

MPC7447A Hardware Specification Addendum for the MC7447AxxnnnnNx Series

This document describes part-number-specific changes to recommended operating conditions and revised electrical specifications, as applicable, from those described in the general *MPC7447A RISC Microprocessor Hardware Specifications*. The MPC7447A is a PowerPC™ microprocessor.

Specifications provided in this document supersede those in the *MPC7447A RISC Microprocessor Hardware Specifications*, Rev. 3 or later, for the part numbers listed in [Table 1](#) only. Specifications not addressed herein are unchanged.

Note that headings and table numbers in this document are not consecutively numbered. They are intended to correspond to the heading or table affected in the general hardware specification.

Part numbers addressed in this document are listed in [Table 1](#).

Freescale Part Numbers Affected:

MC7447AHX600NB
MC7447AHX733NB
MC7447AHX867NB
MC7447AHX1000NB
MC7447AHX1167NB
MC7447AVS600NB
MC7447AVS733NB
MC7447AVS867NB
MC7447AVS1000NB
MC7447AVS1167NB
MC7447AVU600NB
MC7447AVU733NB
MC7447AVU867NB
MC7447AVU1000NB
MC7447AVU1167NB

Table 1. Part Numbers Addressed by this Data Sheet

Freescale Part Number	Operating Conditions			Significant Differences from Hardware Specification
	CPU Frequency (MHz)	V _{DD}	T _j (°C)	
MC7447AHX600NB	600	1.1 V ± 50 mV	0 to 105	Modified core frequency and voltage to reduce power consumption.
MC7447AHX733NB	733			
MC7447AHX867NB	867			
MC7447AHX1000NB	1000			
MC7447AHX1167NB	1167			
MC7447AVS600NB	600			
MC7447AVS733NB	733			
MC7447AVS867NB	867			
MC7447AVS1000NB	1000			
MC7447AVS1167NB	1167			
MC7447AVU600NB	600			
MC7447AVU733NB	733			
MC7447AVU867NB	867			
MC7447AVU1000NB	1000			
MC7447AVU1167NB	1167			

1 General Parameters

Core power supply 1.1 V ± 50 mV DC (nominal), or
1.0 V ± 50 mV DC (derated)

1.1 DC Electrical Characteristics

Table 2 provides the recommended operating conditions for the MPC7447A part numbers described herein.

NOTE

Table 2 describes the nominal operating conditions of the device. For information regarding the operation of the device at supported derated core voltage conditions, see Section 1.3, “Voltage and Frequency Derating.”

Table 2. Recommended Operating Conditions ¹

Characteristic	Symbol	Recommended Value	Unit	Notes
Core supply voltage	V _{DD}	1.1 V ± 50 mV	V	3
PLL supply voltage	AV _{DD}	1.1 V ± 50 mV	V	2, 3

Note:

1. These are the recommended and tested operating conditions. In addition, these devices also support voltage derating; see [Section 1.3, “Voltage and Frequency Derating.”](#) Proper device operation outside of these conditions and those specified in [Section 1.3](#) is not guaranteed.
2. This voltage is the input to the filter discussed in *MPC7447A RISC Microprocessor Hardware Specifications*, Section 9.2, “PLL Power Supply Filtering,” and not necessarily the voltage at the AV_{DD} pin, which may be reduced from V_{DD} by the filter.
3. V_{DD} and AV_{DD} may be reduced in order to reduce power consumption if further maximum core frequency constraints are observed. See [Section 1.3, “Voltage and Frequency Derating,”](#) for specific information.

[Table 3](#) provides the power consumption for the MPC7447A part numbers described herein. For information regarding power consumption when dynamic frequency switching (DFS) is enabled, see the *MPC7447A RISC Microprocessor Hardware Specifications*.

NOTE

The power consumption information in this table applies when the device is operated at the nominal core voltage indicated in [Table 2](#). For power consumption at derated core voltage conditions, see [Section 1.3, “Voltage and Frequency Derating.”](#)

Table 3. Power Consumption for MPC7447A

	Processor (CPU) Frequency					Unit	Notes
	600 MHz	733 MHz	867 MHz	1000 MHz	1167 MHz		
Full-Power Mode							
Typical	6.0	6.8	7.8	8.0	9.2	W	1, 2
Maximum	8.2	9.5	10.3	11.5	13.0	W	1, 3
Nap Mode							
Typical	1.3	1.3	1.3	1.3	1.3	W	1, 2
Sleep Mode							
Typical	1.3	1.3	1.3	1.3	1.3	W	1, 2

Table 3. Power Consumption for MPC7447A (continued)

	Processor (CPU) Frequency					Unit	Notes
	600 MHz	733 MHz	867 MHz	1000 MHz	1167 MHz		
Deep Sleep Mode (PLL Disabled)							
Typical	1.2	1.2	1.2	1.2	1.2	W	1, 2

