AMD Family 10h
Desktop Processor
Power and Thermal Data Sheet

Publication # **43375**
Revision: **3.18**
Issue Date: **February 2009**

Trademarks

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Revision History

Date	Revision	Description
February 2009	3.18	Third public release. • Added new 95-W, AM3 OPNs to the AMD Phenom™ Processor section.
January 2009	3.14	Second public release. • Added new OPNs to the AMD Phenom™ Processor section. • Added Table 11 on page 49.
October 2008	3.00	Initial public release.

1 Overview

This document contains processor thermal specifications and power specifications. The specifications in this document supersede those found in the power roadmaps. For all other electrical specifications, refer to the appropriate product data sheet and the *AMD Family 10h Processor Electrical Data Sheet*, order #40014.

1.1 Organization

This document is organized into the following sections:

- Document overview (Section 1)
- One section for each brand represented in the desktop segment, containing the following subsections:
  - Ordering Part Number (OPN) description (content overview in Section 1.1.1)
  - Thermal and power specification tables (content overview in Section 1.1.3 on page 8)
- Power supply specifications (content overview in Section 1.1.4 on page 8)
- **MTOPS** section in Table 13 on page 51
- **APP** section in Table 14 on page 52

1.1.1 Ordering Part Number Description Section Overview

The Ordering Part Number (OPN) Description section contains a depiction and description of a valid OPN for the brand contained in that chapter. Each character or group of characters within an OPN has a specific meaning (for example, model number, socket compatibility). The meaning of each OPN character is detailed in the OPN description section. Each OPN identifies a processor with a unique thermal and power specification table entry.

The OPN description section also contains a full description of the Subsection Ordering Part Number (SOPN) abstraction characters for the brand contained in that chapter. SOPNs are used to group and organize OPNs into subsections for the thermal and power tables and power supply specifications. A definition of SOPNs is contained in Section 1.3 on page 9.

1.1.2 Thermal and Power Table Guide Overview

The thermal and power table guide section contains a table mapping SOPNs and the properties associated with their defined characters to the proper thermal and power table subsections and page numbers. This table is designed to be used as a quick reference for finding the appropriate subsection for the thermal and power tables corresponding to an SOPN.

1.1.3 Thermal and Power Table Section Overview

The thermal and power specification tables contain the thermal and power requirements for each OPN. This includes the information necessary for thermal management (for example, heat sink requirements, ambient temperature assumptions) and power delivery (for example, voltage and current, and power dissipation for each P-state).

The thermal and power specification tables are organized into subsections that correspond to Subsection Ordering Part Numbers (SOPNs). SOPNs for the thermal and power tables have the brand, power limit, and part definition characters defined. They are of the form **AB** mmmmrrpnc **GH**. Each chapter provides a guide table that maps the SOPNs in the thermal and power tables within that chapter to the appropriate subsection number and page number. Within each subsection the OPNs are sorted by model number, socket compatibility, voltage, temperature, and cache size, respectively.

1.1.4 Power Supply Specification Chapter Overview

The power supply specification chapter contains the operating conditions and requirements for all voltage planes required by the processor. Power supply requirements are organized into subsections that correspond to socket infrastructure. The socket infrastructure of a particular OPN can be found in Table 5 on page 13.

1.1.5 Power Limit Encoding Chapter Overview

The power limit encoding section defines power encodings and their interpretation. Refer to the *BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order #31116, for details.

1.2 Conventions

Following are conventions used with numbers.

- Binary numbers. Binary numbers are indicated by appending a "b" at the end, for example: 0110b.
- Decimal numbers. Unless specified otherwise, all numbers are decimal.
- Hexadecimal numbers. Hexadecimal numbers are indicated by appending an "h" to the end, for example: 45F8h.
- Underscores in numbers. Underscores are used to break up numbers to make them more readable, for example: 0110_1100b. They do not imply any operation.

1.3 Definitions

Following are some key definitions.

- **CPU COF**. CPU Current Operating Frequency.
- **CTP**. Composite Theoretical Performance.
- **Dual-plane.** Platforms in which the VDD and VDDNB (Northbridge) planes are isolated on the platform and controlled as separate voltages.
- **DP.** Dual Processor. Each link on DP models supports connections to I/O devices, and any one link or any sub-link can connect to another MP or DP processor.
- **MP**. Multiprocessor. Each link on MP models supports connections to I/O devices or an MP or DP processor. Systems are limited to the number of nodes supported by all the processors. Refer to the *BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order #31116, for more details.
- **MTOPS**. Millions Of Theoretical Operations Per Second.
- **NB COF**. Northbridge Current Operating Frequency.
- **OPN**. Ordering Part Number. An OPN uniquely identifies a processor and its associated specifications in the thermal and power tables and power supply specifications section.
- **P-state**. Processor Performance State. P-states are valid combinations of CPU voltage, CPU COF, Northbridge voltage, and NB COF.
- **Single-plane.** Platforms in which all the VDD and VDDNB power planes are connected together on the platform and controlled as a single power plane.
- **SOPN**. Subsection Ordering Part Number. An SOPN is an OPN with a subset of defined characters. All defined characters in an SOPN are bolded and capitalized. All abstracted characters in an SOPN are in non-bolded lowercase. Information for any OPN that matches all of the defined characters in an SOPN is contained in that subsection. For example, OPN AB12344CDE5FGH appears under the subsection for SOPN **AB** mmmmmrrpnc **GH**. The abstracted (lowercase) character definitions for SOPNs are contained in the OPN description section of each chapter.
- **State**. Indicates the ACPI defined sleep state, power state, and performance state for the related specifications. 'x' indicates the related specifications are independent of the associated ACPI state. For example, S0.C0.P0 indicates sleep state 0, power state 0, and performance state 0. S3.Cx.Px indicates sleep state 3 entered from any power and performance state combination.
- **TDP**. Thermal Design Power. The thermal design power is the maximum power a processor can draw for a thermally significant period while running commercially useful software. The constraining conditions for TDP are specified in the notes in the thermal and power tables.
- **UP**. Uniprocessor. Each link on UP models supports connections to I/O devices.

- **VID_VDD**. The VID_VDD voltage is the VID-requested VDD supply level. Refer to the *BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order #31116, for VID to voltage translation specifications.
- **VID_VDDNB**. The VID_VDDNB voltage is the VID-requested VDD Northbridge supply level. Refer to the *BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order #31116, for VID to voltage translation specifications.

2 AMD Phenom™ Processor

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

2.1 AMD Phenom™ Processor Ordering Part Number Description

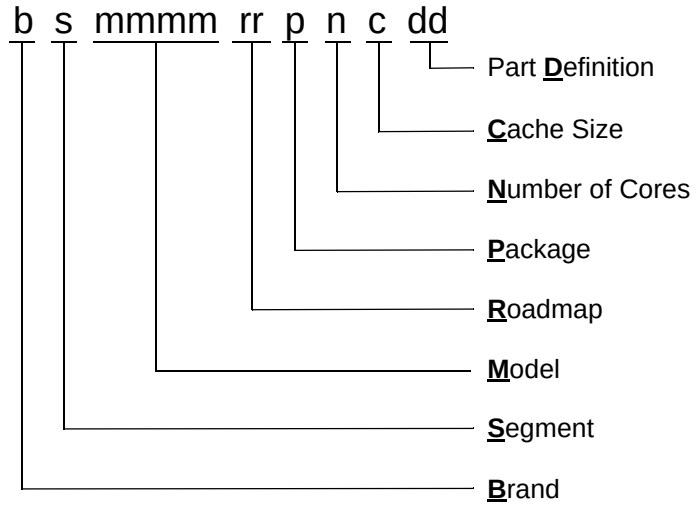

Figure 1. AMD Phenom™ Processor Ordering Part Number Diagram

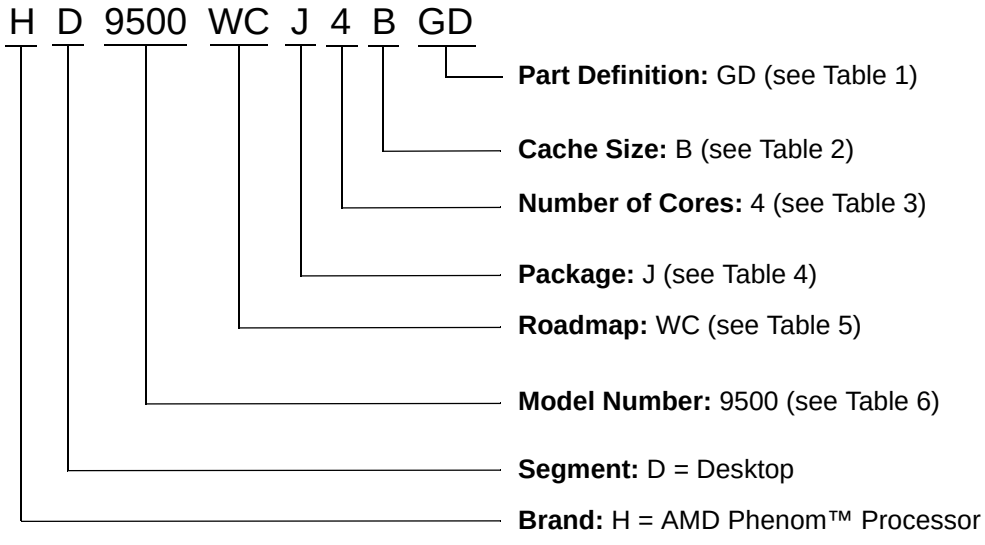

Figure 2. AMD Phenom™ Processor Ordering Part Number Example

Table 1. AMD Phenom™ Processor Part Definition Options

Part Definition	Revision	CPUID 8000_0001h EAX [31:0] (CPUID)
GD	Rev B2	00100F22h
GH	Rev B3	00100F23h
HH	Rev B2	00100F22h
HI	Rev B3	00100F23h

