Advance Information

MPC8240RZUPNS/D Rev. 0, 7/2002

MPC8240 Part Number Specification for the XPC8240RZUnnnx Series

Motorola Part Number Affected: XPC8240RZU250x



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This document describes part-number-specific changes to recommended operating conditions and revised electrical specifications, as applicable, from those described in the general *MPC8240 Integrated Processor Hardware Specifications* (Order No. MPC8240EC/D).

Specifications provided in this document supersede those in the *MPC8240 Integrated Processor Hardware Specifications*, Rev.1.0 or later, 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.

The part number addressed in this document is listed in Table A. For more detailed ordering information see Section 1.8, "Ordering Information."

Motorola	Оре	rating Conditions	Significant Differences from	
Part Number	CPU Frequency	V _{DD}	Т _Ј (°С)	Hardware Specification
XPC8240RZU250x	250 MHz	2.625 ±125 mV	0 to 105	Modified voltage specifications to achieve 250 MHz

Table A. Part Number Addressed by This Data Sheet

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.

1.2 Features

This section summarizes changes to the features of the MPC8240 described in the MPC8240 Integrated Processor Hardware Specifications.

- Power management
 - 2.625-V processor core

1.3 General Parameters

This section summarizes changes to the general parameters of the MPC8240 described in the MPC8240 Integrated Processor Hardware Specifications.

• Core power supply 2.625 V ±125 mV DC nominal

1.4.1. DC Electrical Characteristics

Table 2 provides the recommended operating conditions for the MPC8240 part number described herein.

Char	Symbol	Recommended Value	Unit	Notes	
Supply voltage		V _{DD}	2.625 ±5%	V	4, 6
Supply voltage for PCI and	standard bus standards	OV _{DD}	3.3 ±0.3	V	6
Supply voltages for memor	y bus drivers	GV _{DD}	3.3 ±5%	V	8
PLL supply voltage—CPU	core logic	AV _{DD}	2.625 ±5%	V	4, 6
PLL supply voltage—periph	AV _{DD} 2	2.6255 ±5%	V	4, 7	
DLL supply voltage		LAV _{DD}	2.625 ±5%	V	4, 7
PCI reference		LV _{DD}	5.0 ±5%	V	9, 10
			3.3 ±0.3	V	9, 10
Input voltage	LV _{DD} input tolerant signals	V _{in}	0 to 3.6 or 5.75	V	2, 3
	All other inputs		0 to 3.6	V	5
Die-junction temperature	Т _ј	0 to 105	°C		

Table 2. Recommended Operating Conditions

Notes:

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

- 2. These signals are designed to withstand LV_{DD} + 0.5 V DC when LV_{DD} is connected to a 3.3- or 5.0-V DC power supply.
- 3. LV_{DD} input tolerant signals: PCI interface, EPIC control, and OSC_IN signals.
- 4. See Section 1.8, "Ordering Information," for details on a modified voltage (V_{DD}) version device.

Cautions:

- Input voltage (V_{in}) must not be greater than the supply voltage (V_{DD}/AV_{DD}/AV_{DD}2/LAV_{DD}) by more than 2.5 V at all times, including during power-on reset.
- OV_{DD} must not exceed V_{DD}/AV_{DD}/AV_{DD}/AV_{DD} by more than 1.8 V at any time, including during power-on reset. This limit may be exceeded for a maximum of 20 ms during power-on reset and power-down sequences.
- V_{DD}/AV_{DD}/AV_{DD}/AV_{DD} must not exceed OV_{DD} by more than 0.6 V at any time, including during power-on reset. This limit may be exceeded for a maximum of 20 ms during power-on reset and power-down sequences.
- GV_{DD} must not exceed V_{DD}/AV_{DD}/AV_{DD}/AV_{DD} by more than 1.8 V at any time, including during power-on reset. This limit may be exceeded for a maximum of 20 ms during power-on reset and power-down sequences.
- LV_{DD} must not exceed V_{DD}/AV_{DD}/AV_{DD}/AV_{DD} by more than 5.4 V at any time, including during power-on reset. This limit may be exceeded for a maximum of 20 ms during power-on reset and power-down sequences.
- 10. LV_{DD} must not exceed OV_{DD} by more than 3.6 V at any time, including during power-on reset. This limit may be exceeded for a maximum of 20 ms during power-on reset and power-down sequences.

1.4.1.5 Power Characteristics

Table 5 provides power consumption data for the MPC8240.

