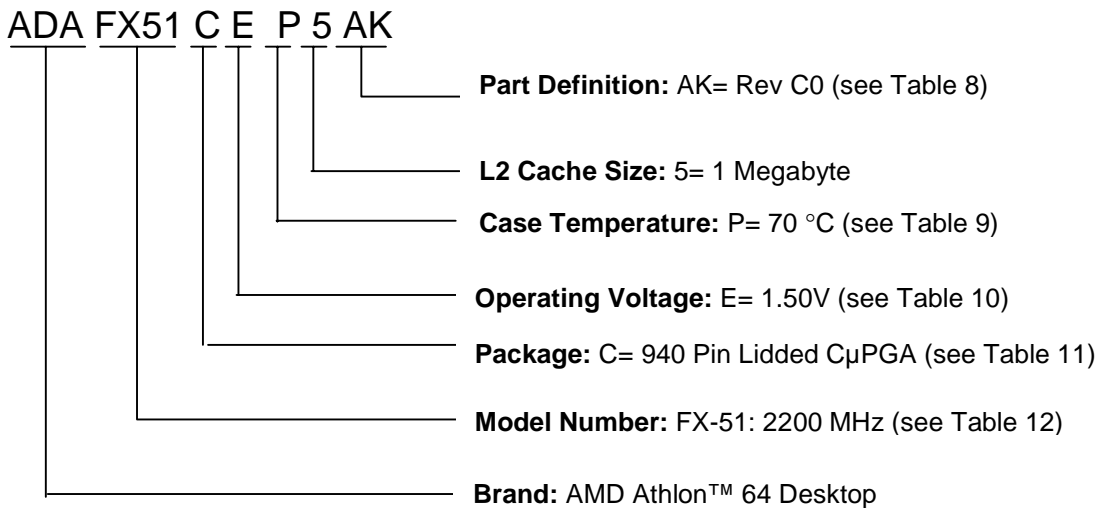


Figure 2 AMD Athlon™ 64 FX Processor Ordering Part Number Example

Table 8 AMD Athlon™ 64 FX Processor Part Definition Options

AK	Rev C0
AT	Rev CG
AS	Rev CG

Table 9 AMD Athlon™ 64 FX Processor Temperature Options

I	63°C
P	70°C

Table 10 AMD Athlon™ 64 FX Processor Operating Voltage Options

E	1.50V
---	-------

Table 11 AMD Athlon™ 64 FX Processor Package Options

C	940 Pin Lidded C μ PGA
D	939 Pin Lidded O μ PGA

Table 12 AMD Athlon™ 64 FX Processor Model Number Options

FX-51:2200 MHz
FX-53:2400 MHz
FX-55:2600 MHz

Table 13 AMD Athlon™ 64 FX Processor Thermal/Power Specifications

Parameter/OPN	ADAFX51CEP5AK	ADAFX51CEP5AT	ADAFX53CEP5AT
Model Number	FX-51	FX-51	FX-53
CPUID 8000_0001h EAX [31:0] ⁷	00000F58h	00000F5Ah	00000F5Ah
FID/VID Status MaxVID Field ⁸	00h	00h	00h
FID/VID Status MaxFID Field ⁸	2Ah	2Ah	2Ah
FID/VID Status StartVID Field ⁸	02h	02h	02h
FID/VID Status StartFID Field ⁸	0Eh	0Eh	10h
L2 Cache Size	1 MB	1 MB	1 MB
T _{CASE} Max ¹⁰	70°C	70°C	70°C
T _{CONTROL} Max ¹¹	70°C	70°C	70°C
Max Frequency	2200 MHz	2200 MHz	2400 MHz
VID_VDD	1.50 V	1.50 V	1.50 V
IDD Max	57.4 A	57.4 A	57.4 A
Thermal Design Power ¹	89 W	89 W	89 W
Thermal Resistance (case to ambient) ⁹	0.31°C/W	0.31°C/W	0.31°C/W
Intermediate P-State #1			
VID_VDD	N/A	N/A	N/A
IDD Max	N/A	N/A	N/A
Thermal Design Power ¹	N/A	N/A	N/A
Min P-State			
VID_VDD	N/A	N/A	N/A
IDD Max	N/A	N/A	N/A
Thermal Design Power ¹	N/A	N/A	N/A
Halt/Stop Grant at Max P-State²			
IDDC1 Max	30.0 A	30.0 A	30.0 A
I/O Power ⁵	2.9 W	2.9 W	2.9 W
Halt/Stop Grant at Min P-State³			
IDDC1 Max	N/A	N/A	N/A
I/O Power ⁵	N/A	N/A	N/A
S3⁴			
I/O Power ^{4,6}	1.4 W	400 mW	400mW