Table 2. AMD Phenom™ Processor Cache Size Options

OPN Character	L2 Cache Size	L3 Cache Size
B	512 KB	2048 KB

Table 3. AMD Phenom™ Processor Number of Cores

OPN Character	Number of Cores
3	3
4	4

Table 4. AMD Phenom™ Processor Package Options

OPN Character	Package
J	AM2r2

Table 5. AMD Phenom™ Processor Roadmap Options

OPN Character	Power, Segment	Socket Infrastructure
OB	65 W, Desktop	AM2r2
WC	95 W, Desktop	AM2r2
XA	125 W, Desktop	AM2r2
FA	140 W, Desktop	AM2r2
OD	65 W, Desktop	AM2r2

Table 6. AMD Phenom™ Processor Model Number Options

Core Frequency	Single-Plane NB Frequency	Dual-Plane NB Frequency	Number of Cores	Model Number
1800 MHz	1600 MHz	1600 MHz	4	9100
1800 MHz	1600 MHz	1600 MHz	4	9150
2000 MHz	1800 MHz	1800 MHz	4	9350
1900 MHz	1800 MHz	1800 MHz	3	8250
2100 MHz	1800 MHz	1800 MHz	3	8400
2100 MHz	1800 MHz	1800 MHz	3	8450
2100 MHz	1800 MHz	1800 MHz	4	9450
2200 MHz	1800 MHz	1800 MHz	4	9500
2200 MHz	1800 MHz	1800 MHz	4	9550
2200 MHz	1800 MHz	1800 MHz	3	8550
2300 MHz	1800 MHz	1800 MHz	3	8600, 860B
2300 MHz	1800 MHz	1800 MHz	4	9600, 960Z, 960B
2300 MHz	1800 MHz	1800 MHz	4	9650
2300 MHz	1800 MHz	1800 MHz	3	8650
2400 MHz	1800 MHz	1800 MHz	3	8750, 875Z, 875B
2400 MHz	2000 MHz	2000 MHz	4	9700
2400 MHz	1800 MHz	1800 MHz	4	9750, 975B
2500 MHz	1800 MHz	1800 MHz	3	8850
2500 MHz	1800 MHz	1800 MHz	4	9850
2500 MHz	2000 MHz	2000 MHz	4	985Z
2500 MHz	1600 MHz	2000 MHz	4	X805
2600 MHz	2000 MHz	2000 MHz	4	995Z
2600 MHz	1600 MHz	2000 MHz	4	X810, X910
2600 MHz	1600 MHz	2000 MHz	3	X710
2800 MHz	1600 MHz	1800 MHz	4	X920
2800 MHz	1600 MHz	2000 MHz	3	Z720
2800 MHz	1600 MHz	2000 MHz	4	X925
3000 MHz	1600 MHz	1800 MHz	4	Z940

Table 7. AMD Phenom™ Processor Thermal Profiles

Thermal Profile	A
Heat Sink Thermal Resistance	0.29°C/W
Heat Sink Local Ambient	42°C
Profile Thermal Resistance	0.232°C/W
Profile Ambient	48°C
TDP	**Tcase Max**
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.0°C
35.0 W	56.1°C
40.0 W	57.3°C
45.0 W	58.4°C
50.0 W	59.6°C
55.0 W	60.8°C
60.0 W	61.9°C
65.0 W	63.1°C
70.0 W	64.2°C
75.0 W	65.4°C
80.0 W	66.6°C
85.0 W	67.7°C
90.0 W	68.9°C
95.0 W	70.0°C

Thermal Profile	B
Heat Sink Thermal Resistance	0.18°C/W
Heat Sink Local Ambient	38°C
Profile Thermal Resistance	0.136°C/W
Profile Ambient	44°C
TDP	**Tcase Max**
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.0°C
35.0 W	55.0°C
40.0 W	55.0°C
45.0 W	55.0°C
50.0 W	55.0°C
55.0 W	55.0°C
60.0 W	55.0°C
65.0 W	55.0°C
70.0 W	55.0°C
75.0 W	55.0°C
80.0 W	55.0°C
85.0 W	55.6°C
90.0 W	56.2°C
95.0 W	56.9°C
100.0 W	57.6°C
105.0 W	58.3°C
110.0 W	59.0°C
115.0 W	59.6°C
120.0 W	60.3°C
125.0 W	61.0°C

***Note**: The thermal profile is used to define the relationship between Tcase max and device-specific Thermal Design Power. The heat sink thermal resistance and heat sink local ambient values specify heat sink design targets. The profile thermal resistance and profile ambient values specify the relationship between part-specific power and part-specific Tcase Max. If the heat sink design targets are met, the thermal profile specifications are met.*

Table 7: AMD Phenom™ Processor Thermal Profiles (Continued)

Thermal Profile	C
Heat Sink Thermal Resistance	0.30°C/W
Heat Sink Local Ambient	42°C
Profile Thermal Resistance	0.242°C/W
Profile Ambient	48°C
TDP	**Tcase Max**
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.3°C
35.0 W	56.5°C
40.0 W	57.7°C
45.0 W	58.9°C
50.0 W	60.1°C
55.0 W	61.3°C
60.0 W	62.5°C
65.0 W	63.7°C
70.0 W	64.9°C
75.0 W	66.2°C
80.0 W	67.4°C
85.0 W	68.6°C
90.0 W	69.8°C
95.0 W	71.0°C

Thermal Profile	D
Heat Sink Thermal Resistance	0.29°C/W
Heat Sink Local Ambient	42°C
Profile Thermal Resistance	0.200°C/W
Profile Ambient	48°C
TDP	**Tcase Max**
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.0°C
35.0 W	55.0°C
40.0 W	56.0°C
45.0 W	57.0°C
50.0 W	58.0°C
55.0 W	59.0°C
60.0 W	60.0°C
65.0 W	61.0°C

***Note**: The thermal profile is used to define the relationship between Tcase max and device-specific Thermal Design Power. The heat sink thermal resistance and heat sink local ambient values specify heat sink design targets. The profile thermal resistance and profile ambient values specify the relationship between part-specific power and part-specific Tcase Max. If the heat sink design targets are met, the thermal profile specifications are met.*

Table 7: AMD Phenom™ Processor Thermal Profiles (Continued)

Thermal Profile	E
Heat Sink Thermal Resistance	0.18°C/W
Heat Sink Local Ambient	38°C
Profile Thermal Resistance	0.143°C/W
Profile Ambient	44°C
TDP	Tcase Max
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.0°C
35.0 W	55.0°C
40.0 W	55.0°C
45.0 W	55.0°C
50.0 W	55.0°C
55.0 W	55.0°C
60.0 W	55.0°C
65.0 W	55.0°C
70.0 W	55.0°C
75.0 W	55.0°C
80.0 W	55.4°C
85.0 W	56.2°C
90.0 W	56.9°C
95.0 W	57.6°C
100.0 W	58.3°C
105.0 W	59.0°C
110.0 W	59.7°C
115.0 W	60.4°C
120.0 W	61.2°C
125.0 W	61.9°C
130.0 W	62.6°C
135.0 W	63.3°C
140.0 W	64.0°C

Thermal Profile	F
Heat Sink Thermal Resistance	0.42°C/W
Heat Sink Local Ambient	42°C
Profile Thermal Resistance	0.338°C/W
Profile Ambient	48°C
TDP	Tcase Max
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	56.5°C
30.0 W	58.1°C
35.0 W	59.8°C
40.0 W	61.5°C
45.0 W	63.2°C
50.0 W	64.9°C
55.0 W	66.6°C
60.0 W	68.3°C
65.0 W	70.0°C

