Revision Guide for AMD NPT Family 0Fh Processors

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Revision History

Date	Revision	Description
December 2011	3.48	Updated Revision Determination; Simplified Tables 12-13; Added errata #415, #573, #670 and #700-#701.
September 2009	3.46	Added AMD Athlon™ Neo X2 Dual-Core Processor and AMD Turion™ Neo X2 Dual-Core Processor to Overview, Tables 3, 5, 8, 9, and 12; Updated Table 9; Updated Table 13 for erratum #122; Updated erratum #152.
June 2009	3.44	Added erratum #393 and #400.
March 2009	3.42	Clarified use of CPUID instruction throughout; Clarified use of package terms in Tables 1-9, Processor Identification, errata #133, #152, #159 and #238; Restructured Tables 1-5; Added AMD Opteron™ Processor brand information to Overview, Tables 1, 7 and 12; Added AMD Sempron™ Dual-Core Processor brand information to Overview, Tables 2, 8, 9 and 12; Updated Tables 8-9 for branding; Clarified Fr3 (1207) package usage by adding it in addition to F (1207) package in Tables 1, 6, 7, Constructing the Processor Name String, errata #149 and #152; Added ASB1 package type in Tables 5, 6, 8, 13, Constructing the Processor Name String, errata #149 and #152; Updated Tables 12-13; Updated Fix Planned status for erratum #141; Added errata #254, #325, #339, #340, #342, #352 and #353; Updated Documentation Support.
February 2008	3.30	Added erratum #312.
October 2007	3.24	Added AMD Athlon™ 64 FX, Mobile AMD Sempron™, AMD Athlon X2, and AMD Athlon processor information; Added JH-F3, DH-F3, BH-G1, BH-G2, DH-G1, and DH-G2 silicon information; Updated document references in Programming and Displaying the Processor Name String; Updated brand table index and name strings in Table 7, Table 8, and Table 9; Updated Table 11 for errata #122 and #168; Updated errata #122 and #169; Added Table 13; Added errata #150, #157, #182, #207, #238, #246, #249, #270, #275, #284, #292 and #297.
October 2006	3.00	Initial public release.

Revision Guide for AMD NPT Family 0Fh Processors

Overview

The purpose of the *Revision Guide for AMD NPT Family 0Fh Processors* is to communicate updated product information to designers of computer systems and software developers. This revision guide includes information on the following products:

- AMD Athlon™ Processor
- AMD Athlon X2 Dual-Core Processor
- AMD Athlon Neo Processor
- AMD Athlon Neo X2 Dual-Core Processor
- AMD Athlon 64 Processor
- AMD Athlon 64 FX Dual-Core Processor
- AMD Athlon 64 X2 Dual-Core Processor
- AMD Opteron™ Processor
- Dual-Core AMD Opteron Processor
- AMD Sempron™ Processor
- AMD Sempron Dual-Core Processor
- AMD Turion™ 64 Mobile Technology
- AMD Turion 64 X2 Mobile Technology
- AMD Turion Neo X2 Dual-Core Processor

This guide consists of these major sections:

- **Processor Identification:** This section, starting on page 6, shows how to determine the processor revision and workaround requirements, and to construct, program and display the processor name string.

- **Product Errata:** This section, starting on page 17, provides a detailed description of product errata, including potential effects on system operation and suggested workarounds. An erratum is defined as a deviation from the product's specification, and as such may cause the behavior of the processor to deviate from the published specifications.
- **Documentation Support:** This section, starting on page 91, provides a listing of available technical support resources.

Revision Guide Policy

Occasionally, AMD identifies product errata that cause the processor to deviate from published specifications. Descriptions of identified product errata are designed to assist system and software designers in using the processors described in this revision guide. This revision guide may be updated periodically.

Processor Identification

This section shows how to determine the processor revision, program and display the processor name string, and construct the processor name string.

Revision Determination

A processor revision is identified using a unique value that is returned in the EAX register after executing the CPUID instruction function 0000_0001h (CPUID Fn0000_0001_EAX). Figure 1 shows the format of the value from CPUID Fn0000_0001_EAX.

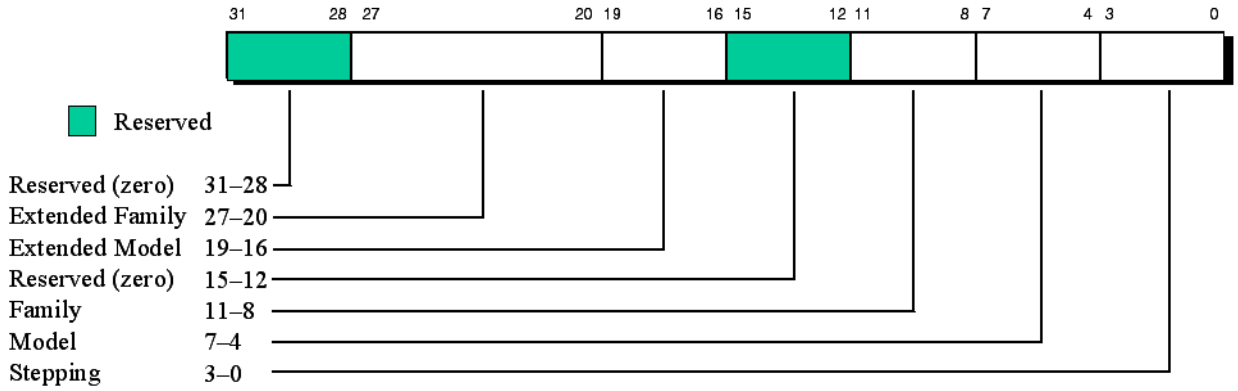

Figure 1. Format of CPUID Fn0000_0001_EAX

Tables 1 through 5show the identification number from CPUID Fn0000_0001_EAX for each revision of the processor.

Table 1. CPUID Values for AMD NPT Family 0Fh F (1207) and Fr3 (1207) Processor Revisions

Rev.	CPUID Fn0000_0001_EAX		
	AMD Opteron™ Processor	Dual-Core AMD Opteron™ Processor	AMD Athlon™ 64 FX Dual-Core Processor
JH-F2	N/A	F (1207): 00040F12h	N/A
JH-F3	F (1207): 00050FD3h	F (1207): 00040F13h	Fr3 (1207): 000C0F13h

Table 2. CPUID Values for AMD NPT Family 0Fh AM2 Single-Core Processor Revisions

Rev.	CPUID Fn0000_0001_EAX for AM2 Processors		
	AMD Athlon™ Processor	AMD Athlon™ 64 Processor	AMD Sempron™ Processor
DH-F2	N/A	00040FF2h 00050FF2h	00040FF2h 00050FF2h
DH-F3	00050FF3h	00050FF3h	N/A
DH-G1	N/A	00070FF1h	00070FF1h
DH-G2	00070FF2h	00060FF2h	00070FF2h

Table 3. CPUID Values for AMD NPT Family 0Fh AM2 Dual-Core Processor Revisions

Rev.	CPUID Fn0000_0001_EAX for AM2 Dual-Core Processors					
	Dual-Core AMD Opteron™ Processor	AMD Athlon™ X2 Dual-Core Processor	AMD Athlon™ 64X2 Dual-Core Processor	AMD Athlon™ 64 FX Dual-Core Processor	AMD Athlon™ Neo X2 Dual-Core Processor	AMD Sempron™ Dual-Core Processor
JH-F2	00040F32h	N/A	00040F32h	00040F32h	N/A	N/A
BH-F2	N/A	N/A	00040FB2h	N/A	N/A	N/A
JH-F3	00040F33h	N/A	00040F33h	N/A	N/A	N/A
BH-G1	N/A	00060FB1h	00060FB1h	N/A	N/A	00060FB1h
BH-G2	N/A	00060FB2h	00060FB2h	N/A	00060FB2h	00060FB2h

Table 4. CPUID Values for AMD NPT Family 0Fh S1g1 Processor Revisions

Rev.	CPUID Fn0000_0001_EAX for S1g1 Processors						
	AMD Athlon Processor	AMD Athlon™ 64 Processor	AMD Sempron™ Processor	AMD Turion™ 64 Mobile Technology	AMD Athlon™ 64 X2 Dual-Core Processor	AMD Sempron™ Dual-Core Processor	AMD Turion™ 64 X2 Mobile Technology
BH-F2	N/A	N/A	N/A	N/A	00040F82h	N/A	00040F82h
DH-F2	N/A	00040FC2h	00040FC2h	00040FC2h	N/A	N/A	N/A

Table 4. CPUID Values for AMD NPT Family 0Fh S1g1 Processor Revisions

Rev.	CPUID Fn0000_0001_EAX for S1g1 Processors						
	AMD Athlon Processor	AMD Athlon™ 64 Processor	AMD Sempron™ Processor	AMD Turion™ 64 Mobile Technology	AMD Athlon™ 64 X2 Dual-Core Processor	AMD Sempron™ Dual-Core Processor	AMD Turion™ 64 X2 Mobile Technology
BH-G1	N/A	N/A	N/A	N/A	00060F81h	N/A	00060F81h
BH-G2	N/A	N/A	N/A	N/A	00060F82h	00060F82h	00060F82h
DH-G2	00070FC2	00060FC2h	00060FC2h 00070FC2h	N/A	N/A	N/A	N/A

Table 5. CPUID Values for AMD NPT Family 0Fh ASB1 Processor Revisions

Rev.	CPUID Fn0000_0001_EAX for ASB1 Processors			
	AMD Athlon™ Neo Processor	AMD Sempron™ Processor	AMD Athlon™ Neo X2 Dual-Core Processor	AMD Turion™ Neo X2 Dual-Core Processor
BH-G2	N/A	N/A	00060FB2h	00060FB2h
DH-G2	00060FF2h 00070FF2h	00060FF2h 00070FF2h	N/A	N/A

Mixed Processor Revision Support

AMD Opteron™ processors with different revisions can be mixed in a multiprocessor system as described in the *BIOS and Kernel Developer's Guide for AMD NPT Family 0Fh Processors*, order# 32559. Mixed revision support includes revision F2 and F3 Dual-Core AMD Opteron processors. Refer to Table 1 for CPUID values for these revisions. Errata workarounds must be applied according to revision as described in the Product Errata section starting on page 17.

Programming and Displaying the Processor Name String

This section, intended for BIOS programmers, describes how to program and display the 48-character processor name string that is returned by CPUID Fn8000_000[4:2]. The hardware or cold reset value of the processor name string is 48 ASCII NUL characters, so the BIOS must program the processor name string before any general purpose application or operating system software uses the extended functions that read the name string. It is common practice for the BIOS to display the processor name string and model number whenever it displays processor information during boot up.

