

**Intel® Mobile Pentium® II Processor at
400 MHz, 366 MHz, 333 MHz,
300PE MHz, and 266PE MHz
Performance Brief**

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1. INTRODUCTION

The 400 MHz Mobile Pentium® II processor is the newest member in the family of Intel processors that provides outstanding performance for all mobile applications. Offered in three package types, the Mobile Pentium II processor in BGA1 and µPGA1 packages is the first mobile processor manufactured in Intel's state-of-the-art 0.18 micron process technology. The Mobile Pentium II processor in Mini-Cartridge and the Pentium II processor mobile modules are manufactured in Intel's 0.25 micron process technology. With the on-die 256-Kbyte L2 cache, the mobile Pentium II processor at 400 MHz enables higher levels of performance for new mobile PCs.

The mobile Pentium II processor family now consists of the following five products:

- Mobile Pentium II Processor at 400 MHz
- Mobile Pentium II Processor at 366 MHz
- Mobile Pentium II Processor at 333 MHz
- Mobile Pentium II Processor at 300PE MHz
- Mobile Pentium II Processor at 266PE MHz⁺

Today's microprocessor performance can be best assessed using the Spectrum of Performance:

- **Productivity Benchmarks** simulate the activities of end users working in typical productivity applications such as word processing, spreadsheets, presentation applications, and personal finance programs.
- **Multimedia Benchmarks** are designed specifically to simulate the activities of end users utilizing video, digital sound, PC imaging or Video Conferencing, and other similar media-rich applications.
- **3D/Floating-Point Benchmarks** measure the performance of three-dimensional visualization techniques such as those used in games to support richer textures and enhanced lighting effects.
- **Internet Technology Benchmarks** evaluate processor Internet performance on browser, 3D, and multimedia technologies.

Representative integer benchmarks include: Processor Level Benchmarks- SPECint*95; System Level Benchmarks- SYSmark*98, Winstone*99, and the processor component of WinBench*99 from Ziff-Davis*.

Representative multimedia benchmarks include: MultimediaMark* 99 from FutureMark* Corp., Intel MMX™ Technology Applications as well as Intel Media Benchmark.

Representative 3D/floating-point benchmarks include: the FPU component of WinBench*99 from Ziff-Davis*, 3DMarkCPU from 3Dmark, WinBench*98 FPU, and SPECfp_base*95.

Representative Internet benchmarks include: the productivity, 3D, and multimedia benchmarks listed above. Additionally, some Java Internet technology benchmarks are JMark*2.0 Processor Test for the processor level benchmark and SYSmark*J for the system level.

This report provides test results on the Spectrum of Performance for Intel's 400-MHz, 366-MHz, 333-MHz, 300PE-MHz, and 266PE-MHz Mobile Pentium II processors with performance normalized to the Mobile Pentium II processor at 266PE MHz. We selected the following benchmarks to represent the Spectrum of Performance:

- Productivity: Processor level benchmark - SPECint*95; system level benchmark - Winstone*99 and SYSmark*98
- Multimedia: MultimediaMark* 99
- 3D/Floating-Point: SPECfp_base*95 and 3DmarkCPU*

Endnotes

⁺ The Mobile Pentium® II Processor at 266PE MHz includes the processors with core logic Vcc at 1.6V and at 1.5V.

- Internet: JMark*2.0

Details of the system configurations used for all the benchmarks throughout this brief are described in Appendix A.

1.1 The Intel Mobile Pentium® II Processor at 400 MHz, 366 MHz, 333 MHz, 300PE MHz, and 266PE MHz

The Intel's 400-, 366-, 333-, 300PE- and 266PE- MHz mobile Pentium II processors deliver excellent performance for all IA architecture based PC software. They are fully compatible with the existing base of IA architecture based PC software written for the Pentium II processor, Pentium processor, Intel486™ processor, and Intel386™ processor. Additionally, this new generation of processors enables higher levels of multimedia and communication performance. It has immediate responsiveness for the latest, most demanding software with powerful, realistic graphics and the ability to run full-screen, full-motion video.

