

Advance Information

MPC7451RXPNS/D
Rev. 2, 9/2002

MPC7451 Part Number
Specification for the
XPC7451RXnnnRx and
XC7451ARXnnnRx Series



*Motorola Part
Numbers Affected:*

XPC7451RX700RE
XPC7451RX800RE
XC7451ARX700RE
XC7451ARX800RE

This document describes part-number-specific changes to recommended operating conditions and revised electrical specifications, as applicable, from those described in the general *MPC7451 RISC Microprocessor Hardware Specifications* (Order No. MPC7451EC/D).

Specifications provided in this document supersede those in the *MPC7451 RISC Microprocessor Hardware Specifications*, Rev. 4 or later, for the part numbers listed in A only. Specifications not addressed herein are unchanged. Because this document is frequently updated, refer to <http://www.motorola.com/semiconductors> or to your Motorola sales office for the latest version.

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 A. For more detailed ordering information see Section 1.11, "Ordering Information."

Table A. Part Numbers Addressed by this Data Sheet

Motorola Part Number	Operating Conditions			Significant Differences from Hardware Specification
	CPU Frequency (MHz)	V _{DD}	T _J (°C)	
XPC7451RX700RE	700	1.65 V ±50 mV	0 to 85	Modified core voltage and temperature specifications
XC7451ARX700RE				
XPC7451RX800RE	800			
XC7451ARX800RE				

Note: The X prefix in a Motorola part number designates a "Pilot Production Prototype" as defined by Motorola SOP 3-13. These are from a limited production volume of prototypes manufactured, tested, and Q.A. inspected on a qualified technology to simulate normal production. These parts have only preliminary reliability and characterization data. Before pilot production prototypes may be shipped, written authorization from the customer must be on file in the applicable sales office acknowledging the qualification status and the fact that product changes may still occur while shipping pilot production prototypes.

1.1 Features

This section summarizes changes to the features of the MPC7451 described in the *MPC7451 RISC Microprocessor Hardware Specifications*.

- Power management
 - 1.65-V processor core

1.4 General Parameters

This section summarizes changes to the general parameters of the MPC7451 described in the *MPC7451 RISC Microprocessor Hardware Specifications*.

- Core power supply: 1.65 V \pm 50 mV DC nominal

1.5.1 DC Electrical Characteristics

Table 4 provides the recommended operating conditions for the MPC7451 part numbers described herein.

Table 4. Recommended Operating Conditions

Characteristic	Symbol	Recommended Value	Unit
Core supply voltage	V_{DD}	1.65 V \pm 50 mV	V
PLL supply voltage	AV_{DD}	1.65 V \pm 50 mV	V
Die-junction temperature	T_j	0 to 85	$^{\circ}$ C

Note: These are the recommended and tested operating conditions. Proper device operation outside of these conditions is not guaranteed.

Table 7 provides the power consumption for the MPC7451 part numbers described herein.

Table 7. Power Consumption for MPC7451

	Processor (CPU) Frequency		Unit	Notes
	700 MHz	800 MHz		
Full-Power Mode				
Typical	15.2	16.5	W	1, 3
Maximum	22.0	22.0	W	1, 2
Doze Mode				
Typical	—	—	W	1, 3, 4
Nap Mode				
Typical	2.0	2.2	W	1, 3
Sleep Mode				
Typical	1.9	2.1	W	1, 3
Deep Sleep Mode (PLL Disabled)				
Typical	1.8	2.0	W	1, 3

Notes:

1. These values apply for all valid processor bus and L3 bus ratios. The values do not include I/O supply power (OV_{DD} and GV_{DD}) or PLL supply power (AV_{DD}). OV_{DD} and GV_{DD} power is system dependent, but is typically <20% of V_{DD} power. Worst case power consumption for $AV_{DD} < 3$ mW.
2. Maximum power is measured at nominal V_{DD} (see Table 4) while running an entirely cache-resident, contrived sequence of instructions which keep the execution units, with or without AltiVec, maximally busy.
3. Typical power is an average value measured at the nominal recommended V_{DD} (see Table 4) in a system while running a typical code sequence.
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.

1.5.2.1 Clock AC Specifications

Table 8 provides the clock AC timing specifications for the MPC7451 part numbers described herein.

Table 8. Clock AC Timing Specifications

At recommended operating conditions. See Table 4.

Characteristic	Symbol	Maximum Processor Core Frequency				Unit	Notes
		700 MHz		800 MHz			
		Min	Max	Min	Max		
Processor frequency	f_{core}	500	700	500	800	MHz	1
VCO frequency	f_{VCO}	1000	1400	1000	1600	MHz	1

Notes:

1. **Caution:** The SYSCLK frequency, PLL_EXT and PLL_CFG[0:3] 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_EXT, PLL_CFG[0:3] signal description in Section 1.9.1, "PLL Configuration," for valid PLL_EXT and PLL_CFG[0:3] settings

1.11 Ordering Information

1.11.1 Part Numbers Addressed by this Specification

Table 20 provides the ordering information for the MPC7455 part described in this document.

Table 20. Part Marking Nomenclature

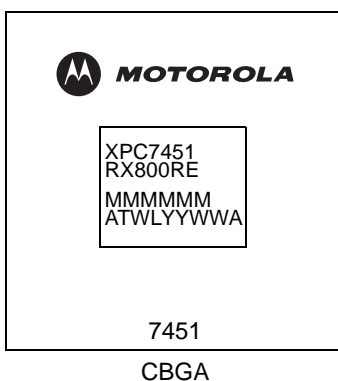
xxx	7451	x	RX	nnn	x	x
Product Code	Part Identifier	Process Descriptor	Package	Processor Frequency ¹	Application Modifier	Revision Level
XPC ²	7451	—	RX = CBGA	700	R: 1.65 V ±50 mV 0 to 85°C	E: 2.1; PVR = 8000 0201
XC ²		A		800		

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. The X prefix in a Motorola PowerPC part number designates a “Pilot Production Prototype” as defined by Motorola SOP 3-13. These are from a limited production volume of prototypes manufactured, tested, and Q.A. inspected on a qualified technology to simulate normal production. These parts have only preliminary reliability and characterization data. Before pilot production prototypes may be shipped, written authorization from the customer must be on file in the applicable sales office acknowledging the qualification status and the fact that product changes may still occur while shipping pilot production prototypes.

1.11.3 Part Marking

Parts are marked as the example shown in Figure 27.



Notes:

- MMMMMM is the 6-digit mask number.
- ATWLYYWWA is the traceability code.
- CCCCC is the country of assembly. This space is left blank if parts are assembled in the United States.

Figure 27. Motorola Part Marking for CBGA Device

Document Revision History

Table B provides a revision history for this part number specification.

Table B. Document Revision History

Rev. No.	Substantive Change(s)
0	Initial release.
1	Updated document template.
	Changed “Full-on Mode” to “Full-Power Mode” and “Sleep—PLL disabled” to “Deep Sleep Mode” in Table 7 to be consistent with User’s Manual.
	Removed specification for Doze mode power since this is not tested (see Table 7, Note 4).
	Removed Deep Sleep Mode-Max power specification since this is not tested.
	Added 700 MHz frequency bin to specification.
	Added Table 8 entries to this specification that differ from hardware specifications.
	Added this table.
2	Added XC7451ARX <i>nnn</i> Rx series part numbers.
	Table 8—Changed 733 MHz to 700 MHz heading.

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