Mode		PCI Bus Clock/Memory Bus Clock CPU Clock Frequency (MHz)						
	33/66/ 233	33/83/ 250	33/100/ 200	33/100/ 250	66/100/ 200	66/100/ 250	Unit	Notes
Typical	3.4	3.6	3.2	3.7	3.2	3.8	W	1, 5
Max—FP	3.8	4.1	3.6	4.2	3.6	4.3	W	1, 2
Max—INT	3.4	3.7	3.3	3.8	3.4	3.8	W	1, 3
Doze	2.2	2.4	2.2	2.6	2.2	2.6	W	1, 4, 6
Nap	700	800	900	900	900	900	mW	1, 4, 6
Sleep	500	500	500	500	800	800	mW	1, 4, 6
			I/O Power	Supplies	•	•	•	
Mode		Minimum			Maximum		Units	Notes
Typ—OV _{DD}		200			600		mW	7, 8
Typ—GV _{DD}		300			900		mW	7, 9

Table 5. Preliminary Power Consumption

Notes:

 The values include V_{DD}, AV_{DD}, AV_{DD}2, and LAV_{DD} but do not include I/O supply power; see Section 1.7.2, "Power Supply Sizing," in the *MPC8240 Integrated Processor Hardware Specifications, for information on OV_{DD}* and GV_{DD} supply power. One DIMM used for memory loading.

- Maximum—FP power is measured at V_{DD} = 2.625 V with dynamic power management enabled while running an entirely cache-resident, looping, floating point multiplication instruction.
- 3. Maximum—INT power is measured at V_{DD} = 2.625 V with dynamic power management enabled while running entirely cache-resident, looping, integer instructions.
- 4. Power saving mode maximums are measured at $V_{DD} = 2.625$ V while the device is in doze, nap, or sleep mode.
- Typical power is measured at V_{DD} = AV_{DD} = 2.625 V, OV_{DD} = 3.3 V where a nominal FP value, a nominal INT value, and a value where there is a continuous flush of cache lines with alternating ones and zeros on 64-bit boundaries to local memory are averaged.
- 6. Power saving mode data measured with only two PCI_CLKs and two SDRAM_CLKs enabled.
- 7. The typical minimum I/O power values were results of the MPC8240 performing cache resident integer operations at the slowest frequency combination of 33:66:166 (PCI:Mem:CPU) MHz.
- The typical maximum OV_{DD} value resulted from the MPC8240 operating at the fastest frequency combination of 66:100:250 (PCI:Mem:CPU) MHz and performing continuous flushes of cache lines with alternating ones and zeros to PCI memory.
- The typical maximum GV_{DD} value resulted from the MPC8240 operating at the fastest frequency combination of 66:100:250 (PCI:Mem:CPU) MHz and performing continuous flushes of cache lines with alternating ones and zeros on 64-bit boundaries to local memory.
- 10. Power consumption on the PLL supply pins (AV_{DD} and AV_{DD}2) and the DLL supply pin (LAVDD) less than 15 mW. This parameter is guaranteed by design and is not tested.

1.5 PLL Configuration

The MPC8240 internal PLLs are configured by the PLL_CFG[0:4] signals. For a given PCI_SYNC_IN (PCI bus) frequency, the PLL configuration signals set both the peripheral logic/memory bus PLL (VCO) frequency of operation for the PCI-to-memory frequency multiplying and the MPC603e CPU PLL (VCO) frequency of operation for memory-to-CPU frequency multiplying. The PLL configurations for the MPC8240 is shown in Table 18.

