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### Understanding [Embedded - Microprocessors](#)

Embedded microprocessors are specialized computing chips designed to perform specific tasks within an embedded system. Unlike general-purpose microprocessors found in personal computers, embedded microprocessors are tailored for dedicated functions within larger systems, offering optimized performance, efficiency, and reliability. These microprocessors are integral to the operation of countless electronic devices, providing the computational power necessary for controlling processes, handling data, and managing communications.

### Applications of [Embedded - Microprocessors](#)

Embedded microprocessors are utilized across a broad spectrum of applications, making them indispensable in

#### Details

|                                 |   |
|---------------------------------|---|
| Product Status                  | Obsolete  |
| Core Processor                  | PowerPC 603e  |
| Number of Cores/Bus Width       | 1 Core, 32-Bit  |
| Speed                           | 266MHz  |
| Co-Processors/DSP               | -   |
| RAM Controllers                 | -   |
| Graphics Acceleration           | No  |
| Display & Interface Controllers | -   |
| Ethernet                        | -   |
| SATA                            | -   |
| USB                             | -   |
| Voltage - I/O                   | 3.3V  |
| Operating Temperature           | 0°C ~ 105°C (TA)  |
| Security Features               | -   |
| Package / Case                  | 255-BCBGA, FCCBGA   |
| Supplier Device Package         | 255-FCCBGA (21x21)  |
| Purchase URL                    | <a href="https://www.e-xfl.com/pro/item?MUrl=&amp;PartUrl=mpc603rrx266lc">https://www.e-xfl.com/pro/item?MUrl=&amp;PartUrl=mpc603rrx266lc</a> |

**Freescale Semiconductor, Inc.** Motorola Part Numbers Affected:

|                |                |
|----------------|----------------|
| MPE603RRX166LC | MPC603RRX166LC |
| MPE603RRX200LC | MPC603RRX200LC |
| MPE603RRX233LC | MPC603RRX233LC |
| MPE603RRX266LC | MPC603RRX266LC |
| MPE603RRX300LC | MPC603RRX300LC |
|                | MPC603RRX200TC |
|                | MPC603RRX266TC |

**Application-Specific Information****PowerPC 603e™ RISC Microprocessor Family:  
MPC603r (Goldeneye) Part Number Specification**

This document defines a unique part number for a PowerPC™ PID7t-603e microprocessor manufactured by Motorola as part number MPC603R or EC603R. It describes changes to recommended operating conditions and revised electrical specifications, as applicable, from those described in the *PowerPC 603e RISC Microprocessor Family: MPC603r Hardware Specifications*.

Specifications provided in this data sheet supercede those in the *MPC603r Hardware Specifications* (order #: MPC603REC/D); specifications not addressed herein are unchanged.

Note that headings and tables in this data sheet are not numbered; however, they are intended to correspond directly to the heading or table affected in the general hardware specifications. Any additional information (including tables) not included in the hardware specification are noted.

Part numbers addressed in this document and a summary of their differences from the general specification are listed in the following table. For more detailed ordering information see "Ordering Information for the PID7t-603e Microprocessor".

**. Part Numbers Addressed by this Data Sheet**

| Motorola Part Number | Operating Conditions |           |                     | Significant Differences                         |
|----------------------|----------------------|-----------|---------------------|---|
|                      | CPU Frequency        | Vdd       | T <sub>J</sub> (°C) |   |
| MPC603RRX166LC       | 166 MHz              | 2.5 ± 5%V | 0 to 105            | No electrical specification changes.            |
| MPC603RRX200LC       | 200 MHz              | 2.5 ± 5%V | 0 to 105            | No electrical specification changes.            |
| MPC603RRX233LC       | 233 MHz              | 2.5 ± 5%V | 0 to 105            | No electrical specification changes.            |
| MPC603RRX266LC       | 266 MHz              | 2.5 ± 5%V | 0 to 105            | No electrical specification changes.            |
| MPC603RRX300LC       | 300 MHz              | 2.5 ± 5%V | 0 to 105            | No electrical specification changes.            |
| MPE603RRX166LC       | 166 MHz              | 2.5 ± 5%V | 0 to 105            | No spec changes. Floating point not guaranteed. |
| MPE603RRX200LC       | 200 MHz              | 2.5 ± 5%V | 0 to 105            | No spec changes. Floating point not guaranteed. |
| MPE603RRX233LC       | 233 MHz              | 2.5 ± 5%V | 0 to 105            | No spec changes. Floating point not guaranteed. |
| MPE603RRX266LC       | 266 MHz              | 2.5 ± 5%V | 0 to 105            | No spec changes. Floating point not guaranteed. |
| MPE603RRX300LC       | 300 MHz              | 2.5 ± 5%V | 0 to 105            | No spec changes. Floating point not guaranteed. |
| MPC603RRX200TC       | 200 MHz              | 2.5 ± 5%V | -40 to 105          | Extended temperature range.                     |
| MPC603RRX266TC       | 266 MHz              | 2.5 ± 5%V | -40 to 105          | Extended temperature range.                     |

**Feature Changes**

This section summarizes significant feature changes between the revision of the PID7t-603e addressed by this document and the previous revision 1.0 (XPC603RRXnnnLA or XPC603RFEnnnLA where nnn is the core frequency).