2. MOBILE PENTIUM® II PROCESSOR FEATURE HIGHLIGHTS

The new line of mobile Pentium II processor allows high-performance notebooks to be designed for today's mobile applications by providing the following features:

- 400, 366, 333, 300PE, and 266PE MHz Core CPU
- Integrated 16 Kbytes of Data and 16Kbytes of Instruction Level-One Cache
- Integrated on-die 256 Kbytes Level Two Cache
- Low Power GTL+ Processor System Bus Interface operating at 66 MHz
- Integrated Floating-Point Unit
- 64-bit External Data Bus
- Supports the Intel Architecture MMX™ Technology
- Supports the Intel Architecture with Dynamic Execution
- Quick Start Mode for low power, fast exit (low latency) clock "throttling"
- Deep Sleep mode for extremely low power dissipation
- High-Reliability Error Detection

3. MICROPROCESSOR PERFORMANCE SUMMARY

3.1 Spectrum of Performance

3.1.1 Productivity Benchmarks

The 32-bit Integer Windows performance of the Intel Mobile Pentium II processor is illustrated by the following benchmarks:

Processor Level Benchmark: SPECint*95

The SPECint*95 benchmark test provides a comparison point for the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark test results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of the Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing.

System Level Benchmark: Business Winstone* 99 and SYSmark* 98

Winstone* 99 is a system-level, application-based benchmark developed by Ziff-Davis. Winstone 99 measures a PC's overall performance when running Windows-based 32-bit applications on Windows* 98 or Windows* NT 4.0. It runs real 32-bit business suites through a series of scripted activities and uses the time a PC takes to complete those activities to produce its performance scores.

Business Winstone* 99 incorporates the following popular office software suites: Corel WordPerfect Suite 8, Lotus SmartSuite, and Microsoft Office 97. To mirror the typical usage patterns of today's PC users, the benchmark keeps multiple applications open within each suite, and switches tasks between these applications and the Netscape Navigator Internet browser. (source: Ziff-Davis*)

SYSmark* 98 for Windows* 98 and Windows* NT 4.0 is a suite of application software and associated benchmark scripts developed by Business Applications Performance Corporation (BAPCO), a non-profit consortium of PC OEMs, software vendors, semiconductor manufacturers, and industry publications. SYSmark 98 is a tool that measures system performance on popular business-oriented applications in the Microsoft* Windows operating environment. The scripts were developed to reflect usage patterns of PC users in a business-oriented environment.

SYSmark* 98 includes 32-bit benchmark scripts for office productivity and content creation. Applications for office productivity are: Corel* CorelDRAW* 8, Microsoft Excel* 97, Dragon Systems* Naturally Speaking* 2.02, Netscape* Communicator* 4.05, Caere* OmniPage Pro* 8.0, Corel Paradox* 8.0, Microsoft PowerPoint* 97, Microsoft Word* 97. Applications for content creation are: MetaCreations* Bryce* 2, Avid* Elastic Reality* 3.1, Macromedia* Extreme3D * 2, Adobe* Photoshop* 4.0.1, Adobe Premiere* 4.2, Xing Technology* XingMPEG* Encoder* 2.1.

Figures 1, 2, and 3 illustrate the performance of the Intel Mobile Pentium II processor when executing the integer part of the benchmarks for CPU and system level performance comparison.