Note: *Motherboards that do not program the proper processor name string and model number will not pass AMD validation and will not be posted on the AMD Recommended Motherboard Web site.*

The name string must be ASCII NUL terminated and the 48-character maximum includes that NUL character.

The processor name string is programmed by MSR writes to the six MSR addresses covered by the range MSRC001_00[35:30]h. Refer to the *BIOS and Kernel Developer's Guide for AMD NPT Family 0Fh Processors*, order# 32559, for the format of how the 48-character processor name string maps to the 48 bytes contained in the six 64-bit registers of MSRC001_00[35:30].

The processor name string is read by CPUID reads to a range of CPUID functions covered by CPUID Fn8000_000[4:2]. Refer to CPUID Fn8000_000[4:2] in the *BIOS and Kernel Developer's Guide for AMD NPT Family 0Fh Processors*, order# 32559, for the 48-character processor name string mapping to the 48 bytes contained in the twelve 32-bit registers of CPUID Fn8000_000[4:2].

Constructing the Processor Name String

This section describes how to construct the processor name string. BIOS uses the following fields to create the name string:

- BrandId[15:0] is from CPUID Fn8000_0001_EBX[15:0].
  - **PwrLmt[3:0]** is defined to be BrandID[8:6,14]. See the *BIOS and Kernel Developer's Guide for AMD NPT Family 0Fh Processors*, order# 32559, for details on BIOS use of PwrLmt[3:0].
  - **BrandTableIndex[4:0]** is defined to be BrandID[13:9]. This field is used in Tables 7 through Table 9 to index into the processor name string tables.
  - **NN[6:0]** is defined to be BrandID[15,5:0]. This field is used to create the model number in the name string. Use of NN[6:0] is explained in Table 10.
- **PkgType[1:0]** is defined to be CPUID Fn8000_0001_EAX[5:4]. 00b = S1g1, 01b = F (1207) or Fr3 (1207), 10b = Reserved, 11b = AM2 or ASB1. This field is used to index the appropriate name string table from Table 6.
- **CmpCap[1:0]:** CMP Capable. Specifies the number of processor cores enabled on the device. 00b=1 processor core; 01b=2 processor cores; 10b=Reserved; 11b=Reserved. CmpCap[1:0] is located in the Northbridge Capabilities Register (Dev:3xE8[13:12]) and is defined in the *BIOS*

and Kernel Developer's Guide for AMD NPT Family 0Fh Processors, order# 32559. This field is used to index the appropriate name string in Tables 7 through Table 9.

The name string is formed by selecting the appropriate name string table from Table 6 using the package type, and then indexing into that table with CmpCap[0], BrandTableIndex[4:0], and PwrLmt[3:0]. The model number is calculated using NN[6:0] and the equation from Table 10 as indexed from the note for each name string specified in Tables 7 through Table 9.

Table 6. Using the Package Type to Select the Name String Table

PkgType	Name String Table
F (1207) or Fr3 (1207)	See Table 7
AM2 or ASB1	See Table 8
S1g1	See Table 9

Table 7. Name String Table for F (1207) and Fr3 (1207) Processors

CmpCap [0]	Brand Table Index [4:0]	PwrLmt [3:0]	Name String	Notes	Package	Comment
0b (Single Core)	01h	2h	AMD Opteron(tm) Processor 22RR EE	1	F	DP Server
1b (Dual Core)	00h	2h	Dual-Core AMD Opteron(tm) Processor 12RR EE	1	F	UP Server
	00h	6h	Dual-Core AMD Opteron(tm) Processor 12RR HE	1	F	UP Server
	01h	2h	Dual-Core AMD Opteron(tm) Processor 22RR EE	1	F	DP Server
	01h	6h	Dual-Core AMD Opteron(tm) Processor 22RR HE	1	F	DP Server
	01h	Ah	Dual-Core AMD Opteron(tm) Processor 22RR	1	F	DP Server
	01h	Ch	Dual-Core AMD Opteron(tm) Processor 22RR SE	1	F	DP Server
	04h	2h	Dual-Core AMD Opteron(tm) Processor 82RR EE	1	F	MP Server
	04h	6h	Dual-Core AMD Opteron(tm) Processor 82RR HE	1	F	MP Server
	04h	Ah	Dual-Core AMD Opteron(tm) Processor 82RR	1	F	MP Server
	04h	Ch	Dual-Core AMD Opteron(tm) Processor 82RR SE	1	F	MP Server
	06h	Eh	AMD Athlon(tm) 64 FX-ZZ Processor	4	Fr3	
All other codes			AMD Processor model unknown	-	-	This case can occur if the processor is upgraded but not the BIOS.

Table 8. Name String Table for AM2 and ASB1 Processors

CmpCap [0]	Brand Table Index [4:0]	Pwr Lmt [3:0]	Name String	Notes	Package	Comment
0b (Single Core)	01h	5h	AMD Sempron(tm) Processor LE-1RR0	1	AM2	
	02h	6h	AMD Athlon(tm) Processor LE-1ZZ0	4	AM2	
	03h	6h	AMD Athlon(tm) Processor 1ZZ0B	4	AM2	
	04h	1h	AMD Athlon(tm) 64 Processor TT00+	3	AM2	
	04h	2h	AMD Athlon(tm) 64 Processor TT00+	3	AM2	
	04h	3h	AMD Athlon(tm) 64 Processor TT00+	3	AM2	
	04h	4h	AMD Athlon(tm) 64 Processor TT00+	3	AM2	
	04h	5h	AMD Athlon(tm) 64 Processor TT00+	3	AM2	
	04h	8h	AMD Athlon(tm) 64 Processor TT00+	3	AM2	
	05h	2h	AMD Sempron(tm) Processor RR50p	1	AM2	
	06h	4h	AMD Sempron(tm) Processor TT00+	3	AM2	
	06h	8h	AMD Sempron(tm) Processor TT00+	3	AM2	
	07h	1h	AMD Sempron(tm) Processor TT0U	3	ASB1	
	07h	2h	AMD Sempron(tm) Processor TT0U	3	ASB1	
	08h	2h	AMD Athlon(tm) Processor TT50e	3	AM2	
	08h	3h	AMD Athlon(tm) Processor TT50e	3	AM2	
	09h	2h	AMD Athlon(tm) Neo Processor MV-TT	3	ASB1	
	0Ch	2h	AMD Sempron(tm) Processor 2RRU	1	ASB1	

Table 8. Name String Table for AM2 and ASB1 Processors (Continued)

CmpCap [0]	Brand Table Index [4:0]	Pwr Lmt [3:0]	Name String	Notes	Package	Comment
1b (Dual Core)	01h	6h	Dual-Core AMD Opteron(tm) Processor 12RR HE	1	AM2	
	01h	Ah	Dual-Core AMD Opteron(tm) Processor 12RR	1	AM2	
	01h	Ch	Dual-Core AMD Opteron(tm) Processor 12RR SE	1	AM2	
	03h	3h	AMD Athlon(tm) X2 Dual Core Processor BE-2TT0	3	AM2	
	04h	1h	AMD Athlon(tm) 64 X2 Dual Core Processor TT00+	3	AM2	
	04h	2h	AMD Athlon(tm) 64 X2 Dual Core Processor TT00+	3	AM2	
	04h	6h	AMD Athlon(tm) 64 X2 Dual Core Processor TT00+	3	AM2	
	04h	8h	AMD Athlon(tm) 64 X2 Dual Core Processor TT00+	3	AM2	
	04h	Ch	AMD Athlon(tm) 64 X2 Dual Core Processor TT00+	3	AM2	
	05h	Ch	AMD Athlon(tm) 64 FX-ZZ Dual Core Processor	4	AM2	
	06h	6h	AMD Sempron(tm) Dual Core Processor RR00	1	AM2	
	07h	3h	AMD Athlon(tm) Dual Core Processor TT50e	3	AM2	
	07h	6h	AMD Athlon(tm) Dual Core Processor TT00B	3	AM2	
	07h	7h	AMD Athlon(tm) Dual Core Processor TT00B	3	AM2	
	08h	3h	AMD Athlon(tm) Dual Core Processor TT50B	3	AM2	
	09h	1h	AMD Athlon(tm) X2 Dual Core Processor TT50e	3	AM2	

Table 8. Name String Table for AM2 and ASB1 Processors (Continued)

CmpCap [0]	Brand Table Index [4:0]	Pwr Lmt [3:0]	Name String	Notes	Package	Comment
1b (Dual Core)	0Ah	1h	AMD Athlon(tm) Neo X2 Dual Core Processor TT50e	3	AM2	
	0Ah	2h	AMD Athlon(tm) Neo X2 Dual Core Processor TT50e	3	AM2	
	0Bh	0h	AMD Turion(tm) Neo X2 Dual Core Processor L6RR	1	ASB1	
	0Ch	0h	AMD Athlon(tm) Neo X2 Dual Core Processor L3RR	1	ASB1	
All other codes			AMD Processor model unknown	-	-	This case can occur if the processor is upgraded but not the BIOS.

Table 9. Name String Table for S1g1 Processors

CmpCap [0]	Brand Table Index [4:0]	PwrLmt [3:0]	Name String	Notes	Comment
0b (Single Core)	01h	2h	AMD Athlon(tm) 64 Processor TT00+	3	
	02h	Ch	AMD Turion(tm) 64 Mobile Technology MK-YY	5	
	03h	1h	Mobile AMD Sempron(tm) Processor TT00+	3	
	03h	6h	Mobile AMD Sempron(tm) Processor PP00+	2	
	03h	Ch	Mobile AMD Sempron(tm) Processor PP00+	2	
	04h	2h	AMD Sempron(tm) Processor TT00+	3	
	06h	4h	AMD Athlon(tm) Processor TF-TT	3	
	06h	6h	AMD Athlon(tm) Processor TF-TT	3	
	06h	Ch	AMD Athlon(tm) Processor TF-TT	3	
	07h	3h	AMD Athlon(tm) Processor L1RR	1	
1b (Dual Core)	01h	Ch	AMD Sempron(tm) Dual Core Processor TJ-YY	5	
	02h	Ch	AMD Turion(tm) 64 X2 Mobile Technology TL-YY	5	
	03h	4h	AMD Athlon(tm) 64 X2 Dual-Core Processor TK-YY	5	
	03h	Ch	AMD Athlon(tm) 64 X2 Dual-Core Processor TK-YY	5	
	05h	4h	AMD Athlon(tm) 64 X2 Dual Core Processor TT00+	3	
	06h	2h	AMD Athlon(tm) X2 Dual Core Processor L3RR	1	
	07h	4h	AMD Turion(tm) X2 Dual Core Processor L5RR	1	
All other codes			AMD Processor model unknown	-	This case can occur if the processor is upgraded but not the BIOS.