Parameter/OPN	ADAFX53DEP5AS
Model Number	FX-53
CPUID 8000_0001h EAX [31:0] ⁷	00000F7Ah
FID/VID Status MaxVID Field ⁸	00h
FID/VID Status MaxFID Field ⁸	2Ah
FID/VID Status StartVID Field ⁸	02h
FID/VID Status StartFID Field ⁸	10h
L2 Cache Size	1 MB
T _{CASE} Max ¹⁰	70°C
T _{CONTROL} Max ¹¹	70°C
Max Frequency	2400 MHz
VID_VDD	1.50 V
IDD Max	57.4 A
Thermal Design Power ¹	89 W
Thermal Resistance (case-to-ambient) ⁹	0.31°C/W
Intermediate P-State #1	
VID_VDD	N/A
IDD Max	N/A
Thermal Design Power ¹	N/A
Min P-State	1200 MHz
VID_VDD	1.10 V
IDD Max	20.1 A
Thermal Design Power ¹	25 W
Halt/Stop Grant at Max P-State²	
IDDC1 Max	30.0 A
I/O Power ⁵	2.9 W
Halt/Stop Grant at Min P-State³	
IDDC1 Max	N/A
I/O Power ⁵	N/A
S3⁴	
I/O Power ^{4,6}	400mW

Parameter/OPN	ADAFX55DEI5AS
Model Number	FX55
CPUID 8000_0001h EAX [31:0] ⁷	00000F7Ah
FID/VID Status MaxVID Field ⁸	00h
FID/VID Status MaxFID Field ⁸	2Ah
FID/VID Status StartVID Field ⁸	02h
FID/VID Status StartFID Field ⁸	12h
L2 Cache Size	1 MB
T _{CASE} Max ¹⁰	63°C
T _{CONTROL} Max ¹¹	63°C
Max Frequency	2600 MHz
VID_VDD	1.50 V
IDD Max	67.4 A
Thermal Design Power ¹	104 W
Thermal Resistance (case-to-ambient) ¹²	0.22°C/W
Min P-State	1200 MHz
VID_VDD	1.10 V
IDD Max	20.1 A
Thermal Design Power ¹	25 W
Halt/Stop Grant at Max P-State²	
IDDC1 Max	32.1 A
I/O Power ⁵	2.9 W
Halt/Stop Grant at Min P-State³	
IDDC1 Max	N/A
I/O Power ⁵	N/A
S3⁴	
I/O Power ^{4,6}	400 mW

Notes:

1. Thermal Design Power (TDP) is measured under the conditions of T_{CASE} Max, IDD Max, and VDD=VID_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
2. Assumes t_{CASE} max, VDD, clock divider set to 32.
3. Assumes 50°C, VDD nom, clock divider set to 32.
4. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tristated except CKE pins.
5. Thermal Design Power for VDDIO, VTT, VLDT, and VDDA power planes only.
6. Thermal Design Power for VDDIO and VTT power planes only.
7. CPUID extended function 8000_0001h fields are used by the 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.
8. FIDVID Status Register, MSR C001_0042h.
9. Ambient temperature into heat sink (internal ambient) assumed to be 42°C.
10. T_{CASE} 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.
11. T_{CONTROL} max (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. T_{CONTROL} max represents the value at which the processor has reached T_{CASE} 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.

12. Ambient temperature into heat sink (internal ambient) assumed to be 40°C.

Chapter 3 AMD Sempron™ Desktop Processor

The specifications for the AMD Sempron™ processor are listed in Table 20 on page 23. Each column represents a specific Ordering Part Number (OPN). Figure 3 provides an example of the OPN structure for this processor family.

Refer to the *AMD Sempron™ Product Data Sheet*, order# 31805, for all other electrical specifications for the processor. Refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors*, order# 26094 for power management BIOS requirements.