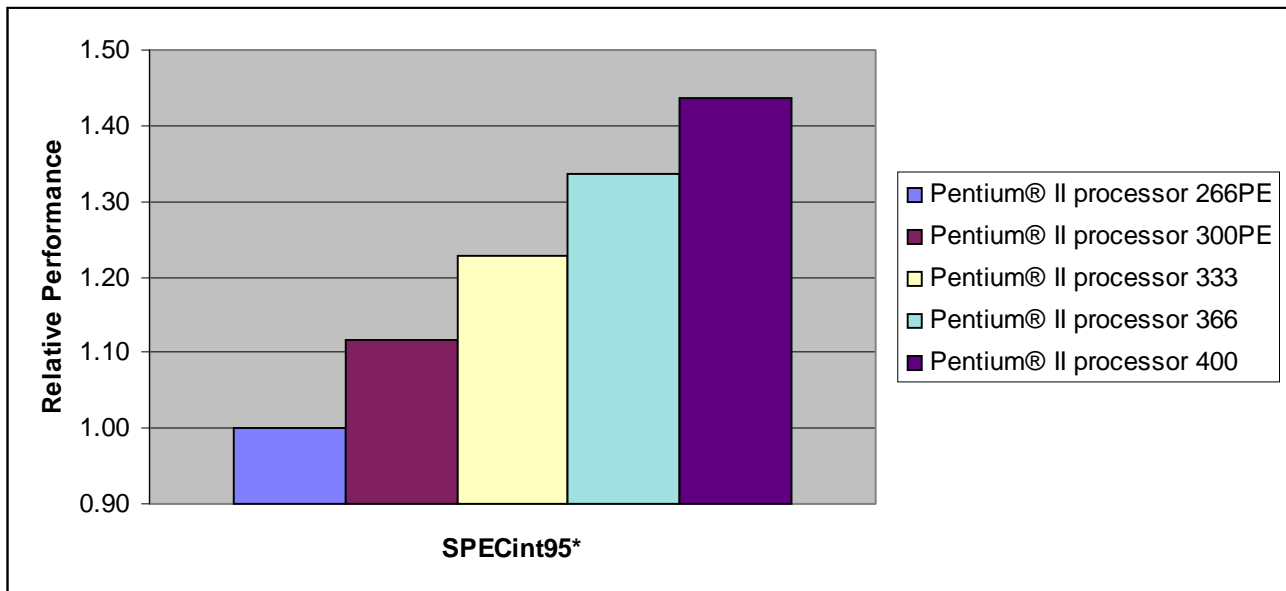


Figure 1. Mobile Pentium® II Processor Relative Performance for SPECint*95

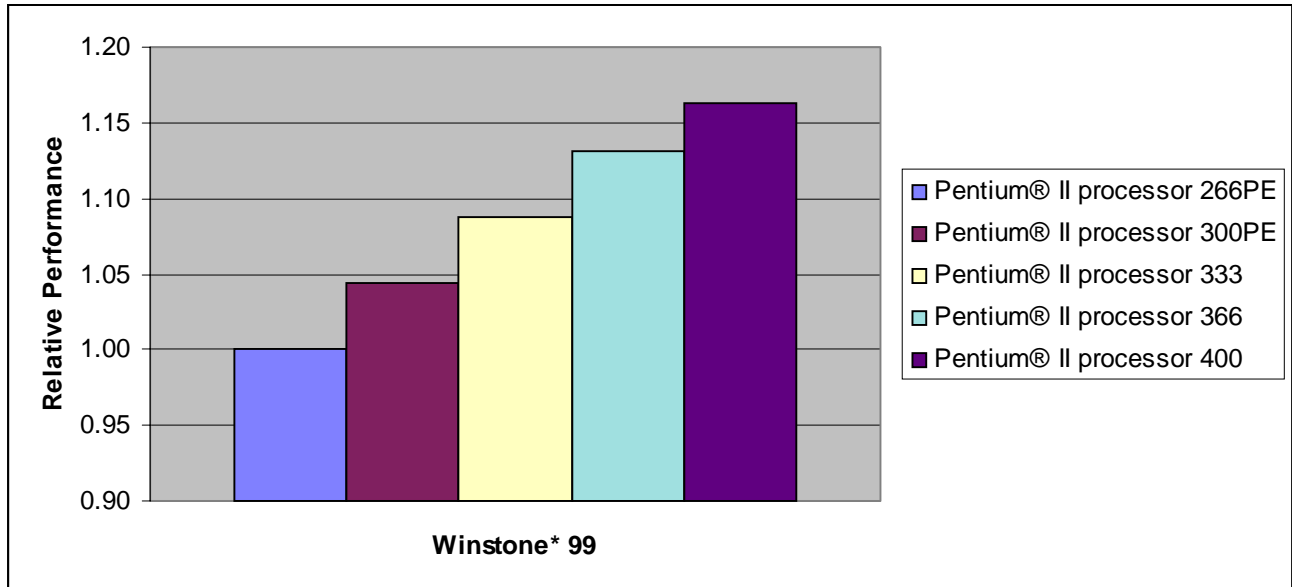


Figure 2. Mobile Pentium® II Processor Relative Performance for Ziff-Davis* Winstone* 99