Table 10. Model Number Calculation

Number	Note
1	RR = -1 + NN. For example, 000011b represents “2”, 100001b represents “32”. Values 000001b (1) to 000010b (2), and 100010b (34) to 111111b (63) are reserved.
2	PP = 26 + NN. For example, 000001b represents “27”, 1111111b represents “89”.
3	TT = 15 + CmpCap*10 + NN. For example, if CmpCap = 00b, 000001b represents “16”, 1111111b represents “78”. If CmpCap = 01b, 000001b represents “26”, 111111b represents “88”.
4	ZZ = 57 + NN. For example, 000001b represents “58”, 100001b represents “90“ Values 100010b (34) to 111111b (63) are reserved.
5	YY = 29 + NN. For example, 000001b represents “30”, 1111111b represents “92”.

Product Errata

This section documents product errata for the processors. A unique tracking number for each erratum has been assigned within this document for user convenience in tracking the errata within specific revision levels. Table 11 cross-references the revisions of the part to each erratum. An "X" indicates that the erratum applies to the revision. The absence of an "X" indicates that the erratum does not apply to the revision. An "*" indicates advance information that the erratum has been fixed but not yet verified. "No fix planned" indicates that no fix is planned for current or future revisions of the processor.

Note: *There may be missing errata numbers. Errata that do not affect this product family do not appear. In addition, errata that have been resolved from early revisions of the processor have been deleted, and errata that have been reconsidered may have been deleted or renumbered.*

Table 11. Cross-Reference of Product Revision to Errata

No.	Errata Description	Revision Number								
		JH-F2	BH-F2	DH-F2	JH-F3	DH-F3	BH-G1	DH-G1	BH-G2	DH-G2
1	Inconsistent Global Page Mappings Can Lead to Machine Check Error	No fix planned								
57	Some Data Cache Tag Eviction Errors Are Reported As Snoop Errors	No fix planned								
60	Single Machine Check Error May Report Overflow	No fix planned								
75	APIC Timer Accuracy Across Power Management Events	No fix planned								
77	Long Mode CALLF or JMPF May Fail To Signal GP When Callgate Descriptor is Beyond GDT/LDT Limit	No fix planned								
89	Potential Deadlock With Locked Transactions	No fix planned								
112	Self-Modifying Code May Execute Stale Instructions	X	X	X	X	X				
122	TLB Flush Filter May Cause Coherency Problem in Multicore Systems	No fix planned								
125	Processor Temporarily Stops Issuing Refresh Requests While Exiting S3 State	No fix planned								
126	Incorrect Output Drive Strength in Systems Using Both x4 and Non-x4 RDIMMs	X	X	X	X	X				
130	Interrupt Shadow Property May Not Be Observed In SVM Mode	X	X	X	X	X				
131	Systems May Deadlock Waiting for a Probe Response	No fix planned								
133	Internal Termination Missing on Some Test Pins	X	X	X						
138	AltVidTriEn Bit Causes System Hang	X	X	X	X	X				
140	TSC Offset Is Not Added to Reads of the TSC MSR0000_0010 When Running a Virtualized Guest	X	X	X	X	X				
141	Inaccurate Internal Triggering of HTC/STC Feature	No fix planned								
142	DQS Receiver Enable Delays Incorrectly Set In Mismatched DIMM Mode	No fix planned								
144	CLFLUSH to Shadow RAM Address Will Not Invalidate	No fix planned								
149	Clock Jitter on MEMCLK Pins During Write Transactions	No fix planned								
150	DDR2-800 DIMMs Using 4 Gbit DRAM May Cause Refresh Counter Overflow	X	X	X	X	X				

Table 11. Cross-Reference of Product Revision to Errata (Continued)

No.	Errata Description	Revision Number								
		JH-F2	BH-F2	DH-F2	JH-F3	DH-F3	BH-G1	DH-G1	BH-G2	DH-G2
151	Incorrect Programming of the Specific End of Interrupt (SEOI) Register Results in Processor Hang	No fix planned								
152	DRAM Controller Violates tXRSD Requirement when Exiting Self-Refresh Mode After Some P-State Changes	No fix planned								
153	Potential System Hang in Multiprocessor Systems With ≥14 Cores	X	X	X						
156	Read Request Incorrectly Generated for Invalid GART Page Table Entries	No fix planned								
157	SMIs That Are Not Intercepted May Cause Unpredictable System Behavior	X	X	X			X	X	X	X
158	HLT Initiated C1 State Transitions May Lead to Processor Hang In SVM Guest Mode	X	X	X	X	X				
159	Clock Jitter on MEMCLK Pins During Read Transactions			X						
161	Performance-Monitoring Counters Do Not Count Code Address Matches	X	X	X	X	X				
162	Writes to Read-Only APIC Register Cause Processor Hang	No fix planned								
164	DRAM Refresh Controller Not Enabled After Using BIOS Controlled DRAM Initialization	X	X	X	X	X				
165	#VMEXIT(INVALID) Unconditionally Clears EVENTINJ Field In VMCB	X	X	X	X	X				
166	FXSAVE/FXRSTOR Instructions Use 64-bit Format in Compatibility Mode	X	X	X	X	X				
167	System Hang with Chipset Initiated PROCHOT_L Throttling When Clock Divisor is Greater Than 64	X	X	X	X	X				
168	System May Hang When Exiting C1E or C3	No fix planned								
169	System May Hang Due to DMA or Stalled Probe Response	No fix planned								
170	In SVM Mode Incorrect Code Bytes May Be Fetched After A World Switch	X	X	X	X	X				
171	Instruction Break Point On VMRUN Instruction Leads To Unpredictable System Behavior	No fix planned								
172	Some Registered DIMMs Incompatible With Address Parity Feature	X			X					
181	Asserting LDTSTOP_L Before DRAM is Initialized May Cause System Hang	X	X	X	X	X				
182	Maximum Asynchronous Latency Constant Is Greater Than 2 ns	No fix planned								
207	S3 I/O Power May Exceed Specification	No fix planned								
238	DRAM Controller Causes Spurious Memory Operations After Self-Refresh Exit At DDR2-667 Or DDR2-800 Memory Speeds						X	X		
246	Breakpoint Due to An Instruction That Has an Interrupt Shadow May Be Delivered to the Hypervisor	No fix planned								
249	DRAM Controller Violates Self-Refresh Exit Requirements At DDR2-667 Or DDR2-800 Memory Speeds						X	X		
254	Internal Resource Livelock Involving Cached TLB Reload						X	X	X	X
270	DRAM Controller Violates tXSNR Requirement When Exiting The S3 State						X	X	X	X
275	HyperTransport™ Link May Fail at 600 MHz	No fix planned								
284	Incorrect DQS Receiver Enable Delay Behavior								X	X
292	Processor May Not Function in Alternate VID	No fix planned								
297	Single Machine Check Error May Report Overflow	No fix planned								
312	CVTSD2SS and CVTPD2PS Instructions May Not Round to Zero	No fix planned								

Table 11. Cross-Reference of Product Revision to Errata (Continued)

No.	Errata Description	Revision Number								
		JH-F2	BH-F2	DH-F2	JH-F3	DH-F3	BH-G1	DH-G1	BH-G2	DH-G2
325	DRAM Read Failure During S3 Resume								X	X
339	APIC Timer Rollover May Be Delayed	No fix planned								
340	AtcDllMaxPhases Not Supported On Some Processors									X
342	SMIs That Are Not Intercepted May Disable Interrupts				X	X				
352	SYSCALL Instruction May Execute Incorrectly Due to Breakpoint	No fix planned								
353	SYSRET Instruction May Execute Incorrectly Due to Breakpoint	No fix planned								
393	Performance Monitor May Count Fastpath Double Operation Instructions Incorrectly	No fix planned								
400	APIC Timer Interrupt Does Not Occur in Processor C-States	No fix planned								
415	HLT Instructions That Are Not Intercepted May Cause System Hang	No fix planned								
573	Processor May Incorrectly Update Instruction Pointer After FSINCOS Instruction	No fix planned								
670	Segment Load May Cause System Hang or Fault After State Change	No fix planned								
700	LAR and LSL Instructions Do Not Check Invalid Long Mode Descriptor Types	No fix planned								
701	Task Switch Intercept Does Not Store VMEXIT EXITINTINFO	No fix planned								

Table 12 cross-references the errata to each processor segment. “X” signifies that the erratum applies to the processor segment. An empty cell signifies that the erratum does not apply. An erratum may not apply to a processor segment due to a specific characteristic of the erratum, or it may be due to the affected silicon revision(s) not being used in this processor segment.

Table 12: Cross-Reference of Errata to Processor Segments

Errata Number	AMD Opteron™ Processor	Dual-Core AMD Opteron™ Processor	AMD Athlon™ Processor	AMD Athlon™ X2 Dual-Core Processor	AMD Athlon™ Neo Processor	AMD Athlon™ Neo X2 Dual-Core Processor	AMD Athlon™ 64 Processor	AMD Athlon™ 64 FX Dual-Core Processor	AMD Athlon™ 64 X2 Dual-Core Processor	AMD Sempron™ Processor	AMD Sempron™ Dual-Core Processor	AMD Turion™ 64 Mobile Technology	AMD Turion™ 64 X2 Mobile Technology	AMD Turion™ Neo X2 Dual-Core Processor
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X
57	X	X	X	X	X	X	X	X	X	X	X	X	X	X
60	X	X	X	X	X	X	X	X	X	X	X	X	X	X
75	X	X	X	X	X	X	X	X	X	X	X	X	X	X
77	X	X	X	X	X	X	X	X	X	X	X	X	X	X
89	X	X	X	X	X	X	X	X	X	X	X	X	X	X
112	X	X	X				X	X	X	X		X	X	
122	X	X		X		X		X	X		X		X	X
125	X	X	X	X	X	X	X	X	X	X	X	X	X	X
126	X	X												
130	X	X	X				X	X	X	X		X	X	
131	X	X	X	X	X	X	X	X	X	X	X	X	X	X
133		X					X	X	X	X		X	X	
138													X	
140	X	X	X				X	X	X			X	X	
141	X	X	X	X	X	X	X	X	X	X	X	X	X	X
142		X	X	X	X	X	X	X	X	X	X	X	X	X
144	X	X	X	X	X	X	X	X	X	X	X	X	X	X
149	X	X	X	X	X	X	X	X	X	X	X	X	X	X
150	X	X	X				X	X	X	X		X	X	
151	X	X	X	X	X	X	X	X	X	X	X	X	X	X
152	X	X	X	X	X	X	X	X	X	X	X	X	X	X
153		X												
156	X	X	X	X	X	X	X	X	X	X	X	X	X	X
157		X	X	X	X	X	X	X	X			X	X	X
158	X	X	X				X	X	X			X	X	
159							X			X		X		
161	X	X	X				X	X	X	X		X	X	
162	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 12: Cross-Reference of Errata to Processor Segments (Continued)

