MPC750 PNS 980114

Motorola Part Numbers Affected:
XPC750ARX200LE
XPC750ARX233LE
XPC750ARX250LE
XPC750ARX266LE
XPC750ARX275LE
XPC750ARX300LE

PowerPC™

Application-Specific Information

MPC750 (Arthur) Part Number Specifications

This document defines a unique part number for an MPC750 microprocessor manufactured by Motorola. It describes changes to recommended operating conditions and revised electrical specifications, as applicable, from those described in the *MPC750 Hardware Specifications*. Any functional differences (errata) for these parts from the functional description provided in the *MPC750 RISC Microprocessor User's Manual* (order # MPC750UM/AD) are described in a separate Errata List available from your local Motorola sales office.

Specifications provided in this data sheet supersede those in of the *MPC750 Hardware Specifications* dated 8/97 (order #: MPC750EC/D); specifications not addressed herein are unchanged. This document is frequently updated, refer to the website at http://www.mot.com/SPS/PowerPC/ for the latest version.

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

Part numbers addressed in this document are listed in Table A. For more detailed ordering information see Table 14.

Table A. Part Numbers Addressed by this Data Sheet

Motorola Part Number	Operating Conditions			Significant Differences from Hardware Specification
	CPU Frequency	Vdd	T_J (°C)	
XPC750ARX200LE	200 MHz	2.5 to 2.7 V	0 to 105	Full Spec
XPC750ARX233LE	233 MHz	2.5 to 2.7 V	0 to 105	Full Spec
XPC750ARX250LE	250 MHz	2.5 to 2.7 V	0 to 105	Not described in MPC750 Hardware Specification
XPC750ARX266LE	266 MHz	2.5 to 2.7 V	0 to 105	Full Spec
XPC750ARX275LE	275 MHz	2.5 to 2.7 V	0 to 105	Not described in MPC750 Hardware Specification
XPC750ARX300LE	300 MHz	2.5 to 2.7 V	0 to 105	Not described in MPC750 Hardware Specification

Note: 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

1.2 General

This section summarizes changes to the features of the MPC750's implementation of the PowerPC architecture described in the *MPC750 Hardware Specifications*.

- An electrical noise sensitivity during random opcode testing in the factory on some XPC750ARX266LE and fewer XPC750ARX233LE parts has been observed to cause erroneous data to be stored from the floating point register file. The cause is high activity on the floating point register file, such as caused by repeated floating-point register stores followed by multiple floating point instructions. Extensive application software qualification and compatibility testing has not encountered any floating point data related problems. In the random opcode testing, reordering of the instructions or intermingling of non-folding, non-floating point instructions eliminated the erroneous store. If failures of this type are observed, contact your local Motorola sales office.

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1.4.1 DC Electrical Characteristics

Table 2 describes the DC operating conditions for the MPC750 part numbers described herein.

Table 2. Recommended Operating Conditions

Characteristic	Symbol	Value	Unit	Notes
Core supply voltage	Vdd	2.5 to 2.7	V	
PLL supply voltage	AVdd	2.5 to 2.7	V	
L2 DLL supply voltage	L2AVdd	2.5 to 2.7	V	
60x bus supply voltage	OVdd	3.135 to 3.465	V	
L2 bus supply voltage	L2OVdd	3.135 to 3.465	V	
Input voltage	V_{in}	GND to OVdd	V	
Junction temperature	T_J	0 to105	°C	

Table 6 provides the power consumption for the MPC750.

Table 6. Power Consumption

Vdd = AVdd = L2AVdd = 2.6 Vdc ±100 mV, OVdd = L2OVdd = 3.3 ± 5% Vdc, GND = 0 Vdc, $0 \leq T_j < 105$ °C

	Processor (CPU) Frequency						Unit	Notes
	200 MHz	233 MHz	250 MHz	266 MHz	275 MHz	300 MHz		
Full-On Mode								
Typical	4.2	5.0	5.4	5.7	5.9	6.4	W	
Maximum	6.0	7.0	7.4	7.9	8.2	8.9	W	
Doze Mode								
Maximum	1.6	1.8	2.0	2.1	2.2	2.4	W	
Nap Mode								
Maximum	250	250	250	250	250	250	mW	
Sleep Mode								
Maximum	100	100	100	100	100	100	mW	
Sleep Mode—PLL and DLL Disabled								
Typical	30	30	30	30	30	30	mW	
Maximum	60	60	70	70	70	70	mW	

Notes (in addition to those in the Hardware Specification):
   None.