Notes:

1. These values apply for all valid processor buses. The values do not include I/O supply power (OV_{DD}) or PLL supply power (AV_{DD}). OV_{DD} power is system dependent but is typically $< 5\%$ of V_{DD} power. Worst case power consumption for $AV_{DD} < 3$ mW.
2. Typical power is an average value measured at the nominal recommended V_{DD} (see [Table 2](#)) and $65^{\circ}C$ while running the Dhrystone 2.1 benchmark and achieving 2.3 Dhrystone MIPs/MHz.
3. Maximum power is the average measured at nominal V_{DD} and maximum operating junction temperature (see [Table 2](#)) while running an entirely cache-resident, contrived sequence of instructions which keep all the execution units maximally busy.
4. Doze mode is not a user-definable state; it is an intermediate state between full-power and either nap or sleep mode. As a result, power consumption for this mode is not tested.

1.2 AC Electrical Characteristics

[Table 4](#) provides the clock AC timing specifications for the MPC7447A part numbers described herein.

NOTE

The core frequency information in this table applies when the device is operated at the nominal core voltage indicated in [Table 2](#). For core frequency specifications at derated core voltage conditions, see [Section 1.3](#), “Voltage and Frequency Derating.”

Table 4. Clock AC Timing Specifications

At recommended operating conditions. See [Table 2](#).

Characteristic	Symbol	Maximum Processor Core Frequency										Unit	Notes
		600 MHz		733 MHz		867 MHz		1000 MHz		1167 MHz			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Processor frequency	f_{core}	500	600	500	733	500	867	500	1000	500	1167	MHz	1, 2, 3
VCO frequency	f_{VCO}	1000	1200	1000	1466	1000	1733	1000	2000	1000	2333	MHz	1, 3

Notes:

1. **Caution:** The SYSCLK frequency and PLL_CFG[0:4] settings must be chosen such that the resulting SYSCLK (bus) frequency, CPU (core) frequency, and PLL (VCO) frequency do not exceed their respective maximum or minimum operating frequencies. Refer to the PLL_CFG[0:4] signal description in *MPC7447A RISC Microprocessor Hardware Specifications*, Section 9.1, “PLL Configuration,” for valid PLL_CFG[0:4] settings.
2. **Caution:** If dynamic frequency switching (DFS) is enabled, the SYSCLK frequency and PLL_CFG[0:4] settings must be chosen such that the resulting processor frequency is greater than or equal to the minimum core frequency.
3. **Caution:** These values specify the maximum processor core and VCO frequencies when the device is operated at the nominal core voltage. If operating the device at the derated core voltage, the processor core and VCO frequencies must be reduced. See [Section 1.3](#), “Voltage and Frequency Derating,” for more information.

1.2.1 Processor Bus AC Specifications

Devices described by this hardware specification addendum conform to the processor bus AC timing specifications provided in the *MPC7447A RISC Microprocessor Hardware Specifications*. Please refer to that document for this information.

1.3 Voltage and Frequency Derating

To reduce the power consumption of the device, these devices support voltage and frequency derating whereby the core voltage (V_{DD}) may be reduced if the reduced maximum processor core frequency requirements are observed. The supported derated core voltage, resulting maximum processor core frequency (f_{core}), and power consumption are provided in [Table 5](#). Only those parameters in [Table 5](#) are affected; all other parameter specifications are unaffected.

Table 5. Supported Voltage, Core Frequency, and Power Consumption Derating

Maximum Rated Core Frequency (Device Marking)	Supported Derated Core Voltage (V_{DD})	Maximum Derated Core Frequency (f_{core})	Full-Power Mode Power Consumption	
			Maximum	Typical
600	1.0 V \pm 50mV	533	5.9 W	4.2 W
733		533	5.9 W	4.2 W
867		667	6.9 W	4.9 W
1000		800	8.0 W	5.6 W
1167		1000	9.4 W	6.6 W

2 Ordering Information

2.1 Part Numbers Addressed by This Specification

[Table 6](#) provides the ordering information for the MPC7447A parts described in this document.

Table 6. Part Marking Nomenclature

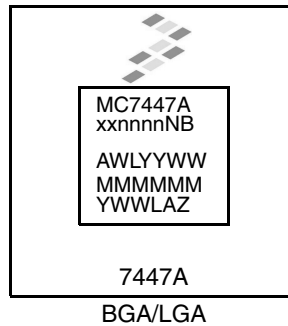
MC	7447A	xx	nnnn	N	x
Product Code	Part Identifier	Package	Processor Frequency ¹	Application Modifier	Revision Level
MC	7447A	HX = HCTE BGA VS = RoHS LGA VU = RoHS BGA	600 733 867 1000 1167	N: 1.1 V \pm 50 mV 0 to 105°C	B:1.1:PVR = 8003 0101

Notes:

1. Processor core frequencies supported by parts addressed by this specification only. Parts addressed by other specifications may support other maximum core frequencies.