Errata Number	AMD Opteron™ Processor	Dual-Core AMD Opteron™ Processor	AMD Athlon™ Processor	AMD Athlon™ X2 Dual-Core Processor	AMD Athlon™ Neo Processor	AMD Athlon™ Neo X2 Dual-Core Processor	AMD Athlon™ 64 Processor	AMD Athlon™ 64 FX Dual-Core Processor	AMD Athlon™ 64 X2 Dual-Core Processor	AMD Sempron™ Processor	AMD Sempron™ Dual-Core Processor	AMD Turion™ 64 Mobile Technology	AMD Turion™ 64 X2 Mobile Technology	AMD Turion™ Neo X2 Dual-Core Processor
164	X	X	X				X	X	X	X		X	X	
165	X	X	X				X	X	X			X	X	
166	X	X	X				X	X	X	X		X	X	
167			X				X		X	X		X	X	
168			X	X	X	X	X		X	X	X	X	X	X
169	X	X	X	X	X	X	X	X	X	X	X	X	X	X
170	X	X	X				X	X	X			X	X	
171	X	X	X	X	X	X	X	X	X			X	X	X
172	X	X												
181	X	X	X				X	X	X	X		X	X	
182	X	X	X	X	X	X	X	X	X	X	X	X	X	X
207	X	X	X	X	X	X	X	X	X	X	X			X
238							X		X	X	X		X	
246	X	X	X	X	X	X	X	X	X			X	X	X
249				X			X		X	X	X			
254			X	X	X	X	X		X	X	X		X	X
270			X	X	X	X	X		X	X	X		X	X
275			X	X	X	X	X	X	X	X	X	X	X	X
284			X	X		X	X		X	X	X			
292													X	
297	X	X	X	X	X	X	X	X	X	X	X	X	X	X
312	X	X	X	X	X	X	X	X	X	X	X	X	X	X
325			X	X		X	X		X	X	X			
339	X	X	X	X	X	X	X	X	X	X	X	X	X	X
340			X		X		X			X				
342	X	X	X				X	X	X					
352	X	X	X	X	X	X	X	X	X	X	X	X	X	X
353	X	X	X	X	X	X	X	X	X	X	X	X	X	X
393	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400	X	X	X	X	X	X	X	X	X	X	X	X	X	X
415	X	X	X	X	X	X	X	X	X			X	X	X
573	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 12: Cross-Reference of Errata to Processor Segments (Continued)

Errata Number	AMD Opteron™ Processor	Dual-Core AMD Opteron™ Processor	AMD Athlon™ Processor	AMD Athlon™ X2 Dual-Core Processor	AMD Athlon™ Neo Processor	AMD Athlon™ Neo X2 Dual-Core Processor	AMD Athlon™ 64 Processor	AMD Athlon™ 64 FX Dual-Core Processor	AMD Athlon™ 64 X2 Dual-Core Processor	AMD Sempron™ Processor	AMD Sempron™ Dual-Core Processor	AMD Turion™ 64 Mobile Technology	AMD Turion™ 64 X2 Mobile Technology	AMD Turion™ Neo X2 Dual-Core Processor
670	X	X	X	X	X	X	X	X	X	X	X	X	X	X
700	X	X	X	X	X	X	X	X	X	X	X	X	X	X
701	X	X	X	X	X	X	X	X	X			X	X	X

Table 13 cross-references the errata to each package type. “X” signifies that the erratum applies to the package type. An empty cell signifies that the erratum does not apply. An erratum may not apply to a package type due to a specific characteristic of the erratum, or it may be due to the affected silicon revision(s) not being used in this package.

Table 13. Cross-Reference of Errata to Package Type

Errata Number	F (1207)	Fr3 (1207)	AM2	ASB1	S1g1
1	X	X	X	X	X
57	X	X	X	X	X
60	X	X	X	X	X
75	X	X	X	X	X
77	X	X	X	X	X
89	X	X	X	X	X
112	X	X	X		X
122	X	X	X	X	X
125	X	X	X	X	X
126	X				
130	X	X	X		X
131	X	X	X	X	X
133	X		X		X
138					X
140	X	X	X		X
141	X	X	X	X	X
142		X	X	X	X
144	X	X	X	X	X
149	X	X	X	X	X
150	X	X	X		X
151	X	X	X	X	X
152	X	X	X	X	X
153	X				
156	X	X	X	X	X
157	X		X	X	X
158	X	X	X		X
159			X		X
161	X	X	X		X
162	X	X	X	X	X
164	X	X	X		X
165	X	X	X		X
166	X	X	X		X

Table 13. Cross-Reference of Errata to Package Type (Continued)

Errata Number	F (1207)	Fr3 (1207)	AM2	ASB1	S1g1
167					X
168			X	X	X
169	X	X	X	X	X
170	X	X	X		X
171	X	X	X	X	X
172	X				
181	X	X	X		X
182	X	X	X	X	X
207	X	X	X	X	
238					X
246	X	X	X	X	X
249			X		
254			X	X	X
270			X	X	X
275			X	X	X
284			X		
292					X
297	X	X	X	X	X
312	X	X	X	X	X
325			X		
339	X	X	X	X	X
340			X	X	X
342	X	X	X		
352	X	X	X	X	X
353	X	X	X	X	X
393	X	X	X	X	X
400	X	X	X	X	X
415	X	X	X	X	X
573	X	X	X	X	X
670	X	X	X	X	X
700	X	X	X	X	X
701	X	X	X	X	X

1 Inconsistent Global Page Mappings Can Lead to Machine Check Error

Description

If the same linear to physical mapping exists in multiple CR3 contexts, and that mapping is marked global in one context and not global in another context, then a machine check error may be reported by the TLB error detection logic (depending on the specific access pattern and TLB replacements encountered).

Potential Effect on System

In the somewhat unlikely event that all required conditions are present (including the effects of the TLB replacement policy), then an unexpected machine check error may be reported. If the erratum occurs in the instruction cache TLB (L1 or L2), the apparent error is logged and corrected. If the erratum occurs in the data cache TLB (L1 or L2), the apparent error is logged and reported as an uncorrectable machine check error.

Suggested Workaround

None required. This is not expected to occur in real systems.

Fix Planned

No

57 Some Data Cache Tag Eviction Errors Are Reported As Snoop Errors

Description

In some cases, the machine check error code on a data cache (DC) tag array parity error erroneously classifies an eviction error as a snoop error.

The common cases of cache line replacements and external probes are classified correctly (as eviction and snoop respectively). The erroneous cases occur when a tag error is detected during a DC eviction that was generated by a hardware prefetch, a cache line state change operation, or a number of other internal microarchitectural events. In such cases, the error code logged in the DC Machine Check Status register (MC0_STATUS, MSR0000_0401) erroneously indicates a snoop error.

Potential Effect on System

Internally detected DC tag errors may be reported to software as having been detected by snoops. Depending upon machine check software architecture, the system response to such errors may be broader than necessary.

Suggested Workaround

None required.

Fix Planned

No

60 Single Machine Check Error May Report Overflow

Description

A single parity error encountered in the data cache tag array may incorrectly report the detection of multiple errors, as indicated by the overflow bit of the DC Machine Check Status register (bit 62 of MSR0000_0401).

Potential Effect on System

System software may be informed of a machine check overflow when only a single error was actually encountered.

Suggested Workaround

Do not rely on the state of the OVER bit in the DC Machine Check Status register.

Fix Planned

No

75 APIC Timer Accuracy Across Power Management Events

Description

The APIC timer may be inaccurate by up to 1 µs across each use of S1 or LDTSTOP_L initiated HyperTransport™ link width/frequency changes.

Potential Effect on System

No observable system impact expected.

Suggested Workaround

None.

Fix Planned

No

77 Long Mode CALLF or JMPF May Fail To Signal GP When Callgate Descriptor is Beyond GDT/LDT Limit

Description

If the target selector of a far call or far jump (CALLF or JMPF) instruction references a 16-byte long mode system descriptor where any of the last 8 bytes are beyond the GDT or LDT limit, the processor fails to report a General Protection fault.

Potential Effect on System

None expected, since the operating system typically aligns the GDT/LDT limit such that all descriptors are legal. However, in the case of erroneous operating system software, the above described GP fault will not be signaled, resulting in unpredictable system failure.

Suggested Workaround

None required, it is anticipated that long mode operating system software will ensure the GDT and LDT limits are set high enough to cover the larger (16-byte) long mode system descriptors.

Fix Planned

No

89 Potential Deadlock With Locked Transactions

Description

Downstream non-posted requests to devices that are dependent on the completion of an upstream non-posted request can cause a deadlock in the presence of transactions resulting in bus locks, as shown in the following two scenarios:

1. A downstream non-posted read to the LPC bus occurs while an LPC bus DMA is in progress. The legacy LPC DMA blocks downstream traffic until it completes its upstream reads.
2. A downstream non-posted read is sent to a device that must first send an upstream non-posted read before it can complete the downstream read.

In both cases, a locked transaction causes the upstream channel to be blocked, causing the deadlock condition.

Potential Effect on System

The system fails due to a bus deadlock.

Suggested Workaround

BIOS should set the DisIOReqLock bit (bit 3 in NB_CFG, MSRC001_001F).

Fix Planned

No

112 Self-Modifying Code May Execute Stale Instructions

Description

The processor may execute stale instructions in a situation involving a store instruction modifying a younger instruction within two cache lines of each other and an internal processor trap condition occurring in a small window:

1. The fetch for the store and the younger instruction must hit in the instruction cache (IC) and are brought into the processor pipeline.
2. The store speculatively executes, and prior to invalidating the line in the IC, an internal trap event occurs.
3. This internal trap event must redirect the instruction fetch to a point in the instruction stream just before the store.
4. The fetch associated with the redirect must hit in the IC before the first execution of the store (in step 2) has invalidated the line containing the target.
5. During the small window of time between the refetch of the younger instruction and the fetch of the last instruction in that cache line from the IC, the speculative store from step 2 invalidates the IC line which contains the younger instruction.

Potential Effect on System

In the unlikely event that the above conditions occur, the processor will execute stale instruction(s).

Just in time (JIT) compilers lack the proximity of the store instruction to the modified code and thus are not affected.

Suggested Workaround

This scenario was contrived in a highly randomized simulation environment and is not expected to occur in a real system. In the unlikely event that the erratum is observed, a serializing instruction can be inserted prior to executing the modified code.