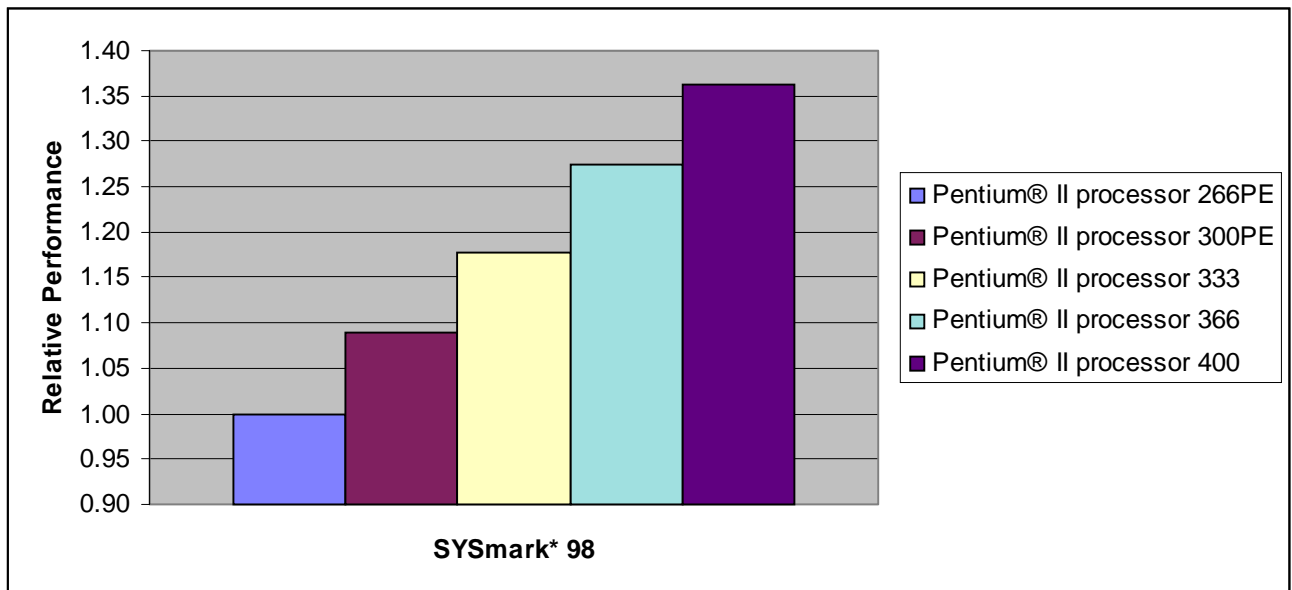


Figure 3. Mobile Pentium® II Processor Relative Performance for SYSmark* 98

3.1.2 Multimedia Benchmarks

The MultimediaMark* 99 is a system level benchmark from FutureMark* Corp. that measures audio, video, and imaging performance. MultimediaMark* 99 is a benchmark that focuses on testing multimedia performance of modern PC in a "real world" environment.

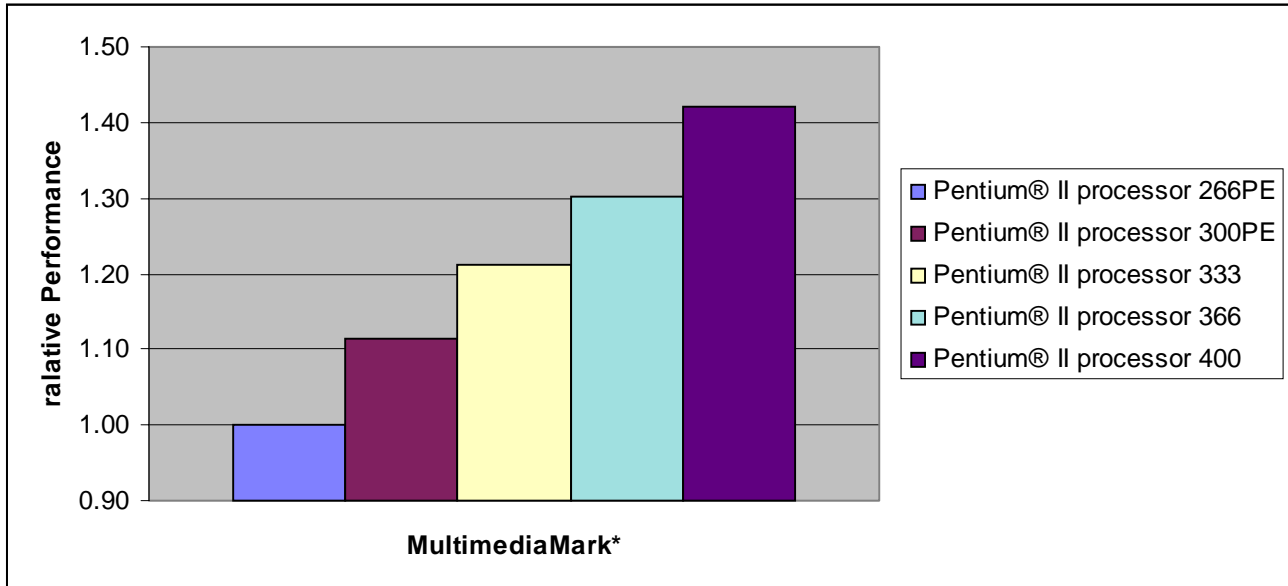


Figure 4. Mobile Pentium® II Processor Relative Performance for MultimediaMark* 99

Figure 4 illustrates the relative performance comparison of the Intel Mobile Pentium II processors when executing the MultimediaMark* 99 benchmark.