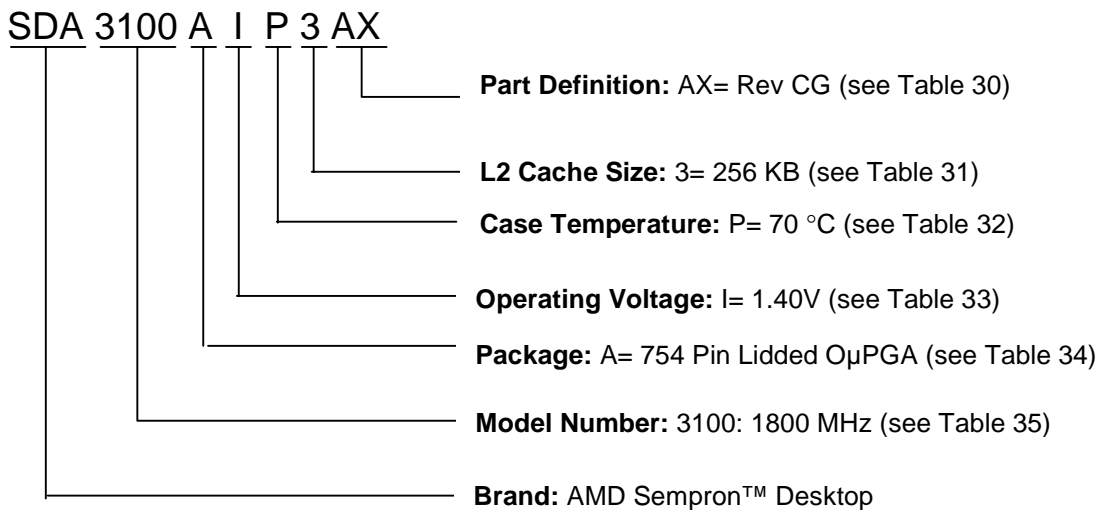


Figure 3 AMD Sempron™ Processor Ordering Part Number Example

Table 14 AMD Sempron™ Processor Part Definition Options

AX	Rev CG
----	--------

Table 15 AMD Sempron™ Processor L2 Cache Size Options

3	256 KB
---	--------

Table 16 AMD Sempron™ Processor Temperature Options

P	70°C
---	------

Table 17 AMD Sempron™ Processor Operating Voltage Options

I	1.40 V
---	--------

Table 18 AMD Sempron™ Processor Package Options

A	754 Pin Lidded O μ PGA
---	----------------------------

Table 19 AMD Sempron™ Processor Model Number Options

Package	Cache Size	Frequency	Model Number
754 Pin Lidded O μ PGA	256 KB	1800 MHz	3100+

Table 20 AMD Sempron™ Processor Thermal/Power Specifications

Parameter/OPN	SDA3100AIP3AX
Model Number	3100+
CPUID 8000_0001h EAX [31:0] ⁷	00000FC0h
FID/VID Status MaxVID Field ⁸	04h
FID/VID Status MaxFID Field ⁸	0Ah
FID/VID Status StartVID Field ⁸	06h
FID/VID Status StartFID Field ⁸	0Ah
L2 Cache Size	256 KB
T _{CASE} Max ¹⁰	70°C
T _{CONTROL} Max ¹¹	70°C
Max P-State	1800 MHz
VID_VDD	1.40 V
IDD Max	42.7 A
Thermal Design Power ¹	62 W
Thermal Resistance (case-to-ambient) ⁹	0.45 °C/W
Intermediate P-State #1	N/A
VID_VDD	N/A
IDD Max	N/A
Thermal Design Power ¹	N/A
Intermediate P-State #2	N/A
VID_VDD	N/A
IDD Max	N/A
Thermal Design Power ¹	N/A
Intermediate P-State #3	N/A
VID_VDD	N/A
IDD Max	N/A
Thermal Design Power ¹	N/A
Min P-State	1000 MHz
VID_VDD	1.1 V
IDD Max	16.2 A
Thermal Design Power ¹	20 W
Halt/Stop Grant at Max P-State²	
IDDC1 Max	30.0 A
I/O Power ⁵	2.2 W
Halt/Stop Grant at Min P-State³	
IDDC1 Max	7.0 A
I/O Power ⁵	2.2 W
S3⁴	
I/O Power ^{4,6}	160 mW

Notes:

1. Thermal Design Power (TDP) is measured under the conditions of T_{CASE} Max, IDD Max, and VDD=VID_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA.
2. Assumes t_{CASE} max, VDD, clock divider set to 32.
3. Assumes 50°C, VDD nom, clock divider set to 32.
4. 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.
5. Thermal Design Power for VDDIO, VTT, VLDT, and VDDA power planes only.
6. Thermal Design Power for VDDIO and VTT power planes only.

7. 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
8. FIDVID Status Register, MSR C001_0042h.
9. Ambient temperature into heat sink (internal ambient) assumed to be 42°C.
10. $T_{CASE\ max}$ 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.
11. $T_{CONTROL\ max}$ (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. $T_{CONTROL\ max}$ represents the value at which the processor has reached $T_{CASE\ max}$ 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. Temperature is in degrees Celsius on the $T_{CONTROL}$ scale.