Fix Planned

Yes

122 TLB Flush Filter May Cause Coherency Problem in Multicore Systems

Description

Under a highly specific set of internal timing conditions in system configurations that include more than one processor core, coherency problems may arise between the page tables in memory and the translations stored in the on-chip TLBs. This can result in the possible use of stale translations even after software has performed a TLB flush.

Potential Effect on System

Unpredictable system failure. This scenario has only been observed in a highly randomized synthetic stress test.

Suggested Workaround

In multicore systems, disable the TLB flush filter by setting HWCR.FFDIS (bit 6 of MSRC001_0015).

Fix Planned

No

125 Processor Temporarily Stops Issuing Refresh Requests While Exiting S3 State

Description

While exiting low power state S3 (Suspend to RAM state), the processor brings the DRAMs out of self-refresh mode and waits 200 µs to allow the internal circuitry to stabilize (e.g. DLLs to lock etc.). During this period, the DRAM controller will not issue refresh requests to the DRAMs for 200 µs.

Potential Effect on System

The DRAM may potentially lose contents while exiting S3 state, resulting in unexpected system behavior.

Suggested Workaround

The BIOS should perform the following steps in the given order when exiting from S3 (Suspend to RAM) state in order to resume the refresh requests to DRAM immediately:

1. Restore memory controller registers as normal.
2. Set the EnDramInit bit (Dev:2x7C[31]), clear all other bits in the same register).
3. Wait at least 750 µs.
4. Clear the EnDramInit bit.
5. Read the value of Dev:2x80 and write that value back to Dev:2x80.
6. Set the exit from the self-refresh bit (Dev:2x90[1]).
7. Clear the exit from self-refresh bit immediately.

Note: *Steps 6 and 7 must be executed in a single 64-byte aligned uninterrupted instruction stream.*

Systems implementing the workaround for erratum #270 should not implement this workaround.

Fix Planned

No

126 Incorrect Output Drive Strength in Systems Using Both x4 and Non-x4 RDIMMs

Description

The processor provides the capability of setting different drive strengths for certain groups of DRAM outputs, including the MA_DQS[16:9] and MB_DQS[16:9] outputs. The drive strengths are programmed via the Output Driver Compensation Control registers (Dev:2x9C; Indexes 00h and 20h). If the DataDrvStren and DqsDrvStren fields in these registers are not programmed to the same strength values, the output drivers listed above may have the incorrect drive strength applied in systems that use both x4 and non-x4 registered DIMMs.

Potential Effect on System

The signal integrity of the DQS outputs may be affected negatively. This may limit the DRAM frequencies and/or the number of DIMMs supported by the processor.

Suggested Workaround

Do not program the DataDrvStren and DqsDrvStren fields to different settings in system configurations using both x4 and non-x4 registered DIMMs.

Fix Planned

Yes

130 Interrupt Shadow Property May Not Be Observed In SVM Mode

Description

In guest mode, if the STI instruction takes a debug exception due to a single step and IF=0 and the #BP exception is intercepted by the hypervisor, then the pending INTR is taken before executing the shadowed instruction.

Potential Effect on System

If the guest is unable to tolerate INTRs after the above scenario, unpredictable behavior may occur.

Suggested Workaround

The hypervisor should not single step the guest across STI instructions with IF=0.

Fix Planned

Yes

131 Systems May Deadlock Waiting for a Probe Response

Description

Under a highly specific and detailed set of internal timing conditions, the northbridge System Request Queue (SRQ) may stall a probe response leading to a deadlock.

Potential Effect on System

Deadlock or a machine check error due to a watchdog timer time-out.

Suggested Workaround

BIOS should set NB_CFG Register[20] (MSRC001_001F). No loss of performance results from this workaround.

Systems implementing the workaround for erratum #169 should not apply this workaround.

Fix Planned

No

133 Internal Termination Missing on Some Test Pins

Description

Internal termination resistors are missing on certain test pins.

Potential Effect on System

Floating inputs on test pins resulting in unpredictable operation.

Suggested Workaround

Termination must be added to the motherboard as shown in the following table.

Pin Name	Termination Value	Voltage Rail	Pin Number on F (1207) Processors	Pin Number on AM2 Processors	Pin Number on S1g1 Processors
TEST18	300 ohms	VSS	F23	E9	H10
TEST19	300 ohms	VSS	F20	F10	G9
TEST21	300 ohms	VSS	AJ20	AL8	AB8
TEST26	300 ohms	VDDIO	AF18	AK5	AE6

Fix Planned

Yes

138 AltVidTriEn Bit Causes System Hang

Description

Setting the AltVidTriEn bit (Dev:3xD8[26]) correctly tristates the HyperTransport™ technology clocks when entering the C3 state with AltVid enabled, but upon exiting C3, clocks are enabled only after the VID transitions back to normal operating voltage. The HyperTransport technology specification requires clocks to be enabled within 400 ns of LDTSTOP_L deassertion but in this case clocks are enabled after 10 microseconds.

Potential Effect on System

The system hangs.

Suggested Workaround

The BIOS should not set the AltVidTriEn bit (Dev:3xD8[26]). Disabling this feature results in a negligible power increase.

Fix Planned

Yes

140 TSC Offset Is Not Added to Reads of the TSC MSR0000_0010 When Running a Virtualized Guest

Description

When a guest is running, the execution of the RDTSC or RDTSCP instructions returns the value of the architectural time stamp counter's contents plus the offset in the guest's VMCB. However, if the guest reads from MSR0000_0010, the value returned is the architectural time stamp value without the offset added.

Potential Effect on System

A program running in a virtualized guest that reads MSR0000_0010 receives a different value than it gets from RDTSC or RDTSCP.

Suggested Workaround

A hypervisor should intercept guest reads of MSR0000_0010 by setting the corresponding bit in the MSR permissions map and manually add the TSC offset.

Fix Planned

Yes

141 Inaccurate Internal Triggering of HTC/STC Feature

Description

The internal thermal sensor used for the hardware thermal control (HTC) and software thermal control (STC) features is inaccurate.

Potential Effect on System

Activation of HTC/STC is inconsistent and does not provide reliable thermal protection.

Suggested Workaround

BIOS should not enable the HTC/STC features. Systems should be designed with conventional thermal control/throttling methods or utilize PROCHOT_L functionality based on temperature measurements from an analog thermal diode (THERMDA/THERMDC).

Fix Planned

No

142 DQS Receiver Enable Delays Incorrectly Set In Mismatched DIMM Mode

Description

The BIOS programmable DQS receiver delays in the DRAM controller interface use incorrect values when operating in mismatched DIMM mode.

Potential Effect on System

DRAM failures resulting in unpredictable system behavior.

Suggested Workaround

When operating in mismatched DIMM mode, BIOS should program identical values in the following DQS Receiver Enable timing registers:

- (Dev:2x9C) Offsets 30h and 36h should have identical DqsRcvEn delay values.
- (Dev:2x9C) Offsets 33h and 39h should have identical DqsRcvEn delay values.

Fix Planned

No

144 CLFLUSH to Shadow RAM Address Will Not Invalidate

Description

WrDram and RdDram bits in extended MTRR type registers are used to copy BIOS ROM to corresponding DRAM and then execute out of DRAM. When these are configured to direct writes to ROM (WrMem =0b) and reads to DRAM (RdMem =01b), the CLFLUSH instruction will not invalidate shadow RAM addresses in the cache.

Potential Effect on System

CLFLUSH instruction is ineffective for shadow RAM space.

Suggested Workaround

Use the WBINVD instruction instead of CLFLUSH in shadow RAM space.

Fix Planned

No

149 Clock Jitter on MEMCLK Pins During Write Transactions

Description

Under certain conditions excessive clock jitter (tJIT(per) and tJIT(cc)) is observed on the MEMCLK pins during DDR write transactions above DDR533 (includes M[B, A][1:0]_CLK_H/L[2:0] pins on AM2, MA[1:0]_CLK_H/L[2:0] on ASB1 packages, M[B, A]0_CLK_H/L[2:1] pins on S1g1 package, and M[B, A][3:0]_CLK_H/L pins on F (1207) and Fr3 (1207) packages). The amount of jitter on the MEMCLK pins depends on the data pattern being driven during DRAM writes.

Potential Effect on System

None expected. No functional failures have been observed due to this issue.

Suggested Workaround

None required.

Fix Planned

No

150 DDR2-800 DIMMs Using 4 Gbit DRAM May Cause Refresh Counter Overflow

Description

The refresh counter may overflow when there are seven or more ranks of DDR2-800 DRAM and at least six ranks are comprised of 4 Gbit devices. This can occur under the following conditions:

1. A system populated with four dual-rank DIMMs comprised of 4 Gbit devices, or
2. A system populated with three dual-rank DIMMs comprised of 4 Gbit devices and a fourth DIMM of any size.

Potential Effect on System

Overflow of the refresh counter could result in data corruption due to dropping of pending refreshes to some DRAM ranks.

Suggested Workaround

BIOS should derate the memory speed to 333 MHz (DDR667) if either of the memory configurations described in the Description section is present.

Fix Planned

Yes

151 Incorrect Programming of the Specific End of Interrupt (SEOI) Register Results in Processor Hang

Description

A hypervisor (or other software) that incorrectly writes to the Extended APIC Specific End of Interrupt (SEOI) register (APIC offset 420h) before enabling SEOI generation causes the processor to hang.

Potential Effect on System

The system hangs.

Suggested Workaround

Prior to writing to the Extended APIC SEOI register, hypervisors (or other software) should enable SEOI generation by setting SeoiEn in the Extended APIC Control register (APIC offset 410h, bit 1).

Fix Planned

No

152 DRAM Controller Violates tXRSD Requirement when Exiting Self-Refresh Mode After Some P-State Changes

Description

On a P-state change in which the FID increases, the DRAM controller may issue a read prior to 200 MEMCLKs after CKE transitions high when exiting self-refresh mode. This is a violation of the tXSRD requirement of the DDR2 SDRAM specification.

Potential Effect on System

The system may hang or the memory read may return invalid data.

Suggested Workaround

BIOS should set the Address Timing Control Register[CkeSetup] (function 2, offset 9Ch, index 04h and 24h, bit 5) and the Address Timing Control Register[CkeFineDelay] (function 2, offset 9Ch, index 04h and 24h, bits 4:0) as shown in the following tables.

SO-DIMM for AM2, S1g1 and ASB1 Processors:

DRAM Speed	CKE Setup	CKE Fine Delay
DDR2-400	0b	0h
DDR2-533	0b	0h
DDR2-667	0b	0h

Unbuffered DIMM for Fr3 (1207), AM2 and ASB1 Processors:

DRAM Speed	CKE Setup	CKE Fine Delay
DDR2-400	0b	0h
DDR2-533	0b	0h
DDR2-667	1b	0h
DDR2-800	1b	0h

Registered DIMM for F (1207) Processors:

DRAM Speed	CKE Setup	CKE Fine Delay
DDR2-400	0b	0h
DDR2-533	0b	0h
DDR2-667	0b	0h

Fix Planned

No

153 Potential System Hang in Multiprocessor Systems With ≥14 Cores

Description

Under a highly specific and detailed set of internal timing conditions, the crossbar flow control buffer pointer can become corrupted, causing incorrect information to be captured and resulting in a system hang.