***Note**: The thermal profile is used to define the relationship between Tcase max and device-specific Thermal Design Power. The heat sink thermal resistance and heat sink local ambient values specify heat sink design targets. The profile thermal resistance and profile ambient values specify the relationship between part-specific power and part-specific Tcase Max. If the heat sink design targets are met, the thermal profile specifications are met.*

Table 7: AMD Phenom™ Processor Thermal Profiles (Continued)

Thermal Profile	G
Heat Sink Thermal Resistance	0.44°C/W
Heat Sink Local Ambient	42°C
Profile Thermal Resistance	0.354°C/W
Profile Ambient	48°C
TDP	**Tcase Max**
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.1°C
25.0 W	56.9°C
30.0 W	58.6°C
35.0 W	60.4°C
40.0 W	62.2°C
45.0 W	63.9°C
50.0 W	65.7°C
55.0 W	67.5°C
60.0 W	69.2°C
65.0 W	71.0°C

Thermal Profile	I
Heat Sink Thermal Resistance	0.19°C/W
Heat Sink Local Ambient	38°C
Profile Thermal Resistance	0.144°C/W
Profile Ambient	44°C
TDP	**Tcase Max**
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.0°C
35.0 W	55.0°C
40.0 W	55.0°C
45.0 W	55.0°C
50.0 W	55.0°C
55.0 W	55.0°C
60.0 W	55.0°C
65.0 W	55.0°C
70.0 W	55.0°C
75.0 W	55.0°C
80.0 W	55.5°C
85.0 W	56.2°C
90.0 W	57.0°C
95.0 W	57.7°C
100.0 W	58.4°C
105.0 W	59.1°C
110.0 W	59.8°C
115.0 W	60.6°C
120.0 W	61.3°C
125.0 W	62.0°C

***Note**: The thermal profile is used to define the relationship between Tcase max and device-specific Thermal Design Power. The heat sink thermal resistance and heat sink local ambient values specify heat sink design targets. The profile thermal resistance and profile ambient values specify the relationship between part-specific power and part-specific Tcase Max. If the heat sink design targets are met, the thermal profile specifications are met.*

Table 7: AMD Phenom™ Processor Thermal Profiles (Continued)

Thermal Profile	H
Heat Sink Thermal Resistance	0.32°C/W
Heat Sink Local Ambient	42°C
Profile Thermal Resistance	0.263°C/W
Profile Ambient	48°C
TDP	Tcase Max
0.0 W	55.0°C
5.0 W	55.0°C
10.0 W	55.0°C
15.0 W	55.0°C
20.0 W	55.0°C
25.0 W	55.0°C
30.0 W	55.9°C
35.0 W	57.2°C
40.0 W	58.5°C
45.0 W	59.8°C
50.0 W	61.2°C
55.0 W	62.5°C
60.0 W	63.8°C
65.0 W	65.1°C
70.0 W	66.4°C
75.0 W	67.7°C
80.0 W	69.0°C
85.0 W	70.4°C
90.0 W	71.7°C
95.0 W	73.0°C

***Note**: The thermal profile is used to define the relationship between Tcase max and device-specific Thermal Design Power. The heat sink thermal resistance and heat sink local ambient values specify heat sink design targets. The profile thermal resistance and profile ambient values specify the relationship between part-specific power and part-specific Tcase Max. If the heat sink design targets are met, the thermal profile specifications are met.*

2.2 AMD Phenom™ Processor Thermal and Power Table Guide

The thermal and power table guide shown in Table 8 maps SOPNs and the properties associated with their defined characters to the proper thermal and power table subsections and page numbers. This table is designed to be used as a quick reference for finding the appropriate subsection for the thermal and power tables corresponding to an SOPN.

Table 8. AMD Phenom™ Processor Thermal and Power Table Guide

SOPN	Power	Revision	Thermal/Power Tables
HD mmmm **OB** pnc **GD**	65 W	B2	Section 2.3.1 on page 22
HD mmmm **WC** pnc **GD**	95 W	B2	Section 2.3.2 on page 23
HD mmmm **XA** pnc **GD**	125 W	B2	Section 2.3.3 on page 26
HD mmmm **WC** pnc **GH**	95 W	B3	Section 2.3.4 on page 27
HD mmmm **XA** pnc **GH**	125 W	B3	Section 2.3.5 on page 35
HD mmmm **FA** pnc **GH**	140 W	B3	Section 2.3.6 on page 37
HD mmmm **OD** pnc **GH**	65 W	B3	Section 2.3.7 on page 38
HD mmmm **WC** pnc **HH**	95 W	B2	Section 2.3.8 on page 41
HD mmmm **WC** pnc **HI**	95 W	B3	Section 2.3.9 on page 42
HD mmmm **XC** pnc **GI**	125 W	C2	Section 2.3.10 on page 43
HD mmmm **WF** pnc **GI**	95 W	C2	Section 2.3.11 on page 44

2.3 AMD Phenom™ Processor Thermal and Power Specifications

The thermal and power specification tables contain the thermal and power requirements for each OPN. This includes the information necessary for thermal management (for example, heat sink requirements, temperature assumptions) and power delivery (for example, voltage, current, and power dissipation for each P-state). Refer to the *AMD Family 10h Processor Electrical Data Sheet*, order #40014, for all other electrical specifications for the processor. Refer to the *BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order #31116, for power management BIOS requirements.

Section 2.1 on page 11 provides an example of the OPN structure for processors documented in this chapter and Table 8 on page 20 provides a guide to OPN organization in the following subsections. Refer to Section 1.2 on page 8 and Section 1.3 on page 9 for numbering conventions and terminology definitions used in these tables. Refer to Section 1.2 on page 8 for full document titles and order numbers for reference documentation.

2.3.1 HD mmmm OB pnc GD (65W DT, AM2r2) Thermal and Power Specifications

OPN			HD9100OBJ4BGD	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 61 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		D	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1600 MHz	1600 MHz
	VID_VDDNB	11,7	N/A	1.150 V
	IDDNB Max	12	N/A	9.6 A
S0.C0.P0	CPU COF	6	1800 MHz	
	TDP	3	65.0 W	65.0 W
	VID_VDD Min	9	1.100 V	1.100 V
	VID_VDD Max	9	1.150 V	1.150 V
	IDD Max	3,10	53.8 A	44.9 A
S0.C0.P1	CPU COF	6	900 MHz	
	TDP	3	46.3 W	39.3 W
	VID_VDD Min	9	1.100 V	1.000 V
	VID_VDD Max	9	1.150 V	1.000 V
	IDD Max	3,10	38.0 A	23.7 A
S0.C1.Pmin	IDD Max	3,10,14	14.6 A	3.5 A
S0	I/O Power	13	7.2 W	7.2 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.2 **HD** mmmm **WC** pnc **GD (95W DT, AM2r2) Thermal and Power Specifications**

OPN			HD8600WCJ3BGD HD860BWCJ3BGD		HD8400WCJ3BGD	
State	**Specification**[8]	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	14.5 A	N/A	15.2 A
S0.C0.P0	CPU COF	6	2300 MHz		2100 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.200 V	1.200 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	73.4 A	60.3 A	73.3 A	59.6 A
S0.C0.P1	CPU COF	6	1150 MHz		1050 MHz	
	TDP	3	72.2 W	54.6 W	74.2 W	55.6 W
	VID_VDD Min	9	1.200 V	1.050 V	1.200 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	56.3 A	30.5 A	57.7 A	30.6 A
S0.C1.Pmin	IDD Max	3,10,14	26.1 A	6.7 A	28.1 A	7.4 A
S0	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

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OPN			HD9600WCJ4BGD HD960BWCJ4BGD		HD9500WCJ4BGD	
State	**Specification**[8]	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C		55 °C to 70 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		A		A	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	12 A	N/A	15 A
S0.C0.P0	CPU COF	6	2300 MHz		2200 MHz	
	TDP	3	95 W	95 W	95 W	95 W
	VID_VDD Min	9	1.150 V	1.150 V	1.150 V	1.150 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	75.2 A	65.6 A	75.6 A	65.3 A
S0.C0.P1	CPU COF	6	1150 MHz		1100 MHz	
	TDP	3	66.3 W	56.7 W	67.2 W	66.1 W
	VID_VDD Min	9	1.150 V	1.050 V	1.150 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	53.7 A	35.5 A	56.4 A	40.8 A
S0.C1.Pmin	IDD Max	3,10,14	37.6 A	17.3 A	44.4 A	24.1 A
S0	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD960ZWCJ4BGD	
State	**Specification**[8]	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C	
	Tctl Max	2	70 °C	
	Tambient min		5 °C	
	Thermal Profile		A	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V
	IDDNB Max	12	N/A	12.0 A
S0.C0.P0	CPU COF	6	2300 MHz	
	TDP	3	95.0 W	95.0 W
	VID_VDD Min	9	1.150 V	1.150 V
	VID_VDD Max	9	1.250 V	1.250 V
	IDD Max	3,10	75.2 A	65.6 A
S0.C0.P1	CPU COF	6	1150 MHz	
	TDP	3	66.3 W	56.7 W
	VID_VDD Min	9	1.150 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V
	IDD Max	3,10	53.7 A	35.5 A
S0.C1.Pmin	IDD Max	3,10,14	37.6 A	17.3 A
S0	I/O Power	13	7.2 W	7.2 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.3 **HD** mmmm **XA** pnc **GD (125W DT, AM2r2) Thermal and Power Specifications**