	·	· · ·							
Ref. CFG^{-} $[0:4]^{2}$ CPU $ID1[0:4]$ PCI Clock Input (PCI_SYNC_IN) Range (MHz) Periph Logic/Mem $Sub Clock Range(MHz) PCI to MemRange(MHz) PCI to MemRangeSubscieweits PCI to MemRangeSubscieweits PCI to MemSubscieweits PCI to MemSubscieweits 1 00101 00101 25-27 50-56 100-113 $		DII			250 MHz Part ^{8, 9}	Ratios ^{3, 4}			
1 00001 11000 $25-27$ $75-83$ $225-250$ $3 (6)$ $3 (6)$ 2 00010 00101 $50-56^{5}$ $50-56$ $100-112$ $1 (4)$ $2 (8)$ 3 00011 00101 $50-56^{5}$ $50-56$ $100-113$ $2 (8)$ $2 (8)$ 4 00100 00101 $25-28^{5}$ $50-56$ $100-113$ $2 (8)$ $2 (8)$ 5 00101 00110 Espass Bypass $2.5 (5)$ 7 00111 11000 $33^{6}-56^{5}$ $33-56$ $100-168$ $1 (4)$ $3 (6)$ 8 01000 11000 $33^{6}-56^{5}$ $33-56$ $100-168$ $1 (4)$ $3 (6)$ A 01010 00111 $25-27$ $50-55$ $225-250$ $2 (4)$ $4.5 (9)$ C 01100 00110 $25-41$ $50-83$ $150-250$ $2 (4)$ $3 (6)$ 10 10000 00100 $25-33$ $75-100$ $150-250$	Ref. CFG	CFG		(PCI_SYNC_IN)	Bus Clock Range	Range	(Mem VCO)		
2000100010150-56 5 50-56100-1121 (4)2 (8)30001100101 $25-28 ^5$ 50-56100-1132 (8)2 (8)40010000101 $25-28 ^5$ 50-56100-1132 (8)2 (8)50010100110 $25-28 ^5$ 50-56100-1132 (8)2 (8)50010100110 $25-28 ^5$ 50-56100-1132 (8)2 (8)70011111000 $33 ^6-56 ^5$ $33-56$ 100-1681 (4)3 (6)80100011000 $33 ^6-56 ^5$ $33-56$ 100-1681 (4)3 (6)A0101000111 $25-27$ 50-55 $225-250$ 2 (4) $4.5 (9)$ C0110000110 $25-41$ 50-83150-2502 (4) 3.6 101000000100 $25-33$ 75-100150-2003 (6)2 (4)121001000100 $33-66$ $50-711$ 175-2502 (4) $3.5 (7)$ 161011011010 $25-33$ $62-83$ 186-250 $2.5 (5)$ $3 (6)$ 181100011000 $25-33$ $62-83$ 186-250 $2.5 (5)$ $3 (6)$ 1A1101011000 $33 ^7-55$ $50-83$ 150-250 $1.5 (3)$ $3.6 (6)$ 1A1101011000 $33 ^7-56$ $50-83$ 150-250 $1.5 (3)$ $2.5 (5)$ 1E1111001111 $33 ^7-66$ $50-100$ 125	0	00000	00110	25–33	75–100	188–250	3 (6)	2.5 (5)	
30001100101BypassBypass2 (8)40010000101 $25-28^{5}$ $50-56$ $100-113$ $2 (8)$ $2 (8)$ 50010100110BypassBypass $2 (5)$ 70011111000BypassBypass $3 (6)$ 80100011000 $33^{6}-56^{5}$ $33-56$ $100-168$ $1 (4)$ $3 (6)$ A0101000111 $25-27$ $50-55$ $225-250$ $2 (4)$ $4.5 (9)$ C0110000110 $25-50$ $50-100$ $125-250$ $2 (4)$ $2.5 (5)$ E0111011000 $25-41$ $50-83$ $150-250$ $2 (4)$ $3 (6)$ 101000000100 $25-33$ $75-100$ $150-200$ $3 (6)$ $2 (4)$ 121001000100 $33-66$ $50-100$ $100-200$ $1.5 (3)$ $2 (4)$ 141010011110 $25-31$ $50-62$ $200-250$ $2 (4)$ $4 (8)$ 181100011000 $25-33$ $62-83$ $186-250$ $2.5 (5)$ $3 (6)$ 1A1101011010 $50^{7}-62$ $50-62$ $200-250$ $1 (2)$ $4 (8)$ 1C1110011000 $33^{7}-55$ $50-83$ $150-250$ $1.5 (3)$ $2.5 (5)$ 1E1111001111 $33^{7}-66$ $50-100$ $125-250$ $1.5 (3)$ $2.5 (5)$ 1E1111001111 $50^{7}-62$ $50-62$ $20-250$ $1.5 (3)$ $2.5 (5)$	1	00001	11000	25–27	75–83	225–250	3 (6)	3 (6)	
40010000101 $25-28^{5}$ 50-56100-1132 (8)2 (8)50010100110BypassBypass2.5 (5)70011111000 $33^{6}-56^{5}$ $33-56$ 100-1681 (4)3 (6)80100011000 $33^{6}-56^{5}$ $33-56$ 100-1681 (4)3 (6)A010100011125-2750-55225-2502 (4)4.5 (9)C011000011025-5050-100125-2502 (4)2.5 (5)E011101100025-4150-83150-2502 (4)3 (6)10100000010025-3375-100150-2003 (6)2 (4)12100100010033-6650-100100-2001.5 (3)2 (4)14101001111025-3150-62200-2502 (4)3.5 (7)16101101100025-3362-83186-2502.5 (5)3 (6)1A11001100033^7-5550-83150-2501.5 (3)3 (6)1A11001100033^7-5550-83150-2501.5 (3)3 (6)1D111010011033^7-6650-100125-2501.5 (3)2.5 (5)1E1111001111 33^7-66 50-100125-2501.5 (3)2.5 (5)	2	00010	00101	50–56 ⁵	50–56	100–112	1 (4)	2 (8)	
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18 11000 11000 25–33 62–83 186–250 2.5 (5) 3 (6) 1A 11010 11010 50 ⁷ –62 50–62 200–250 1 (2) 4 (8) 1C 11100 11000 33 ⁷ –55 50–83 150–250 1.5 (3) 3 (6) 1D 11101 00110 33 ⁷ –66 50–100 125–250 1.5 (3) 2.5 (5) 1E 11110 01111 Not Usable	14	10100	11110	25–35	50–71	175–250	2 (4)	3.5 (7)	
1A 11010 11010 50 ⁷ -62 50-62 200-250 1 (2) 4 (8) 1C 11100 11000 33 ⁷ -55 50-83 150-250 1.5 (3) 3 (6) 1D 11101 00110 33 ⁷ -66 50-100 125-250 1.5 (3) 2.5 (5) 1E 11110 01111 Not Usable	16	10110	11010	25–31	50–62	200–250	2 (4)	4 (8)	
1C 11100 11000 33 ⁷ -55 50-83 150-250 1.5 (3) 3 (6) 1D 11101 00110 33 ⁷ -66 50-100 125-250 1.5 (3) 2.5 (5) 1E 11110 01111 Not Usable	18	11000	11000	25–33	62–83	186–250	2.5 (5)	3 (6)	
1D 11101 00110 33 ⁷ -66 50-100 125-250 1.5 (3) 2.5 (5) 1E 11110 01111 Not Usable Off Off	1A	11010	11010	50 ⁷ –62	50–62	200–250	1 (2)	4 (8)	
1E 11110 01111 Off Off Not Usable 0	1C	11100	11000	33 ⁷ –55	50–83	150–250	1.5 (3)	3 (6)	
Not Usable	1D	11101	00110	33 ⁷ –66	50–100	125–250	1.5 (3)	2.5 (5)	
1F 11111 11111 Off Off	1E	11110	01111		NotUsabla		Off	Off	
	1F	11111	11111			Off	Off		