3.1.3 3D/Floating-Point Benchmarks

The floating-point performance of the Intel Mobile Pentium II processor is illustrated by the following benchmarks:

SPECfp*95

The SPECfp*95 benchmark test provides a comparison point for the performance of the microprocessor, memory architecture, and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark test results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing.

3DMarkCPU*

3DMarkCPU* from Futuremark* - is a diagnostic suite of benchmarks based on current 3D Games and high end applications that analyzes, tests and reports on a system's 3D performance. For processor comparisons, 3DMarkCPU* includes the CPU Processing Speed test. This test focuses on the floating-point intensive 3D-geometry portion of the graphics pipeline.

Figures 5 and 6 illustrate the relative performance comparison of the Intel mobile Pentium II processors when executing SPECfp*95 and 3DmarkCPU* benchmark.

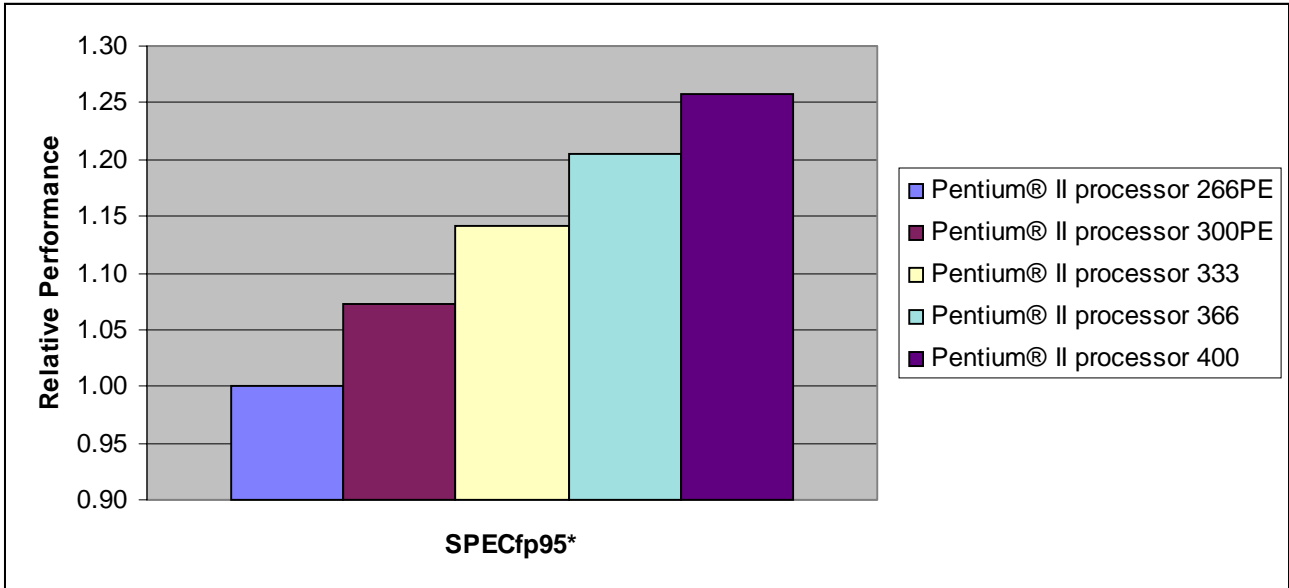


Figure 5. Mobile Pentium® II Processor Relative Performance for SPECfp*95

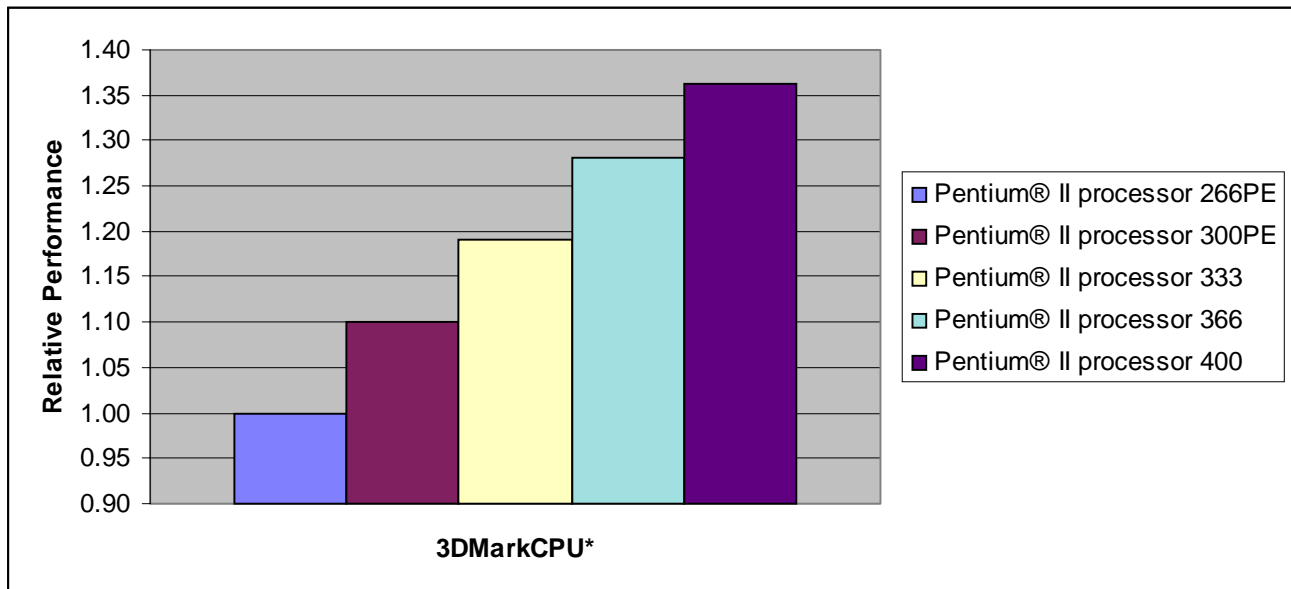


Figure 6. Mobile Pentium® II Processor Relative Performance for 3DMarkCPU*

3.1.4 Internet Technology Benchmarks

Jmark* is a benchmark developed by Ziff-Davis to measure processor Java performance. The Jmark Processor Test stresses the Java Virtual Machine (JVM) on a non-graphical workload. Figure 7 illustrates the relative performance comparison of the Intel mobile Pentium II processors when executing Jmark*2.0 benchmark.