OPN			HD9700XAJ4BGD	
State	**Specification**[8]	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 61 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		B	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	2000 MHz	2000 MHz
	VID_VDDNB	11,7	N/A	1.300 V
	IDDNB Max	12	N/A	16.8 A
S0.C0.P0	CPU COF	6	2400 MHz	
	TDP	3	125.0 W	125.0 W
	VID_VDD Min	9	1.200 V	1.200 V
	VID_VDD Max	9	1.300 V	1.300 V
	IDD Max	3,10	95.4 A	82.3 A
S0.C0.P1	CPU COF	6	1200 MHz	
	TDP	3	90.8 W	69.4 W
	VID_VDD Min	9	1.200 V	1.050 V
	VID_VDD Max	9	1.300 V	1.050 V
	IDD Max	3,10	71.6 A	41.1 A
S0.C1.Pmin	IDD Max	3,10,14	57.6 A	39.4 A
S0	I/O Power	13	7.2 W	7.2 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.4 **HD** mmmm **WC** pnc **GH (95W DT, AM2r2) Thermal and Power Specifications**

OPN			HD8450WCJ3BGH		HD8550WCJ3BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	15.2 A	N/A	14.9 A
S0.C0.P0	CPU COF	6	2100 MHz		2200 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.200 V	1.200 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	73.3 A	59.6 A	73.4 A	59.9 A
S0.C0.P1	CPU COF	6	1050 MHz		1100 MHz	
	TDP	3	74.2 W	55.6 W	73.2 W	55.1 W
	VID_VDD Min	9	1.200 V	1.050 V	1.200 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	57.7 A	30.6 A	57.0 A	30.5 A
S0.C1.Pmin	Core Power	15,18	15.5 W	7.8 W	14.7 W	7.4 W
	NB Power	17	16.5 W	19.0 W	16.1 W	18.6 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	12.9 W	12.9 W	12.4 W	12.4 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD8650WCJ3BGH		HD860BWCJ3BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	14.5 A	N/A	12.8 A
S0.C0.P0	CPU COF	6	2300 MHz		2300 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.250 V	1.250 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	73.4 A	60.3 A	72.4 A	59.6 A
S0.C0.P1	CPU COF	6	1150 MHz		1150 MHz	
	TDP	3	72.2 W	54.6 W	72.2 W	48.7 W
	VID_VDD Min	9	1.200 V	1.050 V	1.250 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	56.3 A	30.5 A	54.2 A	26.9 A
S0.C1.Pmin	Core Power	15,18	13.8 W	7.0 W	12.0 W	5.0 W
	NB Power	17	15.8 W	18.2 W	16.0 W	16.0 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	12.0 W	12.0 W	9.7 W	9.7 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD8750WCJ3BGH		HD875BWCJ3BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	14.2 A	N/A	12.5 A
S0.C0.P0	CPU COF	6	2400 MHz		2400 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.250 V	1.250 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	73.5 A	60.6 A	72.4 A	59.9 A
S0.C0.P1	CPU COF	6	1200 MHz		1200 MHz	
	TDP	3	71.3 W	54.2 W	71.3 W	48.3 W
	VID_VDD Min	9	1.200 V	1.050 V	1.250 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	55.6 A	30.4 A	53.4 A	26.8 A
S0.C1.Pmin	Core Power	15,18	13.1 W	6.6 W	11.1 W	4.6 W
	NB Power	17	15.5 W	17.8 W	15.6 W	15.6 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	11.6 W	11.6 W	9.3 W	9.3 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD875ZWCJ3BGH		HD8850WCJ3BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	14.2 A	N/A	13.9 A
S0.C0.P0	CPU COF	6	2400 MHz		2500 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.200 V	1.200 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	73.5 A	60.6 A	73.6 A	61.0 A
S0.C0.P1	CPU COF	6	1200 MHz		1250 MHz	
	TDP	3	71.3 W	54.2 W	70.4 W	53.7 W
	VID_VDD Min	9	1.200 V	1.050 V	1.200 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	55.6 A	30.4 A	54.9 A	30.3 A
S0.C1.Pmin	Core Power	15,18	13.1 W	6.6 W	12.3 W	6.2 W
	NB Power	17	15.5 W	17.8 W	15.1 W	17.4 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	11.6 W	11.6 W	11.1 W	11.1 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD9850WCJ4BGH		HD985BWCJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C		55 °C to 70 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		A		A	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB Min	11,7	N/A	1.200 V	N/A	1.225 V
	VID_VDDNB Max	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	11.1 A	N/A	10.1 A
S0.C0.P0	CPU COF	6	2500 MHz		2500 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.225 V	1.225 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	74.1 A	63.8 A	73.9 A	63.8 A
S0.C0.P1	CPU COF	6	1250 MHz		1250 MHz	
	TDP	3	63.6 W	49.6 W	63.6 W	46.6 W
	VID_VDD Min	9	1.200 V	1.050 V	1.225 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	49.3 A	29.7 A	48.3 A	28.3 A
S0.C1.Pmin	Core Power	15,18	24.5 W	21.5 W	16.6 W	14.6 W
	NB Power	17	12.5 W	16.3 W	12.3 W	12.3 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	10.0 W	10.0 W	12.3 W	12.3 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD9750WCJ4BGH		HD975BWCJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C		55 °C to 70 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		A		A	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	13.5 A	N/A	11.6 A
S0.C0.P0	CPU COF	6	2400 MHz		2400 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.150 V	1.150 V	1.200 V	1.200 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	75.2 A	64.0 A	74.0 A	63.4 A
S0.C0.P1	CPU COF	6	1200 MHz		1200 MHz	
	TDP	3	65.3 W	56.9 W	64.7 W	50.3 W
	VID_VDD Min	9	1.150 V	1.050 V	1.200 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	52.8 A	33.8 A	50.2 A	29.8 A
S0.C1.Pmin	Core Power	15,18	25.9 W	22.7 W	21.1 W	18.0 W
	NB Power	17	12.9 W	16.9 W	12.8 W	14.5 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	10.6 W	10.6 W	8.1 W	8.1 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD960BWCJ4BGH		HD9650WCJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C		55 °C to 70 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		A		A	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V	N/A	1.250 V
	IDDNB Max	12	N/A	12.0 A	N/A	14.0 A
S0.C0.P0	CPU COF	6	2300 MHz		2300 MHz	
	TDP	3	95.0 W	95.0 W	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.150 V	1.150 V
	VID_VDD Max	9	1.250 V	1.250 V	1.250 V	1.250 V
	IDD Max	3,10	73.9 A	62.9 A	75.1 A	63.5 A
S0.C0.P1	CPU COF	6	1150 MHz		1150 MHz	
	TDP	3	65.8 W	50.9 W	66.1 W	57.6 W
	VID_VDD Min	9	1.200 V	1.050 V	1.150 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V	1.250 V	1.050 V
	IDD Max	3,10	51.1 A	29.9 A	53.6 A	34.0 A
S0.C1.Pmin	Core Power	15,18	22.7 W	19.1 W	27.4 W	23.8 W
	NB Power	17	13.2 W	15.0 W	13.3 W	17.5 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	8.7 W	8.7 W	11.2 W	11.2 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD9550WCJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		A	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V
	IDDNB Max	12	N/A	14.4 A
S0.C0.P0	CPU COF	6	2200 MHz	
	TDP	3	95.0 W	95.0 W
	VID_VDD Min	9	1.150 V	1.150 V
	VID_VDD Max	9	1.250 V	1.250 V
	IDD Max	3,10	74.9 A	63.0 A
S0.C0.P1	CPU COF	6	1100 MHz	
	TDP	3	67.0 W	58.3 W
	VID_VDD Min	9	1.150 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V
	IDD Max	3,10	54.4 A	34.1 A
S0.C1.Pmin	Core Power	15,18	28.9 W	24.9 W
	NB Power	17	13.7 W	18.0 W
	I/O Power	13	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	11.9 W	11.9 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.5 **HD** mmmm **XA** pnc **GH (125W DT, AM2r2) Thermal and Power Specifications**