Table 18. MPC8240 Microprocessor PLL Configurations

Notes:

1. The processor HID1 values only represent the multiplier of the processor's PLL (memory-to-processor multiplier); thus, multiple MPC8240 PLL_CFG[0:4] values may have the same processor HID1 value. This implies that system software cannot read the HID1 register and associate it with a unique PLL_CFG[0:4] value.

2. PLL_CFG[0:4] settings not listed (00110, 01001, 01011, 01101, 01111, 10001, 10011, 10101, 10111, 11001, and 11011) are reserved.

3. In PLL bypass mode, the PCI_SYNC_IN input signal clocks the internal processor directly, the peripheral logic PLL is disabled, and the bus mode is set for 1:1 (PCI:Mem) mode operation. This mode is intended for hardware modeling support. The AC timing specifications given in this document do not apply in PLL bypass mode.

4. In clock off mode, no clocking occurs inside the MPC8240 regardless of the PCI_SYNC_IN input.

5. Limited due to maximum memory VCO = 225 MHz.

- 6. Limited due to minimum CPU VCO = 200 MHz.
- 7. Limited due to minimum memory VCO = 100 MHz.
- 8. For clarity, range values are shown rounded down to the nearest whole number (decimal place accuracy removed).

9. Note that the 250-MHz part is available only in the XPC8240RZUnnnx number series.

1.8 Ordering Information

Ordering information for the parts fully covered by this specification document is provided in Section 1.8.1, "Part Numbers Fully Addressed by This Document."

1.8.1 Part Numbers Fully Addressed by This Document

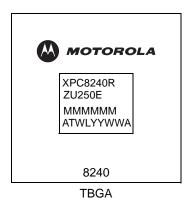
Table 19 provides the Motorola part numbering nomenclature for the MPC8240. Note that the individual part numbers correspond to a maximum processor core frequency. For available frequencies, contact your local Motorola sales office. In addition to the processor frequency, the part numbering scheme also includes an application modifier which may specify special application conditions. Each part number also contains a revision code that refers to the die mask revision number.

XPC	nnnn	L	XX	nnn	X	X
Product Code	Part Identifier	Process Descriptor	Package	Processor Frequency	Application Modifier	Revision Level
XPC	8240	R = Part Spec.	ZU = TBGA	250	2.625 V ±125 mV 0° to 105°C	Contact local Motorola sales office

Table 19. Motorola Part Numbering Nomenclature

1.8.2 Part Marking

Parts are marked as the example shown in Figure 28.



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 28. Motorola Part Marking for TBGA 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.

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