



**Intel
MMX™ Technology
at a Glance**

June 1997

Order Number: 243100-003





MMX™ TECHNOLOGY: HIGHER PERFORMANCE FOR MULTIMEDIA AND COMMUNICATIONS APPLICATIONS

MMX™ technology is a major enhancement to the Intel Architecture designed to accelerate multimedia and communications software. The volume and complexity of data processed by today's personal computer is increasing exponentially, placing incredible demands on the microprocessor. New communications, games and "edutainment" applications are requiring increasing levels of performance. MMX technology includes new data types and 57 new instructions to accelerate calculations common in audio, 2D and 3D graphics, video, speech synthesis and recognition, and data communications algorithms. Processors enabled with MMX technology will deliver enough performance to execute compute-intensive communication and multimedia tasks with headroom left to run other tasks or applications. It allows software developers to design richer, more exciting applications for the PC. MMX technology enables complex visual effects with no loss of frame rate, smoother video, high quality audio and high color resolution.



MMX™ TECHNOLOGY PROCESSOR RAMP

The volume of MMX technology processors will grow rapidly in 1997 as the technology is first incorporated into the desktop and mobile versions of the Pentium® processor and then into successive generations of Intel processors. Software developers should expect a rapidly expanding installed base for their MMX technology enabled applications.

MMX™ TECHNOLOGY INDUSTRY SUPPORT

MMX technology has received broad industry support from operating system vendors, PC suppliers, hardware and software vendors, tools and libraries suppliers.

Microsoft has incorporated support for MMX technology in Direct3D*, a set of API services for real-time, interactive 3-D graphics, and their Visual C++ compiler. Macromedia, Criterion, IBM, NuMega, and Powersoft are among leading tool suppliers announcing support. Major PC OEMs have announced plans to introduce systems based on the Pentium processor with MMX technology in the first quarter of 1997. More can be expected in the coming months.

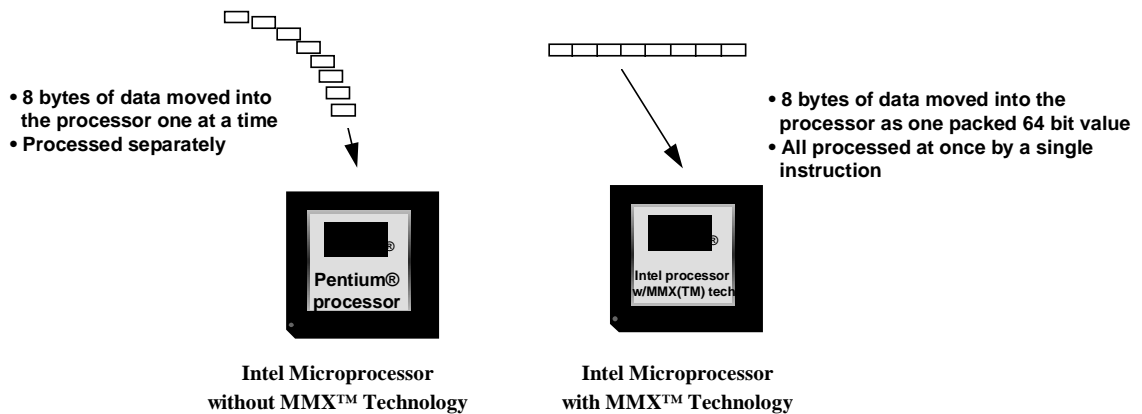


HOW MMX™ TECHNOLOGY WORKS

The definition of MMX technology resulted from a joint effort between Intel's microprocessor architects and software developers. A wide range of software applications was analyzed, including graphics, MPEG video, music synthesis, speech compression, speech recognition, image processing, games, video conferencing and more. These applications were broken down to identify the most compute-intensive routines, which were then analyzed in detail using advanced computer-aided engineering tools. The results of this extensive analysis showed many common, fundamental characteristics across these diverse software categories. The key attributes of these applications were:

- Small integer data types (for example: 8-bit graphics pixels, 16-bit audio samples)
- Small, highly repetitive loops
- Frequent multiplies and accumulates
- Compute-intensive algorithms
- Highly parallel operations

The basis for MMX technology is a technique called Single-Instruction, Multiple-Data (SIMD). This allows for many pieces of information to be processed with a single instruction, providing parallelism which greatly increases performance.



Software developers can take advantage of the MMX technology through the use of 57 new, basic general-purpose integer instructions that can be easily applied to the needs of the wide diversity of multimedia and communications applications. The highlights of the technology are:

- Single Instruction, Multiple Data (SIMD) technique
- 57 new instructions
- Eight 64-bit wide MMX registers
- Four new data types

MMX™ TECHNOLOGY IS FULLY COMPATIBLE

MMX technology is integrated into Intel Architecture processors in a way that maintains full compatibility with existing operating systems, including MS DOS*, Windows* 3.1, Windows 95, OS/2*, Windows NT* and Unix*. It does this by aliasing its registers and state upon the Intel Architecture floating-point registers and state. Therefore, no new registers or states are added to support MMX technology. This means that the operating system uses the standard mechanisms for interacting with the floating-point state to save and restore MMX code. In addition, the full base of Intel Architecture software will run on MMX technology enabled systems.



MMX™ TECHNOLOGY: BIG BENEFITS FROM SMALL INVESTMENT

Multimedia applications typically spend much of their time in small, highly repetitive loops which account for a small portion of the total application code. Rewriting these small sections of code using MMX instructions will deliver significant performance improvements to the application. In this way, MMX technology enables software developers to benefit from a significant boost in performance for their multimedia and communications applications by optimizing small portions of the total application.

FOR MORE INFORMATION

For more information on developing MMX technology applications:

- Visit Intel's corporate website at <http://www.intel.com/pc-supp/multimed/mmx>
- Call Intel Customer Support at 1-800-628-8686

Refer to the following documentation for more information on MMX technology.

- *Intel Architecture Technology Overview* (Order Number 243081)
- *Intel Architecture MMX™ Technology Developer's Manual* (Order Number 243013)
- *Intel Architecture MMX™ Technology Programmer's Reference Manual* (Order Number 243007)



Information in this document is provided in connection with Intel products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, life saving, or life sustaining applications.

Intel may make changes to specifications and product descriptions at any time, without notice.

Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them.

The Pentium® Processor, Pentium Pro Processor, and Pentium II Processor may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

MPEG is an international standard for video compression/decompression promoted by ISO. Implementations of MPEG CODECs, or MPEG enabled platforms may require licenses from various entities, including Intel Corporation.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an ordering number and are referenced in this document, or other Intel literature, may be obtained from:

IntelCorporation
P.O.Box 7641
Mt. Prospect IL 60056-7641

or call 1-800-879-4683

or visit Intel's website at <http://www.intel.com>

Copyright © Intel Corporation 1996, 1997.

* Third-party brands and names are the property of their respective owners.