Potential Effect on System

The system hangs.

Suggested Workaround

A BIOS workaround can be implemented to modify the buffer allocation scheme to limit the maximum number of crossbar command buffers to 49, with some performance impact. The AMD recommended buffer allocation for ladder and twisted ladder configurations are listed in the tables below. This requires modifications to the configuration registers Dev:0x90h, B0h, D0h, Dev:3x70h, and Dev:3x78h (command buffers only) and assumes default values in Dev:3x7Ch.

Outer Node Virtual Channel Command Buffer Allocation

Link	Request	Posted Request	Response	Probe	Number of Command Buffers
Coherent links	1	1	6	4	12
Non-coherent links	5	4	1	0	10
SRI	2	3	3	0	8
MCT	0	0	5	2	7

Total Command Buffer Allocation Per Outer Node

Allocation	Outer Node
12	Coherent link
12	Coherent link
10	Non-coherent link
8	SRI (includes three buffers from FreeList Buffer Count register)
7	MCT
49	**Total**

Dev:0x90h, B0h, D0h LDT Buffer Count Register Settings for Outer Nodes

Mnemonic	Req	PReq	Rsp	Probe
Register Bits	[3:0]	[7:4]	[11:8]	[15:12]
Coherent Links	1	1	6	4
Non-Coherent Links	5	4	1	0

Dev:3x70h SRI to XBAR Buffer Count Register Settings for Outer Nodes

Mnemonic	DReq	DPReq	UReq	UPReq	URsp
Register Bits	[29:28]	[31:30]	[1:0]	[5:4]	[9:8]
Value	1	1	1	1	1

Dev:3x78h MCT to XBAR Buffer Count Register Settings for Outer Nodes

Mnemonic	Rsp	Prb
Register Bits	[11:8]	[14:12]
Value	5	2

Inner Node Virtual Channel Command Buffer Allocation

Link	Request	Posted Request	Response	Probe	Number of Command Buffers
Coherent links	2	1	5	4	12
SRI	1	2	3	0	6
MCT	0	0	5	2	7

Total Command Buffer Allocation Per Inner Node

Allocation	Inner Node
12	Coherent link
12	Coherent link
12	Coherent link
6	SRI (includes three buffers from FreeList Buffer Count register)
7	MCT
49	**Total**

Dev:0x90h, B0h, D0h LDT Buffer Count Register Settings for Inner Nodes

Mnemonic	Req	Preq	Rsp	Probe
Register Bits	[3:0]	[7:4]	[11:8]	[15:12]
Coherent links	2	1	5	4

Dev:3x70h SRI to XBAR Buffer Count Register Settings for Inner Nodes

Mnemonic	DReq	DPReq	UReq	UPReq	URsp
Register Bits	[29:28]	[31:30]	[1:0]	[5:4]	[9:8]
Value	0	0	1	1	1

Dev:3x78h MCT to XBAR Buffer Count Register Settings for Inner Nodes

Mnemonic	Rsp	Prb
Register Bits	[11:8]	[14:12]
Value	5	2

Fix Planned

Yes

156 Read Request Incorrectly Generated for Invalid GART Page Table Entries

Description

When a read request is made to an invalid address within the GART aperture (i.e., when the valid bit is not set in the GART page table entry), the northbridge incorrectly generates a read request to the page specified in the GART page table entry (PTE).

Potential Effect on System

A read request to an arbitrary address may result in undefined behavior.

Suggested Workaround

Operating system software should map a valid guard page after each contiguous region of valid pages in the aperture. Operating system software should also ensure that the physical page address of all invalid (unused) GART entries points to a guard page. The guard page should point to a valid physical page in DRAM; the same physical guard page can be used to guard all allocations and entries. The placement of the guard page is operating system dependent, but one solution is to assign a value of 0h for the physical page address of the guard page.

Fix Planned

No

157 SMIs That Are Not Intercepted May Cause Unpredictable System Behavior

Description

If an SMI is not intercepted in SVM guest context, the processor incorrectly remains in guest mode. As a result, intercepts remain enabled and the BIOS SMM handler may trap unexpectedly to the hypervisor. Additionally, if the BIOS SMM handler places the processor into S3 (power down) state it is not possible to properly resume the system.

Potential Effect on System

Unpredictable system behavior.

Suggested Workaround

Contact your AMD representative for information on a BIOS update.

Fix Planned

Yes

158 HLT Initiated C1 State Transitions May Lead to Processor Hang In SVM Guest Mode

Description

If C1 clock ramping is enabled in SVM guest context, and if HLT is executed immediately after STI or as a first guest instruction following a VMRUN with interrupt shadow enabled, a pending virtual interrupt will lead to processor hang.

Potential Effect on System

C1 state transitions in SVM guest mode may lead to processor hang.

Suggested Workaround

Hypervisors should not execute the VMRUN instruction with V_IRQ = 1 and HLT Intercept = 0 or they should disable C1 clock ramping in guest mode.

Fix Planned

Yes

159 Clock Jitter on MEMCLK Pins During Read Transactions

Description

Under certain conditions excessive clock jitter, tJIT(cc), is observed on the MEMCLK pins during DDR read transactions above DDR533 (includes M[B, A][1:0]_CLK_H/L[2:0] pins on AM2 processors, and M[B, A]0_CLK_H/L[2:1] pins on S1g1 processors). The amount of jitter on the MEMCLK pins depends on the data pattern being driven during DRAM reads.

Potential Effect on System

None expected. No functional failures have been observed due to this issue.

Suggested Workaround

None required.

Fix Planned

No

161 Performance-Monitoring Counters Do Not Count Code Address Matches

Description

The performance-monitoring counters do not count code address matches with DR0-3 unless the corresponding breakpoint is enabled in DR7.

Potential Effect on System

Performance counters can not be used for instruction address matches when the corresponding breakpoints are not enabled.

Suggested Workaround

None.

Fix Planned

Yes

162 Writes to Read-Only APIC Register Cause Processor Hang

Description

If a hypervisor (or other software) incorrectly attempts a write to the read-only Extended APIC Feature register (APIC offset 400h) the processor will hang.

Potential Effect on System

A system hang will result if software writes to the read-only Extended APIC Feature register (APIC offset 400h).

Suggested Workaround

Hypervisors (or other software) should not write to the read-only Extended APIC Feature register (APIC offset 400h).

Fix Planned

No

164 DRAM Refresh Controller Not Enabled After Using BIOS Controlled DRAM Initialization

Description

The DRAM controller does not enable the refresh controller when BIOS Controlled DRAM Initialization (Dev 2x7Ch) is used to execute the DRAM initialization sequence described by the JEDEC specification.

Potential Effect on System

Unpredictable system behavior due to memory data loss.

Suggested Workaround

BIOS must use Hardware Controlled DRAM Initialization using DRAM Configuration Low Register[InitDram] (Dev 2x90h[0]); BIOS must not use BIOS Controlled DRAM Initialization.

Fix Planned

Yes

165 #VMEXIT(INVALID) Unconditionally Clears EVENTINJ Field In VMCB

Description

If VMRUN returns with #VMEXIT(INVALID), the EVENTINJ field in the VMCB is unconditionally cleared.

Potential Effect on System

When Guest mode is exited due to VMEXIT(INVALID), the state of the EVENTINJ field in the VMCB is lost and the hypervisor does not have that information available for analysis.

Suggested Workaround

None required. Hypervisors should have this information available in other data structures.

Fix Planned

Yes

166 FXSAVE/FXRSTOR Instructions Use 64-bit Format in Compatibility Mode

Description

In compatibility mode, FXSAVE/FXRSTOR instructions use the 64-bit memory image format (see figure 11-8 in the *AMD64 Architecture Programmer's Manual Volume 2: System Programming*, order# 24593) as opposed to the non-64-bit format (figure 11-9).

Potential Effect on System

A minor performance loss observed due to saving an additional 16 quadwords to memory.

Suggested Workaround

None required.

Fix Planned

Yes

167 System Hang with Chipset Initiated PROCHOT_L Throttling When Clock Divisor is Greater Than 64

Description

When chipset initiated PROCHOT_L throttling is enabled and a clock divisor greater than 64 is selected, a system hang may occur.

Potential Effect on System

The system may hang.

Suggested Workaround

BIOS should program the PMM1 clock divisor to 64 by setting the Power Management Control Low Register [PMM1[ClkSel]] to 011b (Dev 3x80h[14-12] = 011b).

Fix Planned

Yes

168 System May Hang When Exiting C1E or C3

Description

A link may fail to reconnect when exiting C1E or C3.

Potential Effect on System

The link may fail to reconnect when exiting C1E or C3 leading to a system hang.

Suggested Workaround

BIOS should set FidVidEn in the Power Management Control Low Register[PMM1[FidVidEn]] to 1b (Dev 3x80h[10] = 1b).

When implementing this workaround BIOS must clear AltVidEn in the Power Management Control Low Register[PMM1[AltVidEn]] to 0b (Dev 3x80h[11] = 0b).

Fix Planned

No

169 System May Hang Due to DMA or Stalled Probe Response

Description

Under a highly specific and detailed set of internal timing conditions, the northbridge System Request Queue (SRQ) may stall leading to a deadlock.

Potential Effect on System

Deadlock or machine check exception due to watchdog timer time-out leading to system hang.

Suggested Workaround

The BIOS should set NB_CFG Register[32] (MSRC001_001F) to 1b and set F0x68[22:21] (DsNpReqLmt0) to 01b. No loss of performance results from this workaround.

The workaround for this erratum supersedes the workaround for erratum #131. When implementing this workaround, the workaround for erratum #131 should not be applied.

Fix Planned

No

170 In SVM Mode Incorrect Code Bytes May Be Fetched After A World Switch

Description

On an exit from guest mode (world switch) when CR3 changes, under a highly specific and detailed set of conditions, incorrect code bytes may be forwarded from the prefetch buffer.

Potential Effect on System

Incorrect code bytes may be executed, resulting in unpredictable system behavior after world switches.

Suggested Workaround

Hypervisors should set TLB_CONTROL to Flush TLB on VMRUN in the VMCB.