OPN			HD985ZXAJ4BGH		HD9750XAJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 61 °C		55 °C to 61 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		B		B	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	2000 MHz	2000 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.300 V	N/A	1.300 V
	IDDNB Max	12	N/A	18.4 A	N/A	18.3 A
S0.C0.P0	CPU COF	6	2500 MHz		2400 MHz	
	TDP	3	125.0 W	125.0 W	125.0 W	125.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.200 V	1.200 V
	VID_VDD Max	9	1.300 V	1.300 V	1.300 V	1.300 V
	IDD Max	3,10	95.0 A	80.1 A	95.0 A	80.2 A
S0.C0.P1	CPU COF	6	1250 MHz		1200 MHz	
	TDP	3	89.4 W	69.7 W	90.7 W	70.2 W
	VID_VDD Min	9	1.200 V	1.050 V	1.200 V	1.050 V
	VID_VDD Max	9	1.300 V	1.050 V	1.300 V	1.050 V
	IDD Max	3,10	70.2 A	39.4 A	71.2 A	39.9 A
S0.C1.Pmin	Core Power	15,18	40.8 W	32.3 W	42.2 W	33.0 W
	NB Power	17	17.9 W	23.9 W	17.7 W	23.8 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	13.6 W	13.6 W	14.5 W	14.5 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD9850XAJ4BGH		HD995ZXAJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 61 °C		55 °C to 61 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		B		B	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	2000 MHz	2000 MHz	2000 MHz	2000 MHz
	VID_VDDNB	11,7	N/A	1.300 V	N/A	1.300 V
	IDDNB Max	12	N/A	18.4 A	N/A	17.8 A
S0.C0.P0	CPU COF	6	2500 MHz		2600 MHz	
	TDP	3	125.0 W	125.0 W	125.0 W	125.0 W
	VID_VDD Min	9	1.200 V	1.200 V	1.200 V	1.200 V
	VID_VDD Max	9	1.300 V	1.300 V	1.300 V	1.300 V
	IDD Max	3,10	95.0 A	80.1 A	95.0 A	80.5 A
S0.C0.P1	CPU COF	6	1250 MHz		1300 MHz	
	TDP	3	89.4 W	69.7 W	88.2 W	68.9 W
	VID_VDD Min	9	1.200 V	1.050 V	1.200 V	1.050 V
	VID_VDD Max	9	1.300 V	1.050 V	1.300 V	1.050 V
	IDD Max	3,10	70.2 A	39.4 A	69.2 A	39.3 A
S0.C1.Pmin	Core Power	15,18	40.8 W	32.3 W	39.0 W	31.1 W
	NB Power	17	17.9 W	23.9 W	17.5 W	22.2 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	13.7 W	13.7 W	13.1 W	13.1 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

2.3.6 HD mmmm FA pnc GH (140W DT, AM2r2) Thermal and Power Specifications

OPN			HD995ZFAJ4BGH[19]	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 64 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		E	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	2000 MHz	2000 MHz
	VID_VDDNB	11,7	N/A	1.300 V
	IDDNB Max	12	N/A	18.1 A
S0.C0.P0	CPU COF	6	2600 MHz	
	TDP	3	140.0 W	140.0 W
	VID_VDD Min	9	1.250 V	1.250 V
	VID_VDD Max	9	1.300 V	1.300 V
	IDD Max	3,10	105.9 A	89.6 A
S0.C0.P1	CPU COF	6	1300 MHz	
	TDP	3	102.6 W	69.8 W
	VID_VDD Min	9	1.250 V	1.050 V
	VID_VDD Max	9	1.300 V	1.050 V
	IDD Max	3,10	78.5 A	39.8 A
S0.C1.Pmin	Core Power	15,18	44.2 W	31.8 W
	NB Power	17	20.4 W	23.5 W
	I/O Power	13	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	13.4 W	13.4 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.7 **HD** mmmm **OD** pnc **GH (65W DT, AM2r2) Thermal and Power Specifications**

OPN			HD8450ODJ3BGH		HD8250ODJ3BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		G		G	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.200 V	N/A	1.200 V
	IDDNB Max	12	N/A	11.0 A	N/A	11.6 A
S0.C0.P0	CPU COF	6	2100 MHz		1900 MHz	
	TDP	3	65.0 W	65.0 W	65.0 W	65.0 W
	VID_VDD Min	9	1.125 V	1.125 V	1.125 V	1.125 V
	VID_VDD Max	9	1.200 V	1.200 V	1.200 V	1.200 V
	IDD Max	3,10	51.8 A	42.1 A	51.6 A	41.4 A
S0.C0.P1	CPU COF	6	1050 MHz		950 MHz	
	TDP	3	46.7 W	39.1 W	48.2 W	40.1 W
	VID_VDD Min	9	1.125 V	1.000 V	1.125 V	1.000 V
	VID_VDD Max	9	1.200 V	1.000 V	1.200 V	1.000 V
	IDD Max	3,10	37.5 A	21.5 A	38.7 A	21.6 A
S0.C1.Pmin	Core Power	15,18	5.5 W	3.2 W	6.8 W	3.9 W
	NB Power	17	10.9 W	13.2 W	11.4 W	13.9 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	8.6 W	8.6 W	9.6 W	9.6 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD9150ODJ4BGH		HD9350ODJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C		55 °C to 70 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		F		F	
	Startup P-State	5	S0.C0.P1		S0.C0.P1	
	HTC P-State	4	S0.C0.P1		S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1600 MHz	1600 MHz	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.125 V	N/A	1.125 V
	IDDNB Max	12	N/A	10.1 A	N/A	9.8 A
S0.C0.P0	CPU COF	6	1800 MHz		2000 MHz	
	TDP	3	65.0 W	65.0 W	65.0 W	65.0 W
	VID_VDD Min	9	1.075 V	1.075 V	1.075 V	1.075 V
	VID_VDD Max	9	1.125 V	1.125 V	1.125 V	1.125 V
	IDD Max	3,10	54.9 A	45.8 A	55.0 A	46.0 A
S0.C0.P1	CPU COF	6	900 MHz		1000 MHz	
	TDP	3	47.2 W	41.7 W	45.5 W	40.5 W
	VID_VDD Min	9	1.075 V	1.000 V	1.075 V	1.000 V
	VID_VDD Max	9	1.125 V	1.000 V	1.125 V	1.000 V
	IDD Max	3,10	39.7 A	25.9 A	38.1 A	25.0 A
S0.C1.Pmin	Core Power	15,18	17.8 W	16.0 W	15.4 W	14.1 W
	NB Power	17	9.9 W	11.3 W	9.2 W	10.5 W
	I/O Power	13	7.2 W	7.2 W	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	10.6 W	10.6 W	8.8 W	8.8 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HD9450ODJ4BGH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 70 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		F	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.125 V
	IDDNB Max	12	N/A	9.4 A
S0.C0.P0	CPU COF	6	2100 MHz	
	TDP	3	65.0 W	65.0 W
	VID_VDD Min	9	1.075 V	1.075 V
	VID_VDD Max	9	1.125 V	1.125 V
	IDD Max	3,10	55.1 A	46.4 A
S0.C0.P1	CPU COF	6	1050 MHz	
	TDP	3	44.7 W	39.9 W
	VID_VDD Min	9	1.075 V	1.000 V
	VID_VDD Max	9	1.125 V	1.000 V
	IDD Max	3,10	37.4 A	24.8 A
S0.C1.Pmin	Core Power	15,18	14.5 W	13.5 W
	NB Power	17	9.3 W	10.6 W
	I/O Power	13	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	8.1 W	8.1 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.8 **HD** mmmm **WC** pnc **HH (95W DT, AM2r2) Thermal and Power Specifications**

OPN			HD8400WCJ3BHH	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		C	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V
	IDDNB Max	12	N/A	15.2 A
S0.C0.P0	CPU COF	6	2100 MHz	
	TDP	3	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V
	VID_VDD Max	9	1.250 V	1.250 V
	IDD Max	3,10	73.3 A	59.6 A
S0.C0.P1	CPU COF	6	1050 MHz	
	TDP	3	74.2 W	55.6 W
	VID_VDD Min	9	1.200 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V
	IDD Max	3,10	57.7 A	30.6 A
S0.C1.Pmin	Core Power	15,18	15.5 W	7.8 W
	NB Power	17	16.5 W	19.0 W
	I/O Power	13	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	12.9 W	12.9 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.9 **HD** mmmm **WC** pnc **HI (95W DT, AM2r2) Thermal and Power Specifications**

OPN			HD8550WCJ3BHI	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C	
	Tctl Max	2	70 °C	
	Tambient Min		5 °C	
	Thermal Profile		C	
	Startup P-State	5	S0.C0.P1	
	HTC P-State	4	S0.C0.P1	
S0.Cx.Px	NB COF	6,7	1800 MHz	1800 MHz
	VID_VDDNB	11,7	N/A	1.250 V
	IDDNB Max	12	N/A	14.9 A
S0.C0.P0	CPU COF	6	2200 MHz	
	TDP	3	95.0 W	95.0 W
	VID_VDD Min	9	1.200 V	1.200 V
	VID_VDD Max	9	1.250 V	1.250 V
	IDD Max	3,10	73.4 A	59.9 A
S0.C0.P1	CPU COF	6	1100 MHz	
	TDP	3	73.2 W	55.1 W
	VID_VDD Min	9	1.200 V	1.050 V
	VID_VDD Max	9	1.250 V	1.050 V
	IDD Max	3,10	57.0 A	30.5 A
S0.C1.Pmin	Core Power	15,18	14.7 W	7.4 W
	NB Power	17	16.1 W	18.6 W
	I/O Power	13	7.2 W	7.2 W
S1.C1E.Pmin	TDP	16	12.4 W	12.4 W
S3	I/O Power	13	350 mW	350 mW

The notes for this table are on page 47.