2.2 Part Marking

Parts are marked as the example shown in [Figure 1](#).



Notes:

AWLYYWW is the test code.

MMMMMM is the M00 (mask) number.

YWWLAZ is the assembly traceability code.

Figure 1. Part Marking for BGA Device

3 Document Revision History

[Table 7](#) provides a revision history for this part number specification.

Table 7. . Document Revision History

Rev. No.	Date	Substantive Change(s)
3	09/23/05	Added RoHS BGA parts: <ul style="list-style-type: none"> • MC7447AVU600NB • MC7447AVU733NB • MC7447AVU867NB • MC7447AVU1000NB • MC7447AVU1167NB
2	01/24/05	Added LGA parts: <ul style="list-style-type: none"> • MC7447AVS600NB • MC7447AVS733NB • MC7447AVS867NB • MC7447AVS1000NB • MC7447AVS1167NB
1	09/20/04	Changed title wording from 'Part Number Specification' to 'Hardware Specification Addendum'; adopted new Document ID numbering scheme.
	09/09/04	Added information on derating.
	08/27/04	Added 600-, 733- and 867-MHz speed bins.
0		Initial release.

THIS PAGE INTENTIONALLY LEFT BLANK

How to Reach Us:

USA/Europe/Locations Not Listed:

Freescale Semiconductor
Literature Distribution Center
P.O. Box 5405,
Denver, Colorado 80217
1-480-768-2130
(800) 521-6274

Japan:

Freescale Semiconductor Japan Ltd.
Technical Information Center
3-20-1, Minami-Azabu, Minato-ku
Tokyo 106-8573, Japan
81-3-3440-3569

Asia/Pacific:

Freescale Semiconductor Hong Kong Ltd.
2 Dai King Street
Tai Po Industrial Estate
Tai Po, N.T. Hong Kong
852-26668334

Home Page:

www.freescale.com

Information in this document is provided solely to enable system and software implementers to use Freescale Semiconductor products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

Freescale Semiconductor reserves the right to make changes without further notice to any products herein. Freescale Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Freescale Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Freescale Semiconductor does not convey any license under its patent rights nor the rights of others. Freescale Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale Semiconductor was negligent regarding the design or manufacture of the part.

Learn More: For more information about Freescale Semiconductor products, please visit www.freescale.com

Freescale™ and the Freescale logo are trademarks of Freescale Semiconductor, Inc. The described product is a PowerPC microprocessor. The PowerPC name is a trademark of IBM Corp. and used under license. All other product or service names are the property of their respective owners.

© Freescale Semiconductor, Inc. 2005.

MPC7447AECS01AD
Rev. 3
09/2005

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Microprocessors - MPU category](#):

Click to view products by [NXP manufacturer](#):

Other Similar products are found below :

[MC7457RX1000LC](#) [MC7457RX1267LC](#) [A2C00010998 A](#) [A2C52004004](#) [R5F117BCGNA#20](#) [ADJ3400IAA5DOE](#) [MPC8245TZU300D](#)
[MPC8260ACVVMHBB](#) [MPC8323ECVRAFDCA](#) [MPC8536ECVJAVLA](#) [BOXNUC5PGYH0AJ](#) [20-668-0024](#) [P1010NSN5DFB](#)
[P2020NXE2HHC](#) [P5020NSE7VNB](#) [LS1020ASN7KQB](#) [LS1020AXN7HNB](#) [LS1020AXN7KQB](#) [A2C00010729 A](#) [A2C00039344](#)
[T1022NSE7MQB](#) [T1022NXN7PQB](#) [T1023NSE7MQA](#) [T1024NXE7PQA](#) [T1042NSN7MQB](#) [T1042NXN7WQB](#) [T2080NSN8PTB](#)
[T2080NXE8TTB](#) [T2081NXN8TTB](#) [MC68302CEH20C](#) [TS68040MF33A](#) [MPC8260ACVVMIBB](#) [MPC8280CZUUPEA](#)
[MPC8313ECVRAGDC](#) [MPC8313EVRADDC](#) [MPC8313VRADDC](#) [MPC8323EVRAFDCA](#) [BOXSTCK1A8LFCL](#) [UPD78F0503AMCA-](#)
[CAB-G](#) [UPD78F0513AGA-8EU-AT](#) [Z8018008VEG](#) [LS1020ASE7HNB](#) [LS1021ASE7KQB](#) [LS1021ASN7KQB](#) [MPC8358ECVRAGDGA](#)
[MPC8544CVJALFA](#) [MPC855TZQ80D4](#) [MPC8569VJAUNLB](#) [P1013NSN2EFB](#) [P5020NXE7TNB](#)