This revision was for manufacturing improvements only; there are no functional differences between this revision 2.1 and the previous revision 1.0.

This revision is functionally equivalent to the PID7v-603e (Valiant) microprocessor Revision 2.1 (XPC603PFEnnnLE/XPC603PRXnnnLE) including the following errata.

**Errata**

This section summarizes design defects or errors (errata) that are known to exist on this revision of the PID7t-603e. 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 *MPC603e & EC603e™ RISC Microprocessor User's Manual* (order # MPC603EUM/AD Rev 1). Refer to the website at <http://www.mot.com/SPS/PowerPC/> for the latest version of this Part Number Specification or to your local Motorola sales office for later and/or more detailed description of the errata.



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The known errata as of the date of this document are summarized below.

| # | Problem  | Description   | Impact   | Solutions  |
|---|--|---|--|--|
| 1 | Snoop copyback causes dcbi to broadcast wrong address.   | A snoop which causes a copy-back and occurs in a one cycle window near a dcbi causes the dcbi to broadcast the address of the snoop copyback. | Only systems using both software and hardware coherency simultaneously.                                    | Use software semaphores rather than rely on dcbi to invalidate cache lines shared across multiple processors.  |
| 2 | Competition for reservation with lwarx/stwcx may cause live-lock   | The problem occurs when two processors are competing on the bus for a reservation, and the bus is operating with address pipelining           | System Hang  | Insert a bus clock's worth of no-ops before lwarx  |
| 3 | Touch load causes incorrect address to appear on memory bus  | A touch load (dcbt) preceded by an instruction that generates an exception causes a random address to appear on the memory bus                | Systems issuing instructions which generate mmu exceptions one cycle before using a touch load instruction | Disable touch loads with NOOPTI bit in HID0.   |
| 4 | Write-thru stores followed by dcbz followed by a snoop, all to the same cache line, may cause incoherency. | The sequence of write-thru stores followed by dcbz followed by a snoop, all to the same cache line, may cause incoherency.                    | The write-thru store is completed after the dcbz.  | Store zeroes rather than rely on dcbz to zero cache lines in areas of memory that are marked as write-thru and can be accessed via multiple logical addresses. |
| 5 | The broadcasting of dcbz instructions may retry snoop accesses indefinitely.                               | A sequence of broadcast bcbz instructions may retry snoop accesses indefinitely.  | Snoop originator may timeout.  | Disable broadcasting of dcbz by marking the memory space being addressed by the dcbz instruction as not global in the BAT or PTE.                              |

## Electrical and Thermal Characteristics

This section provides any changes to the AC and DC electrical specifications and thermal characteristics for the PID6-603e parts described herein.

### DC Electrical Characteristics

This section describes the changed thermal operating conditions for the PID7t-603e part numbers described herein.

#### . Recommended Operating Conditions

| Characteristic                      | Symbol         | Value      | Unit | Notes |
|-------------------------------------|----------------|------------|------|-------|
| Junction temperature                | T <sub>J</sub> | -40 to 105 | °C   |       |
| Note: 1. Parts with TC suffix only. |                |            |      |       |

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## Ordering Information

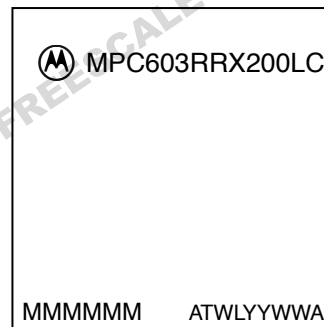
The following table provides the ordering information for the PID7t-603e part numbers described herein.

### Ordering Information for the PID7t-603e Microprocessor

| Package Type | Device Rev | Process | Mask Code | CPU Frequency (MHz) | Motorola Part Number |
|--------------|------------|---------|-----------|---------------------|----------------------|
| 255<br>CBGA  | 2.1        | PPC3.0  | 2H93J     | 166                 | MPC603RRX166LC       |
|              |            |         |           | 200                 | MPC603RRX200LC       |
|              |            |         |           | 233                 | MPC603RRX233LC       |
|              |            |         |           | 266                 | MPC603RRX266LC       |
|              |            |         |           | 300                 | MPC603RRX300LC       |
|              |            |         |           | 166                 | MPE603RRX166LC       |
|              |            |         |           | 200                 | MPE603RRX200LC       |
|              |            |         |           | 233                 | MPE603RRX233LC       |
|              |            |         |           | 266                 | MPE603RRX266LC       |
|              |            |         |           | 300                 | MPE603RRX300LC       |
|              |            |         |           | 200                 | MPC603RRX200TC       |
|              |            |         |           | 266                 | MPC603RRX266TC       |

## Part Marking

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



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)

## Part Marking for BGA Devices

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For information on Freescale's Environmental Products program, go to <http://www.freescale.com/epp>.