2.3.10 HD mmmm XC pnc GI (125W DT, AM2r2) Thermal and Power Specifications

OPN			HDX920XCJ4DGI[19]		HDZ940XCJ4DGI[19]	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 62 °C		55 °C to 62 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		I		I	
	Startup P-State	5	S0.C0.P3		S0.C0.P3	
	HTC P-State	4	S0.C0.P3		S0.C0.P3	
S0.Cx.Px	NB COF	6,7	1600 MHz	1800 MHz	1600 MHz	1800 MHz
	VID_VDDNB Min	11,7	N/A	1.150 V	N/A	1.150 V
	VID_VDDNB Max	11,7	N/A	1.300 V	N/A	1.300 V
	IDDNB Max	12	N/A	20.0 A	N/A	20.0 A
S0.C0.P0	CPU COF	6	2800 MHz		3000 MHz	
	TDP	3,7	140.8 W	125.0 W	139.6 W	125.0 W
	VID_VDD Min	9	1.225 V	1.225 V	1.225 V	1.225 V
	VID_VDD Max	9	1.425 V	1.425 V	1.425 V	1.425 V
	IDD Max	3,10	102.5 A	78.9 A	102.3 A	79.4 A
S0.C0.P1	CPU COF	6	2100 MHz		2300 MHz	
	TDP	3,7	94.7 W	91.4 W	94.9 W	91.7 W
	VID_VDD Min	9	1.150 V	1.125 V	1.150 V	1.125 V
	VID_VDD Max	9	1.325 V	1.325 V	1.325 V	1.325 V
	IDD Max	3,10	77.6 A	55.2 A	77.7 A	56.0 A
S0.C0.P2	CPU COF	6	1600 MHz		1800 MHz	
	TDP	3,7	88.7 W	70.1 W	88.9 W	70.8 W
	VID_VDD Min	9	1.150 V	1.025 V	1.150 V	1.025 V
	VID_VDD Max	9	1.225 V	1.225 V	1.225 V	1.225 V
	IDD Max	3,10	72.4 A	39.3 A	72.5 A	40.1 A
S0.C0.P3	CPU COF	6	800 MHz		800 MHz	
	TDP	3,7	79.2 W	52.7 W	77.0 W	48.8 W
	VID_VDD Min	9	1.150 V	0.925 V	1.150 V	0.875 V
	VID_VDD Max	9	1.150 V	1.150 V	1.150 V	1.150 V
	IDD Max	3,10	64.1 A	24.9 A	62.1 A	21.4 A
S0.C1.Pmin	Core Power (Pre-Flush)	20	39.7 W	8.8 W	38.7 W	6.9 W
	Core Power (Post-Flush)	20	36.8 W	6.3 W	35.8 W	4.8 W
	NB Power	17	30.4 W	22.3 W	31.0 W	22.3 W
	I/O Power	13	8.5 W	8.5 W	8.5 W	8.5 W
S1.C1E.Pmin	TDP	16	19.7 W	11.4 W	18.9 W	10.4 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

2.3.11 HD mmmm WF pnc GI (95W DT, AM3) Thermal and Power Specifications

OPN			HDX805WFK4FGI		HDX810WFK4FGI	
State	Specification[8]	Notes	Single-Plane	Dual-Plane	Single-Plane	Dual-Plane
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P3		S0.C0.P3	
	HTC P-State	4	S0.C0.P3		S0.C0.P3	
S0.Cx.Px	NB COF	6,7	1600 MHz	2000 MHz	1600 MHz	2000 MHz
	VID_VDDNB Min	11,7	N/A	1.150 V	N/A	1.150 V
	VID_VDDNB Max	11,7	N/A	1.300 V	N/A	1.300 V
	IDDNB Max	12	N/A	20.0 A	N/A	20.0 A
S0.C0.P0	CPU COF	6	2500 MHz		2600 MHz	
	TDP	3,7	104.0 W	95.0 W	104.0 W	95.0 W
	VID_VDD Min	9	1.150 V	1.150 V	1.150 V	1.150 V
	VID_VDD Max	9	1.425 V	1.425 V	1.425 V	1.425 V
	IDD Max	3,10	75.8 A	58.7 A	75.8 A	58.9 A
S0.C0.P1	CPU COF	6	1800 MHz		1900 MHz	
	TDP	3,7	85.5 W	71.7 W	85.5 W	71.7 W
	VID_VDD Min	9	1.150 V	1.050 V	1.150 V	1.050 V
	VID_VDD Max	9	1.325 V	1.325 V	1.325 V	1.325 V
	IDD Max	3,10	68.5 A	40.5 A	68.5 A	40.8 A
S0.C0.P2	CPU COF	6	1300 MHz		1400 MHz	
	TDP	3,7	79.5 W	57.2 W	79.5 W	57.2 W
	VID_VDD Min	9	1.150 V	0.950 V	1.150 V	0.950 V
	VID_VDD Max	9	1.225 V	1.225 V	1.225 V	1.225 V
	IDD Max	3,10	63.3 A	28.3 A	63.3 A	28.7 A
S0.C0.P3	CPU COF	6	800 MHz		800 MHz	
	TDP	3,7	73.5 W	48.4 W	72.3 W	47.6 W
	VID_VDD Min	9	1.150 V	0.875 V	1.150 V	0.875 V
	VID_VDD Max	9	1.150 V	1.150 V	1.150 V	1.150 V
	IDD Max	3,10	58.1 A	20.2 A	57.1 A	19.9 A
S0.C1.Pmin	Core Power (Pre-Flush)	20	37.5 W	6.6 W	36.5 W	6.5 W
	Core Power (Post-Flush)	20	34.6 W	4.4 W	33.5 W	4.3 W
	NB Power	17	22.3 W	22.3 W	22.3 W	22.3 W
	I/O Power	13	8.5 W	8.5 W	8.5 W	8.5 W
S1.C1E.Pmin	TDP	16	17.5 W	10.0 W	17.0 W	9.9 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HDX910WFK4DGI		HDX925WFK4DGI	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 71 °C		55 °C to 71 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		C		C	
	Startup P-State	5	S0.C0.P3		S0.C0.P3	
	HTC P-State	4	S0.C0.P3		S0.C0.P3	
S0.Cx.Px	NB COF	6,7	1600 MHz	2000 MHz	1600 MHz	2000 MHz
	VID_VDDNB Min	11,7	N/A	1.150 V	N/A	1.150 V
	VID_VDDNB Max	11,7	N/A	1.300 V	N/A	1.300 V
	IDDNB Max	12	N/A	20.0 A	N/A	20.0 A
S0.C0.P0	CPU COF	6	2600 MHz		2800 MHz	
	TDP	3,7	104.0 W	95.0 W	103.1 W	95.0 W
	VID_VDD Min	9	1.150 V	1.150 V	1.150 V	1.150 V
	VID_VDD Max	9	1.425 V	1.425 V	1.425 V	1.425 V
	IDD Max	3,10	75.8 A	58.9 A	75.8 A	59.5 A
S0.C0.P1	CPU COF	6	1900 MHz		2100 MHz	
	TDP	3,7	85.5 W	71.7 W	85.5 W	72.2 W
	VID_VDD Min	9	1.150 V	1.050 V	1.150 V	1.050 V
	VID_VDD Max	9	1.325 V	1.325 V	1.325 V	1.325 V
	IDD Max	3,10	68.5 A	40.8 A	68.5 A	41.6 A
S0.C0.P2	CPU COF	6	1400 MHz		1600 MHz	
	TDP	3,7	79.5 W	57.2 W	79.5 W	58.0 W
	VID_VDD Min	9	1.150 V	0.950 V	1.150 V	0.950 V
	VID_VDD Max	9	1.225 V	1.225 V	1.225 V	1.225 V
	IDD Max	3,10	63.3 A	28.7 A	63.3 A	29.6 A
S0.C0.P3	CPU COF	6	800 MHz		800 MHz	
	TDP	3,7	72.3 W	47.6 W	70.0 W	46.1 W
	VID_VDD Min	9	1.150 V	0.875 V	1.150 V	0.850 V
	VID_VDD Max	9	1.150 V	1.150 V	1.150 V	1.150 V
	IDD Max	3,10	57.1 A	19.9 A	55.0 A	18.1 A
S0.C1.Pmin	Core Power (Pre-Flush)	20	36.5 W	6.5 W	35.5 W	5.6 W
	Core Power (Post-Flush)	20	33.5 W	4.3 W	32.5 W	3.6 W
	NB Power	17	22.3 W	22.3 W	22.3 W	22.3 W
	I/O Power	13	8.5 W	8.5 W	8.5 W	8.5 W
S1.C1E.Pmin	TDP	16	17.0 W	9.9 W	16.1 W	9.5 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