Fix Planned

Yes

171 Instruction Break Point On VMRUN Instruction Leads To Unpredictable System Behavior

Description

VMRUN can be interrupted using a hardware instruction breakpoint using one of the debug registers, DR[0-3]. When the debug handler executes IRET, the processor is expected to execute the VMRUN instruction. However, in the failing case, the processor incorrectly re-enters the breakpoint handler with mixed guest and host state. This in turn causes erroneous execution and leads to unpredictable system behavior.

Potential Effect on System

Hypervisor developers will not be able to use hardware instruction break point on VMRUN instruction.

Suggested Workaround

Set the breakpoint on the instruction prior to VMRUN, then single step through VMRUN.

Fix Planned

No

172 Some Registered DIMMs Incompatible With Address Parity Feature

Description

Some DDR-2 registered DIMMs have been observed to generate erroneous address parity errors when operating at 200 MHz MEMCLK. The address parity detection feature may detect false errors upon MEMRESET_L deassertion (during P-state transitions) due to a non-compliant register used on many registered DIMMs already deployed in production.

Potential Effect on System

Machine check exception due to address parity error.

Suggested Workaround

BIOS should disable address parity in the DRAM Configuration Low register (write zero to Dev:2x90[8]).

181 Asserting LDTSTOP_L Before DRAM is Initialized May Cause System Hang

Description

After power up (cold reset), the link frequency is set to 200 MHz, the link width is set to 8, and the processor core frequency may be set below its maximum rated setting. The link frequency and width adjustments can be accomplished using warm resets or LDTSTOP_L. Using LDTSTOP_L for link frequency and width adjustments prior to DRAM initialization may cause the system to hang.

Potential Effect on System

The system may hang.

Suggested Workaround

BIOS can use warm reset to adjust link frequency and width settings instead of LDTSTOP_L. If LDTSTOP_L is used, then BIOS must set DRAM Configuration High[DisDramInterface] to 1 (Dev 2x94h[14] = 1) and set DRAM Configuration High[MemClkFreqVal] to 1 (Dev 2x94h[3] = 1) prior to generating LDTSTOP_L.

Fix Planned

Yes

182 Maximum Asynchronous Latency Constant Is Greater Than 2 ns

Description

The maximum asynchronous latency is the maximum round-trip latency in the system from the processor to the DRAM devices and back, which is defined as the sum of the worst case trained setting for DQS receiver enable delay and the delay internal to the processor. The internal delay of some processors is greater than 2 ns.

Potential Effect on System

DRAM timing failures leading to a system hang.

Suggested Workaround

BIOS should program the Maximum Asynchronous Latency, DRAM Configuration High [MaxAsynchLatency] (Dev 2x94[7:4]) as the sum of the following components:

- The worst case trained delay setting for DQS Receiver Enable Delay Timing Control [DqsRcvEnDelay] (Dev 2x9Ch[10h, 13h, 16h, 19h, 30h, 33h, 36h, 39h]), and
- A constant of 3 ns associated with the delay internal to the processor.

Fix Planned

No

207 S3 I/O Power May Exceed Specification

Description

The S3 I/O power may be greater than the specified maximum of 250 mW.

Potential Effect on System

There are no functional effects; however, the processor I/O power may be as high as 350 mW in S3.

Suggested Workaround

None required.

Fix Planned

No

238 DRAM Controller Causes Spurious Memory Operations After Self-Refresh Exit At DDR2-667 Or DDR2-800 Memory Speeds

Description

When exiting self-refresh after certain P-state transitions with a memory clock frequency setting of 333 MHz (DDR2-667) or 400 MHz (DDR2-800) the CS, ODT, address, and command DRAM controller pins may fail to transition to the driven state prior to CKE assertion.

Potential Effect on System

System memory may experience spurious operations resulting in unpredictable system behavior.

Suggested Workaround

If ((CPUID Fn8000_0007_EDX[2:1] = 11b) && (MSRC001_0042[StartFid] != MSRC001_0042[MaxFid]) && (MSRC001_0042[StartFid] = 00000b)), BIOS should derate DDR2-800 system memory to 333-MHz operation (DDR2-667) by setting the DRAM Configuration High Register[MemClkFreq] (function 2, offset 94, bits 2:0) to 010b. Additionally, BIOS should modify the fields in the Address Timing Control Register (function 2, offset 9Ch, index 04h and 24h) as shown in the following table when operating at a memory clock frequency setting of 333 MHz.

Address Timing Control Register Settings for AMD S1g1 Processors Operating at the 333 MHz Memory Clock Frequency Setting

DIMM Configuration	Field Name	Bit Position	Setting
Single Rank x16	AddrCmdSetup	21	1b
	AddrCmdFineDelay	20:16	05h
	CsOdtSetup	13	1b
	CsOdtFineDelay	12:8	05h
Single Rank x8, Dual Rank x16	AddrCmdSetup	21	1b
	AddrCmdFineDelay	20:16	05h
	CsOdtSetup	13	1b
	CsOdtFineDelay	12:8	05h
Dual Rank x8	AddrCmdSetup	21	0b
	AddrCmdFineDelay	20:16	00h
	CsOdtSetup	13	1b
	CsOdtFineDelay	12:8	05h

Fix Planned

Yes

246 Breakpoint Due to An Instruction That Has an Interrupt Shadow May Be Delivered to the Hypervisor

Description

A #DB exception occurring in guest mode may be delivered in the host context under the following conditions:

- A trap-type #DB exception is generated in guest mode during execution of an instruction with an interrupt shadow, and
- The instruction that generated the exception is immediately followed by an instruction resulting in #VMEXIT.

Potential Effect on System

Unpredictable results due to an unexpected #DB exception.

Suggested Workaround

The hypervisor should have a valid interrupt gate in the IDT of the #DB handler entry and the handler must be able to determine that this event has occurred. If the event is detected, the handler should execute an IRET back to the hypervisor; one method that could be used to evaluate for this condition is to compare the RIP pushed on the stack to the RIP of the instruction following VMRUN, if they are equivalent then this event has occurred.

Fix Planned

No

249 DRAM Controller Violates Self-Refresh Exit Requirements At DDR2-667 Or DDR2-800 Memory Speeds

Description

When exiting self-refresh after certain P-state transitions with a memory clock frequency setting of 333 MHz (DDR2-667) or 400 MHz (DDR2-800) the CS, ODT, address, and command DRAM controller pins may fail to transition to the driven state prior to CKE assertion.

Potential Effect on System

None expected. No functional failures have been observed due to this issue.

Suggested Workaround

None required.

Fix Planned

Yes

254 Internal Resource Livelock Involving Cached TLB Reload

Description

Under a highly specific and detailed set of conditions, an internal resource livelock may occur between a TLB reload and other cached operations.

Potential Effect on System

The system may hang.

Suggested Workaround

BIOS should apply the workaround based on the extended model, base model, and stepping reported by CPUID Fn8000_0001 as described in the following table:

CPUID Fn8000_0001_EAX	HWCR[3] (MSRC001_0015)	BU_CFG[1] (MSRC001_1023)	BU_CFG[21] (MSRC001_1023)
00060FC1h	1b	1b	0b
00060FF1h	1b	1b	0b
00070FC1h	1b	1b	0b
00070FF1h	1b	1b	0b
00060FC2h	0b	0b	1b
00060FF2h	0b	0b	1b
00070FC2h	0b	0b	1b
00070FF2h	0b	0b	1b
00060F82h	0b	0b	1b
00060FB2h	0b	0b	1b

None required for dual-core stepping 1h processors. For system developers that wish to provide a workaround for dual-core stepping 1h processors, BIOS should apply the workaround based on the extended model, base model, and stepping reported by CPUID Fn8000_0001 as described in the following table:

CPUID Fn8000_0001_EAX	HWCR[3] (MSRC001_0015)	BU_CFG[1] (MSRC001_1023)	BU_CFG[21] (MSRC001_1023)
00060F81h	1b	1b	0b
00060FB1h	1b	1b	0b

Fix Planned

No

270 DRAM Controller Violates tXSNR Requirement When Exiting The S3 State

Description

The DRAM controller may begin issuing refresh commands when exiting the S3 state that violate the tXSNR DDR2 specification requirement.

Potential Effect on System

A refresh command may collide with an auto-refresh cycle resulting in unpredictable system behavior.

Suggested Workaround

The BIOS should perform the following steps in the given order when exiting from S3 (Suspend to RAM) state.

1. Restore memory controller registers as normal.
2. Set the DisAutoRefresh bit (Dev:2x8C[18]).
3. Set the EnDramInit bit (Dev:2x7C[31]), clear all other bits in the same register.
4. Wait at least 750 µs.
5. Clear the EnDramInit bit.
6. Clear the DisAutoRefresh bit.
7. Read the value of Dev:2x80 and write that value back to Dev:2x80.
8. Set the exit from the self-refresh bit (Dev:2x90[1]).
9. Clear the exit from self-refresh bit immediately.

Note: *Steps 8 and 9 must be executed in a single 64-byte aligned uninterrupted instruction stream.*

The workaround for this erratum supersedes the workaround for erratum #125. When implementing this workaround, the workaround for erratum #125 should not be applied.

Fix Planned

No

275 HyperTransport™ Link May Fail at 600 MHz

Description

The HyperTransport™ link may fail at a frequency of 600 MHz due to attenuation of the output clock signals (L0_CLKOUT_H/L[1:0]). All other supported HyperTransport™ link frequencies are unaffected.

Potential Effect on System

The system may hang.

Suggested Workaround

BIOS should not use a 600 MHz HyperTransport™ link frequency.

Fix Planned

No

284 Incorrect DQS Receiver Enable Delay Behavior

Description

The processor may ignore initial read data DQS assertions for certain sequences of DRAM read instructions on memory channels with more than one DIMM populated.

Potential Effect on System

DRAM read data corruption or system hang.

Suggested Workaround

Contact your AMD representative for information on a BIOS update.

Fix Planned

No

292 Processor May Not Function in Alternate VID

Description

The processor may function improperly when the alternate VID (AltVID) code is applied.

Potential Effect on System

Unpredictable system behavior.

Suggested Workaround

BIOS must clear AltVidEn in the Power Management Control Low Register [PMM1[AltVidEn]] (F3x80[11] = 0b) and [PMM3[AltVidEn]] (F3x80[27] = 0b).

Fix Planned

No

297 Single Machine Check Error May Report Overflow

Description

A single tag snoop parity error encountered in the instruction cache tag array may incorrectly report the detection of multiple errors, as indicated by the overflow bit of the IC Machine Check Status register (MSR0000_0405[62]).

Potential Effect on System

System software may be informed of a machine check overflow when only a single error was actually encountered.

Suggested Workaround

None required.

