Advance Information

MPC7410TRXNEPNS/D
Rev. 1.1, 5/2003

MPC7410 Part Number Specification for the MPC7410TRXnnnNE Series

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Motorola Part Numbers Affected:

MPC7410TRX400NE
MPC7410TRX450NE

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). The MPC7410 is a PowerPC™ microprocessor.

Specifications provided in this document supersede those in the *MPC7410 Hardware Specifications*, 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/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 Table 17.

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	
MPC7410TRX400NE	400 MHz	1.5V±50mV	-40 to 105	1.8/2.5 V	Extended temperature range. 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 MPC7410RX400LE specifications in the general MPC7410 Hardware Specifications.
	450 MHz	1.8V±100mV	-40 to 105	1.8/2.5/3.3 V	Extended temperature range. The MPC7410TRX400NE also fully conforms to the MPC7410TRX450LE specification. Refer to the general MPC7410 Hardware Specifications.
MPC7410TRX450NE	450 MHz	1.5V±50mV	-40 to 105	1.8/2.5 V	Extended temperature range. 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 MPC7410RX450LE specifications in the general MPC7410 Hardware Specifications.
	500 MHz	1.8V±100mV	-40 to 105	1.8/2.5/3.3 V	Extended temperature range. The MPC7410TRX450NE also fully conforms to the MPC7410TRX500LE specification. Refer to the general MPC7410 Hardware Specifications.

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 XPC7410TRXnnnNE does not support the default OVdd setting of 3.3 V. The BVSEL input must be tie either low or to $\overline{\text{HRESET}}$.

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	-40 to 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	Processor (CPU) Frequency	Unit	Notes
	400Mhz	450Mhz		
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
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.

1.9 Document Revision History

Table 16 provides a revision history for this Part Number Specification.

Table 16. Document Revision History

Document Revision	Substantive Changes
Rev 0	Initial Release
Rev 1	Minor formatting
Rev 1.1	Rather than readers of this spec referring to the MPC7410RXnnnNE part number spec and then to the MPC7410RXnnnLE general hardware spec, this spec now includes the spec differences outlined in the MPC7410RXnnnNE part number spec. Any specifications not called out in this spec for the part numbers listed in Table A default back to the general hardware spec.

1.10 Ordering Information

1.10.1 Part Numbers Addressed by this Specification

Table 17 provides the ordering information for the MPC7410 part described in this document.

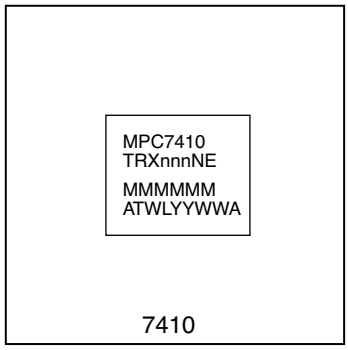
Table 17. Part Marking Nomenclature

MPC	7410	x	RX	nnn	x	x
Product Code	**Part Identifier**	**Process Descriptor**	**Package**	**Processor Frequency[1]**	**Application Modifier**	**Revision Level**
MPC	7410	T: –40° to 105°C	RX = CBGA	400 450	N: 1.5 V ±50 mV	E: 1.4; PVR = 800C 1104

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

1.10.3 Part Marking

Parts are marked as the example shown in Figure 26.



Notes:
nnn is the speed grade of the part
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)

BGA

Figure 26. Motorola Part Marking for BGA Device

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