OPN			HDX710WFK3DGI		HDZ720WFK3DGI	
State	**Specification[8]**	**Notes**	**Single-Plane**	**Dual-Plane**	**Single-Plane**	**Dual-Plane**
S0.C0.Px	Tcase Max	1	55 °C to 73 °C		55 °C to 73 °C	
	Tctl Max	2	70 °C		70 °C	
	Tambient Min		5 °C		5 °C	
	Thermal Profile		H		H	
	Startup P-State	5	S0.C0.P3		S0.C0.P3	
	HTC P-State	4	S0.C0.P3		S0.C0.P3	
S0.Cx.Px	NB COF	6,7	1600 MHz	2000 MHz	1600 MHz	2000 MHz
	VID_VDDNB Min	11,7	N/A	1.150 V	N/A	1.150 V
	VID_VDDNB Max	11,7	N/A	1.300 V	N/A	1.300 V
	IDDNB Max	12	N/A	20.0 A	N/A	20.0 A
S0.C0.P0	CPU COF	6	2600 MHz		2800 MHz	
	TDP	3,7	107.4 W	95.0 W	106.5 W	95.0 W
	VID_VDD Min	9	1.150 V	1.150 V	1.150 V	1.150 V
	VID_VDD Max	9	1.425 V	1.425 V	1.425 V	1.425 V
	IDD Max	3,10	75.9 A	57.1 A	75.8 A	57.5 A
S0.C0.P1	CPU COF	6	1900 MHz		2100 MHz	
	TDP	3,7	87.6 W	72.2 W	87.6 W	72.6 W
	VID_VDD Min	9	1.150 V	1.050 V	1.150 V	1.050 V
	VID_VDD Max	9	1.325 V	1.325 V	1.325 V	1.325 V
	IDD Max	3,10	70.3 A	40.0 A	70.3 A	40.5 A
S0.C0.P2	CPU COF	6	1400 MHz		1600 MHz	
	TDP	3,7	83.1 W	57.8 W	83.1 W	58.5 W
	VID_VDD Min	9	1.150 V	0.950 V	1.150 V	0.950 V
	VID_VDD Max	9	1.225 V	1.225 V	1.225 V	1.225 V
	IDD Max	3,10	66.4 A	28.5 A	66.4 A	29.1 A
S0.C0.P3	CPU COF	6	800 MHz		800 MHz	
	TDP	3,7	77.7 W	48.8 W	75.9 W	47.2 W
	VID_VDD Min	9	1.150 V	0.875 V	1.150 V	0.850 V
	VID_VDD Max	9	1.150 V	1.150 V	1.150 V	1.125 V
	IDD Max	3,10	61.8 A	20.5 A	60.2 A	18.7 A
S0.C1.Pmin	Core Power (Pre-Flush)	20	39.6 W	7.9 W	38.7 W	6.9 W
	Core Power (Post-Flush)	20	36.6 W	5.2 W	35.8 W	4.4 W
	NB Power	17	22.3 W	22.3 W	22.3 W	22.3 W
	I/O Power	13	8.5 W	8.5 W	8.5 W	8.5 W
S1.C1E.Pmin	TDP	16	19.6 W	10.5 W	19.0 W	10.4 W
S3	I/O Power	13	350 mW	350 mW	350 mW	350 mW

The notes for this table are on page 47.

AMD Phenom™ Processor Thermal and Power Specification Table Notes:

1. *Tcase Max is the maximum case temperature specification which is a physical value in degrees Celsius. Tcase Max can be any valid Tcase Max value in the range specified for the corresponding OPN.*
2. *Tctl Max (maximum control temperature) is a non-physical temperature on an arbitrary scale that can be used for system thermal management policies. Refer to the BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors, order# 31116.*
3. *The processor thermal solution should be designed to accommodate thermal design power (TDP) at Tcase Max. TDP is measured under the conditions of all cores operating at CPU COF, Tcase Max, and VDD at the voltage requested by the processor. TDP includes all power dissipated on-die from VDD, VDDNB, VDDIO, VLDT, VTT and VDDA. TDP is not the maximum power of the processor.*
4. *P-state limit when HTC is active. Refer to the* BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order# 31116 for more information.*
5. *Hardware transitions the part to startup P-state at cold boot. During initialization, the startup NB COF and VID_VDDNB values may differ from those of the startup P-state. Please see the* BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order# 31116 for detailed power sequencing information.*
6. *Frequency reported to the OS is rounded to the nearest 100-MHz boundary.*
7. *During initialization, the startup NB COF and VID_VDDNB values may differ from those of the startup P-state. Please see the* BIOS and Kernel Developer's Guide (BKDG) For AMD Family 10h Processors*, order# 31116 for specific power sequencing information.*
8. *Specifications for multi-core processors assume equivalent P-states (voltage and frequency) and equivalent Tcase conditions for all cores. Refer to the* BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order #31116, for details on P-state operation for multi-core processors.*
9. *Variable voltage, any valid voltage between VID_VDD Min and VID_VDD Max is allowed.*
10. *TDP IDD conditions: single plane platforms supply IDD and IDDNB tied together and use the IDD Max specification.*
11. *Single plane platforms have VID_VDD and VID_VDDNB tied together, and use the VID_VDD specification.*
12. *TDP IDDNB conditions: single plane platforms supply IDD and IDDNB tied together and use the IDDNB Max specification.*
13. *Thermal Design Power dissipated by the processor VDDIO and VTT power planes only. Assumes VDDIO = 1.8 V and VTT = VDDIO / 2.*
14. *Refer to erratum 308 in the* Revision Guide for AMD Family 10h Processors*, PID #43122 for the appropriate clock divisor setting.*
15. *Assumes 50°C, Min P-state VID_VDD, core clock divider set to 128 and L2 and data cache scrubbing disabled. Refer to the* BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors, order# 31116 *for recommended settings.*
16. *Assumes 35°C, min P-state VID_VDD, core clock divider set to 16, HyperTransport™ links disconnected, memory in self-refresh mode and DDR2 SDRAM interface tri-stated. Recommended settings in the* BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors, order# 31116, *provide improved power values.*
17. *Thermal Design Power dissipated by the processor at min P-state VID_VDDNB.*
18. *Thermal Design Power dissipated by the processor at min P-state VID_VDD.*
19. *This product is intended for dual-plane platforms only.*
20. *Core Power (Pre-Flush) and (Post-Flush) refers to the Cache Flush On Halt feature described in the* BIOS and Kernel Developer's Guide (BKDG) for AMD Family 10h Processors*, order# 31116. Core Power pre-flush and post-flush values are based on the recommended* BKDG *settings. Actual C1 idle core power varies with system usage according to the following equation:*
    *C1 idle Core Power = F3xDC[CashFlushOnHaltTmr]/OS timer tick interval * Core Power (Pre-Flush) + (1 - F3xDC[CachFlushOnHaltTmr]/OS timer tick interval * Core Power (Post-Flush))*
    The OS timer tick interval varies between operating systems and within an operating system depending on usage.

3 Power Supply Specifications

3.1 bsmmmmrr J ncdd - AM2r2 Power Supply Operating Conditions

Table 9. bsmmmmrr J ncdd DC Operating Conditions for VDD Power Supply

Symbol	Parameter	Units	Min	Typ	Max	Notes
VID_VDD	VID-Requested VDD Supply Level	V	Refer to the thermal/power tables under the appropriate SOPN section for this OPN-specific parameter.			
VDD_dc	DC Tolerance - VDD Supply Voltage	V	VID_VDD – 50 mV	VID_VDD	VID_VDD + 50 mV	
VDD_PON	Metal Mask VID	V	0.95	1.00	MaxVID_VDD	1,2
VDDNB_dc	VDDNB Supply voltage	V	VID_VDDNB – 50 mV	VID_VDDNB	VID_VDDNB + 50 mV	
VID_VDDNB	VDDNB Supply voltage	V	Refer to the thermal/power tables under the appropriate SOPN section for this OPN-specific parameter.			
VDDNB_PON	Metal Mask VDDNB	V	0.95	1.00	MaxVID_VDDNB	1,2

Notes:

1) After PWROK assertion, the VID signals change from the Metal Mask VID to the value programmed during device manufacturing.