Fix Planned

No

312 CVTSD2SS and CVTPD2PS Instructions May Not Round to Zero

Description

The Convert Scalar Double-Precision Floating-Point to Scalar Single-Precision Floating-Point (CVTSD2SS) and Convert Packed Double-Precision Floating-Point to Packed Single-Precision Floating-Point (CVTPD2PS) instructions do not round to zero when the Flush to Zero and Underflow Mask bits (MXCSR bits 15 and 11) are set to 1b and the double-precision operand is less than the smallest single-precision normal number.

Potential Effect on System

The conversion result will yield the smallest single-precision normalized number rather than zero. It is not expected that this will result in any anomalous software behavior since enabling flush to zero provides less precise results.

Suggested Workaround

None.

Fix Planned

No

325 DRAM Read Failure During S3 Resume

Description

The initial reads to DRAM may fail during a resume from the S3 state when only one DIMM is populated on a channel, and the DIMM is using processor chip selects CS2/3.

Potential Effect on System

The first several reads to the DRAM channel may return invalid data resulting in unpredictable system behavior.

Suggested Workaround

Contact your AMD representative for information on a BIOS update.

Fix Planned

No

339 APIC Timer Rollover May Be Delayed

Description

The APIC timer does not immediately rollover when it transitions to zero and Timer Local Vector Table Entry[Mode] (APIC_BASE + offset 320h[17]) is configured to run in periodic mode. In addition, when Timer Local Vector Table Entry[Mask] (APIC_BASE + offset 320h[16]) is configured to generate an interrupt, the interrupt is also delayed whether configured for periodic or one-shot mode.

The per rollover error that may be observed is approximately 5 ns.

Potential Effect on System

None expected. The standard use of the APIC timer and the level of accuracy required does not make the error significant.

Suggested Workaround

None required.

Fix Planned

No

340 AtcDllMaxPhases Not Supported On Some Processors

Description

The Address and Timing Control DLL Phases (AtcDllMaxPhases) (Function 2 Offset 9Ch, Index 04, bit 28) is not supported on some processors. The specific processors are identified by CPUID Fn0000_0001_EAX values of 00060FC2h and 00060FF2h.

Potential Effect on System

None.

Suggested Workaround

None required.

Fix Planned

No

342 SMIs That Are Not Intercepted May Disable Interrupts

Description

During a resume from SMM that is due to an unintercepted SMI from a SVM guest context, the processor core does not restore the correct effective interrupt flag (IF) if the guest VMCB V_INTR_MASKING bit (offset 060h bit 24) is 1b. Under these conditions, the effective interrupt flag may be zero.

SMIs are not intercepted if VMCB offset 00Ch bit 2 is 0b or HWCR[SmmLock] (MSRC001_0015[0]) is 1b.

Potential Effect on System

The guest context may run with interrupts disabled until the next guest intercept. The hypervisor may not be able to regain control and the system may hang.

Suggested Workaround

Contact your AMD representative for information on a BIOS update.

Fix Planned

No

352 SYSCALL Instruction May Execute Incorrectly Due to Breakpoint

Description

A SYSCALL instruction executes incorrectly and an incorrect debug exception is taken when all of the following conditions are satisfied:

- An enabled instruction breakpoint address matches the RIP of the SYSCALL instruction.
- The processor is in 64-bit mode or compatibility mode.
- The instruction would not generate any other exception.
- SYSCALL Flag Mask Register[16] (MSRC000_0084[16]) is set to 1b.
- rFLAGS.RF is set to 1b.

Potential Effect on System

None expected during normal operation. Kernel debuggers may observe unpredictable system behavior.

Suggested Workaround

Operating system software should clear SYSCALL Flag Mask Register[16] (MSRC000_0084[16]) to 0b during initialization.

Fix Planned

No

353 SYSRET Instruction May Execute Incorrectly Due to Breakpoint

Description

A SYSRET instruction executes incorrectly and an incorrect debug exception is taken when all of the following conditions are satisfied:

- An enabled instruction breakpoint address matches the RIP of the SYSRET instruction.
- The processor is in 64-bit mode or compatibility mode.
- The instruction would not generate any other exception.
- R11[16] is cleared to 0b.
- rFLAGS.RF is set to 1b.

Potential Effect on System

None expected during normal operation. Kernel debuggers may observe unpredictable system behavior.

Suggested Workaround

Software should set R11[16] to 1b before executing the SYSRET instruction in 64-bit mode.

Fix Planned

No

393 Performance Monitor May Count Fastpath Double Operation Instructions Incorrectly

Description

The processor does not report the correct count for all fastpath double operation instructions when Performance Event Select Register (PERF_CTL[3:0]) MSRC001_000[3:0][EventSelect] is 0CCh. This erratum applies to all unit mask settings for this event.

Potential Effect on System

Performance monitoring software will not have an accurate count of fastpath double operation instructions.

Suggested Workaround

None.

Fix Planned

No

400 APIC Timer Interrupt Does Not Occur in Processor C-States

Description

An APIC timer interrupt that becomes pending in low-power states C1E, C2 or C3 will not cause the processor to enter the C0 state even if the interrupt is enabled by Timer Local Vector Table Entry[Mask], APIC_BASE + 320h[16]). APIC timer functionality is otherwise unaffected.

Potential Effect on System

System hang may occur provided that the operating system has not configured another interrupt source.

APIC timer interrupts may be delayed or, when the APIC timer is configured in rollover mode (APIC_BASE + 320h[17] = 1b), the APIC timer may roll over multiple times in the low-power state with only one interrupt presented after the processor resumes. The standard use of the APIC timer does not make this effect significant.

Suggested Workaround

Operating system software should enable another source of timer interrupts, such as the High Precision Event Timer, before it enters the C1 state by executing the HLT instruction and C1E is enabled using Interrupt Pending and CMP-Halt Register[C1eOnCmpHalt or SmiOnCmpHalt] (MSRC001_0055[28:27] are not 00b). For purposes of determining if C1E is enabled, the operating system should not sample MSRC001_0055 until after ACPI has been enabled.

Operating system software should enable another source of timer interrupts, such as the High Precision Event Timer, when the processor enters the C2 or the C3 state.

Fix Planned

No

415 HLT Instructions That Are Not Intercepted May Cause System Hang

Description

In guest mode when VMCB.V_INTR_MASK flag is 1b, the processor may not process host interrupts if a guest executes a HLT instruction that is not intercepted.

Potential Effect on System

System hang.

Suggested Workaround

Hypervisors should intercept HLT instructions by setting VMCB.Intercept_HLT (offset 00Ch bit 24) to 1b.

Fix Planned

No

573 Processor May Incorrectly Update Instruction Pointer After FSINCOS Instruction

Description

After execution of an FSINCOS instruction, the processor core may incorrectly update the instruction pointer (rIP) and execute incorrect instructions or may hang.

Potential Effect on System

Unpredictable system behavior after execution of an FSINCOS instruction.

Suggested Workaround

None.

Fix Planned

No

670 Segment Load May Cause System Hang or Fault After State Change

Description

Under a highly specific and detailed set of conditions, a segment load instruction may cause a failure in one of the following instructions later in the instruction stream:

- BTC mem, imm8
- BTC mem, reg
- BTR mem, imm8
- BTR mem, reg
- BTS mem, imm8
- BTS mem, reg
- RCL mem, cl
- RCL mem, imm
- RCR mem, cl
- RCR mem, imm
- SHLD mem, reg, imm
- SHLD mem, reg, cl
- SHRD mem, reg, imm
- SHRD mem, reg, cl
- XCHG mem, reg (uses an implicit LOCK prefix)
- XCHG reg, mem (uses an implicit LOCK prefix)
- Any instruction with an explicit LOCK prefix in the instruction opcode.

Potential Effect on System

The processor may present a #PF exception after some of the instruction effects have been applied to the processor state. No system effect is observed unless the operating system's page fault handler has some dependency on this interim processor state, which is not the case in any known operating system software. The interim state does not impact program behavior if the operating system resolves the #PF and resumes the instruction. However, this interim state may be observed by a debugger or if the operating system changes the #PF to a program error (for example, a segmentation fault).

Suggested Workaround†

System software should set MSRC001_1020[8] = 1b.

†This workaround ensures that instructions with an implicit or explicit LOCK prefix do not cause a system hang due to this erratum. However, instructions may still present a #PF after altering architectural state.

Fix Planned

No

700 LAR and LSL Instructions Do Not Check Invalid Long Mode Descriptor Types

Description

The architecture specifies that the processor checks for invalid descriptor types when a Load Access Rights Byte (LAR) instruction or a Load Segment Limit (LSL) instruction is executed in long mode. An invalid descriptor type should cause the processor to clear the zero flag (ZF) and complete the instruction without modifying the destination register. However, the processor does not perform this check and loads the attribute (LAR) or segment limit (LSL) as if the descriptor type was valid.

The invalid descriptor types for LAR are 1 (available 16-bit TSS), 3 (busy 16-bit TSS), 4 (16-bit call gate) or 5 (task gate). The invalid descriptor types for a LSL instruction are types 1 (available 16-bit TSS) or 3 (busy 16-bit TSS).

Potential Effect on System

None expected, since the operating system code would typically only provide legal descriptors. However, in the case of erroneous software, the above described check would not be performed, resulting in unpredictable system failure. AMD has not observed this erratum with any commercially-available software.

Suggested Workaround

None required, it is anticipated that long mode operating system code ensures that the descriptor type is legal when executing LAR and LSL instructions.

Fix Planned

No

701 Task Switch Intercept Does Not Store VMEXIT EXITINTINFO

Description

During an SVM intercept for a task switch intercept, the processor does not store EXITINTINFO (VMCB offset 0x088) if the guest was attempting to deliver an interrupt or exception through the IDT.

Potential Effect on System

The hypervisor may incorrectly determine the cause of a guest's task switch, resulting in incorrect SVM virtual machine behavior.

Suggested Workaround

None.

Fix Planned

No

Documentation Support

The following documents provide additional information regarding the operation of the processor:

- *BIOS and Kernel Developer's Guide for AMD NPT Family 0Fh Processors,* order# 32559
- *AMD64 Architecture Programmer's Manual Volume 1: Application Programming*, order# 24592
- *AMD64 Architecture Programmer's Manual Volume 2: System Programming*, order# 24593
- *AMD64 Architecture Programmer's Manual Volume 3: General-Purpose and System Instructions,* order# 24594
- *AMD64 Architecture Programmer's Manual Volume 4: 128-Bit and 256-Bit Media Instructions,* order# 26568
- *AMD64 Architecture Programmer's Manual Volume 5: 64-Bit Media and x87 Floating-Point Instructions,* order# 26569
- *AMD CPUID Specification*, order# 25481
- *HyperTransport™ I/O Link Specification* (www.hypertransport.org)

See the AMD Web site at *www.amd.com* for the latest updates to documents.