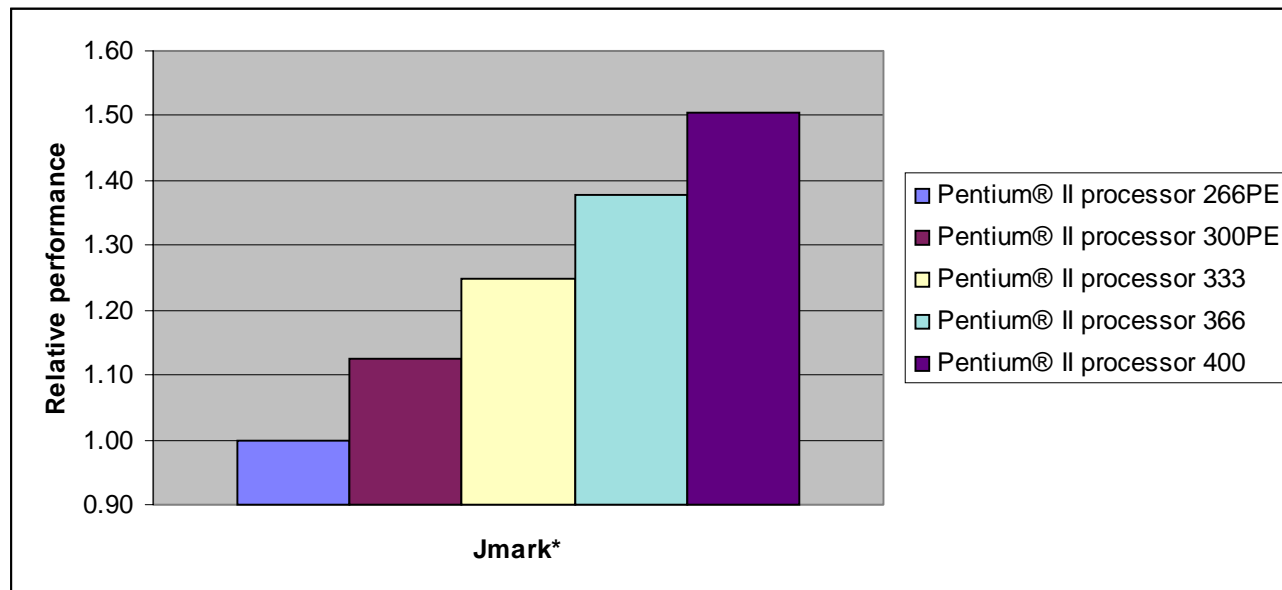


Figure 7. Mobile Pentium® II Processor Relative Performance for JMark*

4. SUMMARY

Table 1 summarizes the microprocessor benchmark relative performance results for the Mobile Pentium II processors discussed in this performance brief.

Table 1. Mobile Pentium® II Processor Benchmark Results

Processor	Winston e* 99	SYSmark * 98	MultimediaMark * 99	3DMarkCPU*	SPECint*95	SPECfp 95*	JMark*
Mobile Pentium II Processor 266PE MHz	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mobile Pentium II Processor 300PE MHz	1.04	1.09	1.11	1.10	1.12	1.07	1.13
Mobile Pentium II Processor 333 MHz	1.09	1.18	1.21	1.19	1.23	1.14	1.25
Mobile Pentium II Processor 366 MHz	1.13	1.27	1.30	1.28	1.34	1.20	1.38
Mobile Pentium II Processor 400 MHz	1.16	1.36	1.42	1.36	1.44	1.26	1.50

Appendix A — System Configurations

Table A-1 shows the systems and their configurations used for evaluating the benchmark performances discussed in this brief.

Table A-1. System Configurations

Processor	Mobile Pentium® II Processor at 266PE/300PE/333/366/400 MHz
OEM's System	ThinkPad* IBM* 770 with Pentium II processor Mobile Module with Intel 440BX Chip Set
Primary Cache	16-Kbyte (Instruction) 16-Kbyte (Data)
Secondary Cache	512 Kbytes PBSRAM for Mobile Pentium® II Processor at 233/266//300 MHz On-die 256 Kbytes for Mobile Pentium® II Processor at 266PE/300PE/333/366 MHz
System Memory Size/Speed	64 Mbytes SDRAM
Motherboard Chip Set	Intel 82440BX
Hard Disk	8.1 GB
Media	2X DVD-ROM
Operating System	Windows 98 for Winstone 99, MutlimediaMark and 3DMarkCPU, Windows NT* 4.0 (OSR3) for SPECint95* and SPECfp95*
Sound	Crystal (SoundBlaster* Pro compatible)
Video Controller	Trident9385DVD graphics controller



UNITED STATES, Intel Corporation
2200 Mission College Blvd., P.O. Box 58119, Santa Clara, CA 95052-8119
Tel: +1 408 765-8080

JAPAN, Intel Japan K.K.
5-6 Tokodai, Tsukuba-shi, Ibaraki-ken 300-26
Tel: + 81-29847-8522

FRANCE, Intel Corporation S.A.R.L.
1, Quai de Grenelle, 75015 Paris
Tel: +33 1-45717171

UNITED KINGDOM, Intel Corporation (U.K.) Ltd.
Pipers Way, Swindon, Wiltshire, England SN3 1RJ
Tel: +44 1-793-641440

GERMANY, Intel GmbH
Dornacher Strasse 1
85622 Feldkirchen/ Muenchen
Tel: +49 89/99143-0

HONG KONG, Intel Semiconductor Ltd.
32/F Two Pacific Place, 88 Queensway, Central
Tel: +852 2844-4555

CANADA, Intel Semiconductor of Canada, Ltd.
190 Attwell Drive, Suite 500
Rexdale, Ontario M9W 6H8
Tel: +416 675-2438

BRAZIL, Intel Semicondutores do Brasil
Centro Empresarial Nações Unidas - Edifício Torre Oeste
Av. das Nações Unidas, 12.901 - 18o. andar - Brooklin Novo
04578.000 São Paulo - S.P. - Brasil
Tel: +55-11-5505-2296