1.4.2 AC Electrical Characteristics

This section in the MPC750 Hardware Specification provides the AC electrical characteristics for the MPC750. After fabrication, parts are sorted by maximum processor core frequency as shown in Section 1.4.2.1, "Clock AC Specifications" and tested for conformance to the AC specifications for that frequency. The MPC750 Hardware Specifications is for 200, 233, and 266 MHz processor core frequencies. This Part Number Specification describes additional maximum core frequencies.

1.4.2.1 Clock AC Specifications

Table 7 provides the additional clock AC timing specifications described in this Part Number Specification. Refer to the MPC750 Hardware Specification for the remaining frequencies.

Table 7. Clock AC Timing Specifications

Vdd = AVdd = L2AVdd = 2.6 Vdc ±100 mV, OVdd = L2OVdd = 3.3 ± 5% Vdc, GND = 0 Vdc, $0 \leq T_j < 105$ °C

Num	Characteristic	250 MHz		275 MHz		300 MHz		Unit	Notes
		Min	Max	Min	Max	Min	Max		
	Processor frequency	150	250	150	275	150	300	MHz	

Table 7. Clock AC Timing Specifications (Continued)

Vdd = AVdd = L2AVdd = 2.6 Vdc ±100 mV, OVdd = L2OVdd = 3.3 ± 5% Vdc, GND = 0 Vdc, 0 ≤ T$_j$ < 105 °C

Num	Characteristic	250 MHz		275 MHz		300 MHz		Unit	Notes
		Min	Max	Min	Max	Min	Max		
	VCO frequency	300	500	300	550	300	600	MHz	
	SYSCLK frequency	25	83.3	25	83.3	25	83.3	MHz	1
1	SYSCLK cycle time	12	40	12	40	12	40	ns	
2, 3	SYSCLK rise and fall time	—	2	—	2	—	2	ns	2
4	SYSCLK duty cycle measured at 1.4V	40	60	40	60	40	60	%	3
	SYSCLK jitter	—	±150	—	±150	—	±150	ps	4
	Internal PLL relock time	—	100	—	100	—	100	µs	5

Notes (in addition to those in the Hardware Specification):
None.

1.4.2.2 60x Bus Input AC Specifications

Table 8 in the MPC750 Hardware Specification provides the 60x bus input AC timing specifications for 200, 233, and 266 MHz. The input AC specifications for the frequencies described in this Part Number Specification are identical to those in Table 8 of the MPC750 Hardware Specification.

1.4.2.3 60x Bus Output AC Specifications

Table 9 in the MPC750 Hardware Specification provides the 60x bus output AC timing specifications for 200, 233, and 266 MHz. The output AC specifications for the frequencies described in this Part Number Specification are identical to those in Table 9 of the MPC750 Hardware Specification.

1.9 Ordering Information

Table 14 provides the ordering information for the MPC750 part numbers described herein. Specifying a part number in Table 14 does not imply production status or availability. Consult your local Motorola sales office for availability.

Table 14. Ordering Information for the MPC750 Microprocessor

Package Type	Device Rev	Process	Mask Code	CPU Frequency (MHz)	Motorola Part Number
360 CBGA	2.2	PPC3.0	2H30E	200 MHz	XPC750ARX200LE
				233 MHz	XPC750ARX233LE
				250 MHz	XPC750ARX250LE
				266 MHz	XPC750ARX266LE
				275 MHz	XPC750ARX275LE
				300 MHz	XPC750ARX300LE

PRELIMINARY—SUBJECT TO CHANGE WITHOUT NOTICE

1.10 Part Marking

This section provides information on Motorola device marking standards. Parts are marked as the example shown in Figure A.

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│      XPC750ARX200LE         │
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│                             │
│                             │
│                             │
│ MMMMMM        ATWLYYWWA     │
└─────────────────────────────┘
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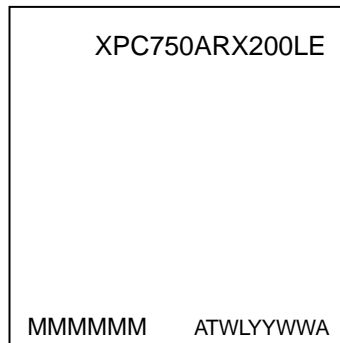
BGA

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 A. Motorola Part Marking for BGA Devices

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