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PowerPC™

MPC7410 Part Number Specification for the RX*xxx*NE Series

This document describes part-number-specific changes to recommended operating conditions and revised electrical specifications, as applicable, from those described in the general *MPC7410 Hardware Specifications* (order #: MPC7410EC/D).

Specifications provided in this document supersede those in the *MPC7410 Hardware Specifications*, Rev. 0.3 (dated 3/2001) for the part numbers listed in Table A only. Specifications not addressed herein are unchanged. Because this document is frequently updated, refer to http://www.motorola.com/sps 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 Table C.

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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)	OVdd	
XPC7410RX400NE	400 MHz	1.5V±50mV	0 to 105	1.8/2.5 V	Reduced core voltage to achieve lower power consumption. Removes 3.3V OVdd support. For all AC/DC specifications not mentioned in this document, please refer to the XPC7410RX400LE specifications in the general MPC7410 Hardware Specifications.
	450 MHz	1.8V ±100mV	0 to 105	1.8/2.5/3.3 V	The XPC7410RX400NE also fully conforms to the XPC7410RX450LE specification. Refer to the general MPC7410 Hardware Specifications.
XPC7410RX450NE	450 MHz	1.5V±50mV	0 to 105	1.8/2.5 V	Reduced core voltage to achieve lower power consumption.Removes 3.3V OVdd support. For all AC/DC specifications not mentioned in this document, please refer to the XPC7410RX450LE specifications in the general MPC7410 Hardware Specifications.
	500 MHz	1.8V ±100mV	0 to 105	1.8/2.5/3.3 V	The XPC7410RX450NE also fully conforms to the XPC7410RX500LE specification. Refer to the general MPC7410 Hardware Specifications.

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.

Errata

This section summarizes design defects or errors (errata) that are known to exist for these parts. There may be additional errata that are not known or are not yet documented here which may cause the part to deviate from the functional description provided in the *MPC7410 RISC Microprocessor User's Manual* (order # MPC7410UM/AD Rev 0). Contact your local Motorola sales office for later and/or more detailed description of the errata.

The known errata as of the date of this document are summarized in Table B.

#	Problem	Description	Impact	Work-Around
	IFTT mode does not identify dcbt/dst instructions as data fetches.	The Instruction Fetch Transaction Type (IFTT) encoding differentiation mode does not correctly identify dcbt/dst instructions as data fetches.	Any system which depends on IFTT to differentiate instruction from data fetches.	Do the following: 1. Replace dcbt/dst with dcbtst/dstst. 2. Set HID0[NOPTI] and HID0[NOPDST] to no-op all touch instructions. 3. Remove dcbt/dst from the code.
	TAU reports incorrect temperatures.	The thermal assist unit (TAU) reports temperatures between 35 to 55 degrees lower than actual.	Programmed trip temperatures will not trigger output interrupts even if actual temperatures exceed the setpoint by up to 55 degrees.	None.

1.2 Features

This section summarizes changes to the features of the MPC7410 described in the *MPC7410 Hardware Specifications*.

- Bus interface
  — Selectable interface voltages of 1.8 V, 2.5 V (3.3 V not supported)

1.4.1 DC Electrical Characteristics

Voltage to the L2 I/Os and processor interface I/Os are provided through separate sets of supply pins and may be provided at the voltages shown in Table 2.

Table 2. Input Threshold Voltage Setting

BVSEL Signal [3]	Processor Bus Input Threshold is Relative to:	L2VSEL Signal [3]	L2 Bus Input Threshold is Relative to:	Note
0	1.8 V	0	1.8 V	1
$\overline{\text{HRESET}}$	2.5 V	$\overline{\text{HRESET}}$	2.5 V	1, 2
1	Not Supported	1	2.5 V	1, 4, 5
HRESET	Not Supported	HRESET	Not Supported	

Notes:
1. **Caution:** The input threshold selection must agree with the OVdd/L2OVdd voltages supplied.
2. To select the 2.5-V threshold option, BVSEL and/or L2VSEL should be tied to $\overline{\text{HRESET}}$ so that the two signals change state together. This is the preferred method for selecting this mode of operation.
3. To overcome the internal pull-up resistance, a pull-down resistance less than 250 ohms should be used.
4. Default voltage setting if left unconnected (internal pulled-up).
5. **Caution:** The XPC7410RXnnnNE does not support the default OVdd setting of 3.3 V. The BVSEL input must be tie either low or to $\overline{\text{HRESET}}$.