2) MaxVID is reported in MSRC001_0071 (COFVID_STATUS).

Table 10. bsmmmmrr J ncdd AC Operating Conditions for VDD Power Supply

Symbol	Parameter	Units	Min	Typ	Max	Notes
VDD_ac	VDD Supply Voltage	V	VID_VDD – 140 mV	VID_VDD	VID_VDD + 150 mV	1
VDDNB_ac	VDDNB Supply Voltage	V	VID_VDDNB – 140 mV	VID_VDDNB	VID_VDDNB + 150 mV	1

Notes:

1) The voltage set-point must be contained within the DC specification in order to ensure proper operation. Voltage ripple and transient events outside the DC specification must remain within the AC specification at all times. Transients above dc max must return to within the DC specification within 30 µS and must stay under a triangle described by the AC limit at one end and the DC limit at the other, as shown in Figure 3 on page 49.

Table 11. bsmmmmrr J ncdd Maximum Power-Up and Power-Down Conditions for Power Supplies

Symbol	Parameter	Units	Max	Notes
VDDIO	VDDIO Supply Voltage for DDR2 electricals	V	2.05	
VDDIO	VDDIO Supply Voltage for DDR3 electricals	V	1.65	
VLDT	VLDT Supply Voltage	V	1.32	
VDDA	VDDA Supply Voltage	V	2.70	
VDD, VDDNB	VDD, VDDNB Supply Voltage	V	Max AC Voltage	

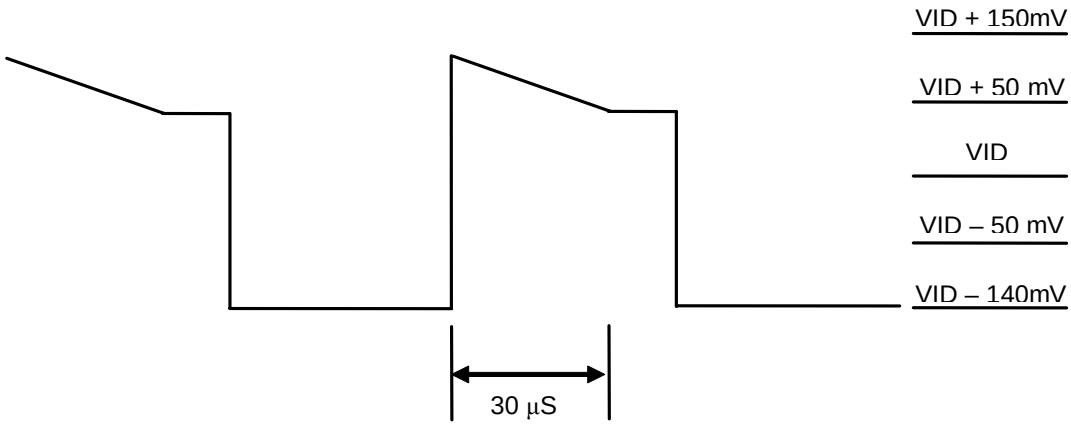

Figure 3. Socket AM2 AC and DC Transient Limits

Table 12. bsmmmmrr J ncdd AC and DC Operating Conditions for non-VDD Power Supplies

Symbol	Parameter	Units	Min	Typ	Max	Notes
VDDIO_dc	VDDIO Supply Voltage for DDR2 electricals	V	1.70	1.80	1.90	1
VDDIO_ac	VDDIO Supply voltage	V	VDDIO_dc – 150 mV	VDDIO_dc	VDDIO_dc + 150 mV	2, 3
VLDT	VLDT Supply Voltage	V	1.14	1.20	1.26	
VTT_dc	VTT Supply Voltage for DDR2 electricals	V	0.85	0.90	0.95	4
VTT_ac	VTT Supply Voltage	V	VTT_dc – 75mV	VTT_dc	VTT_dc + 75mV	2, 3
VDDA	VDDA Supply Voltage	V	2.40	2.50	2.60	
IDDIO1	VDDIO Power Supply Current	A			3.60	7, 9
ITT1	VTT Power Supply Current	A			1.75	6, 8, 9
ILDT	VLDT Power Supply Current	A			1.40	5, 9
ILDT	VLDT Power Supply Current	mA			500	9,10
IDDA	VDDA Power Supply Current	mA			250	9

Notes:

1) All voltages are referenced to VSS. In order to ensure proper functionality, DC voltage regulator must be set accordingly to ensure that VDDIO_dc level measured at the VDDIO_FB_H/L pins does not exceed the specified maximum and minimum range. As such, factors such as voltage regulator inaccuracy and IR drop must be carefully considered and compensated for. For example, if the inaccuracy and IR drop amounts to 50 mV, then the voltage regulator setting for VDDIO should not be lower than 1.75 V to avoid violating the VDDIO_dc minimum spec of 1.70 V.

2) VDDIO_ac and VTT_ac parameters are measured over 60 seconds time frame with all data bus bits switching.

3) Power supply A/C measurements use a 20-MHz scope bandwidth limit.

*4) All voltages are referenced to VSS. Voltage regulator for VTT must be set accordingly so that VTT_dc level measured at the processor VTT_SENSE pin tracks 0.5*VDDIO_dc and stays within the specified maximum and minimum range. Factors such as voltage regulator inaccuracy and IR drop must be carefully considered and compensated for. For example, if the inaccuracy and IR drop amounts to 20 mV, the voltage regulator setting must be set 20 mV higher so that VTT still tracks 0.5*VDDIO_dc and stays within the range of 0.85 V and 0.95 V.*

5) ILDT is specified for one 16x16-bit Gen3 link.

6) VTT must both sink and source current.

7) VDDIO current is consumed by I, O, I/O switching current and on-chip functions (PDL, DLL, level-shifters, etc.).

8) VTT current is consumed by I, O, I/O switching current and on-chip functions (PDL, DLL, level-shifters, etc.).

9) This specification reflects the values published in the appropriate power roadmap document.

10) ILDT is specified for one 16x16-bit HyperTransport™ links operating at 2.0 GT/s.

4 MTOPS

Table 13 shows the composite theoretical performance (CTP) calculations. 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 13. Composite Theoretical Performance (CTP) Calculation

Frequency	MTOPS Single-Core	MTOPS Dual-Core	MTOPS Triple-Core	MTOPS Quad-Core
1600	8,667	16,267	23,867	31,467
1700	9,209	17,284	25,359	33,434
1800	9,750	18,300	26,850	35,400
1900	10,292	19,317	28,342	37,367
2000	10,834	20,334	29,834	39,334
2100	11,375	21,350	31,325	41,300
2200	11,917	22,367	32,817	43,267
2300	12,459	23,384	34,309	45,234
2400	13,000	24,400	35,800	47,200
2500	13,542	25,417	37,292	49,167
2600	14,084	26,434	38,784	51,134
2700	14,625	27,450	40,275	53,100
2800	15,167	28,467	41,767	55,067
2900	15,709	29,484	43,259	57,034
3000	16,250	30,500	44,750	59,000
3100	16,792	31,517	46,242	60,967
3200	17,334	32,534	47,734	62,934

5 APP

Table 14 shows the Adjusted Peak Performance (APP) calculations ("Calculations") for the AMD Phenom™ processor and the AMD Athlon™ processor. The Calculations are stated in Millions of Weighted Teraflops (WT) 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 14. Adjusted Peak Performance (APP) Calculation

Frequency	APP Dual-Core	APP Triple-Core	APP Quad-Core
1600	0.0019	0.0048	0.0077
1700	0.0020	0.0051	0.0082
1800	0.0022	0.0054	0.0086
1900	0.0023	0.0057	0.0091
2000	0.0024	0.0060	0.0096
2100	0.0025	0.0063	0.0101
2200	0.0026	0.0066	0.0106
2300	0.0028	0.0069	0.0110
2400	0.0029	0.0072	0.0115
2500	0.0030	0.0075	0.0120
2600	0.0031	0.0078	0.0125
2700	0.0032	0.0081	0.0130
2800	0.0034	0.0084	0.0134
2900	0.0035	0.0087	0.0139
3000	0.0036	0.0090	0.0144
3200	0.0038	0.0096	0.0154