DC Electrical Characteristics

Table 3 provides the recommended operating conditions for the MPC7410 part numbers described herein.

Table 3. Recommended Operating Conditions

Characteristic		Symbol	Recommended Value	Unit
Core supply voltage		Vdd	1.5V ± 50mV	V
PLL supply voltage		AVdd	1.5V ± 50mV	V
L2 DLL supply voltage		L2AVdd	1.5V ± 50mV	V
Processor bus supply voltage	BVSEL = 0	OVdd	1.8V ± 100mV	V
	BVSEL = $\overline{\text{HRESET}}$	OVdd	2.5V ± 100mV	V
	BVSEL = HRESET or BVSEL = 1	OVdd	Not Supported	V
L2 bus supply voltage	L2VSEL = 0	L2OVdd	1.8V ± 100mV	V
	L2VSEL = $\overline{\text{HRESET}}$ or L2VSEL = 1	L2OVdd	2.5V ± 100mV	V
Input voltage	Processor bus and JTAG Signals	V_{in}	GND to OVdd	V
	L2 Bus	V_{in}	GND to L2OVdd	V
Die-junction temperature		T_j	0-105	°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 MPC7410 part at the frequencies described herein.

Table 7. Power Consumption for MPC7410

	Processor (CPU) Frequency 400Mhz	Processor (CPU) Frequency 450Mhz	Unit	Notes
Full-On Mode				
Typical	2.92	3.29	W	1, 3
Maximum	6.6	7.43	W	1, 2,
Doze Mode				
Maximum	3.6	4.1	W	1, 2
Nap Mode				
Maximum	1.35	1.5	W	1, 2
Sleep Mode				
Maximum	1.3	1.45	W	1, 2

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Table 7. Power Consumption for MPC7410 (Continued)

	Processor (CPU) Frequency 400Mhz	Processor (CPU) Frequency 450Mhz	Unit	Notes
Sleep Mode—PLL and DLL Disabled				
Typical	0.6	0.6	W	1, 3
Maximum	1.1	1.1	W	1, 2

Notes:
1. These values apply for all valid processor bus and L2 bus ratios. The values do not include I/O Supply Power (OVdd and L2OVdd) or PLL/DLL supply power (AVdd and L2AVdd). OVdd and L2OVdd power is system dependent, but is typically <10% of Vdd power. Worst case power consumption for AVdd = 15 mw and L2AVdd = 15 mW.
2. Maximum power is measured at 105 °C and Vdd = 1.5V while running an entirely cache-resident, contrived sequence of instructions which keep the execution units, including AltiVec, maximally busy.
3. Typical power is an average value measured at 65 °C and Vdd = 1.5V in a system while running typical benchmarks.

1.10 Ordering Information

Table C provides the ordering information for the MPC7410 part described in this Part Number Specification.

Table C. Ordering Information for the MPC7410 Microprocessor

Package Type	Device Rev	Process	Mask Code	CPU Frequency (MHz)	Motorola Part Number
360 CBGA	1.4	HIP 6	84K65D	400MHz	XPC7410RX400NE
				450MHz	XPC7410RX450NE

1.10.1 Part Marking

Parts are marked as the example shown in Figure A.

Ordering Information
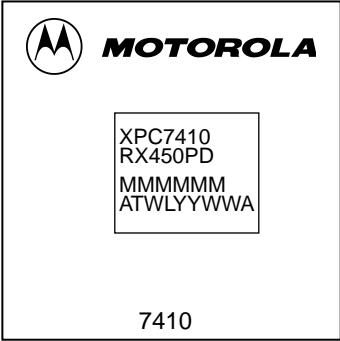
Notes:

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 Device

HOW TO REACH US:

USA/EUROPE/LOCATIONS NOT LISTED: Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

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ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong. 852-26668334

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