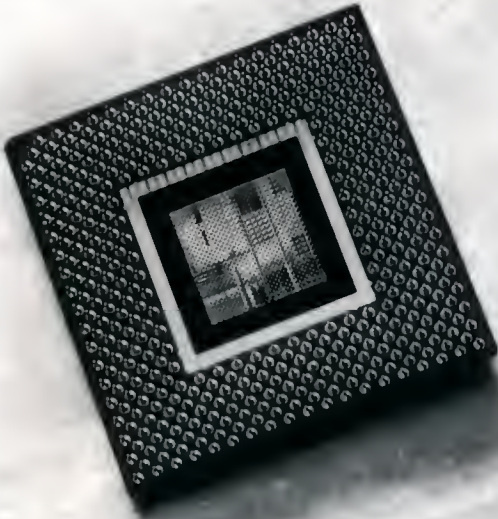


## Nx586<sup>®</sup> Processor Family



**NexGen's industry leading technologies deliver the highest performance x86 processors to mainstream PC users.**

### FAST

The Nx586 processor delivers the highest levels of x86 performance. Tests with well known benchmarks show performance comparable to that of Intel's<sup>®</sup> Pentium<sup>®</sup> processor. The Nx586 processor is the most advanced processor available today incorporating NexGen's patented RISC86<sup>™</sup> microarchitecture, double sized L1 cache, and a private L2 cache bus.

### COMPATIBLE

The Nx586 processor family is fully x86 binary code compatible. Both NexGen and a leading independent testing laboratory have proven this compatibility in thorough testing. In addition, the 'Microsoft<sup>®</sup> Windows<sup>™</sup>-Compatible' logo, IBM's<sup>®</sup>

OS/2<sup>®</sup> logo, and the Novell<sup>®</sup> "Yes, It runs with NetWare<sup>®</sup>" logo are clear evidence that the Nx586 processor will run applications flawlessly.

### AFFORDABLE

The Nx586 processor family promotes lower PC costs than the Pentium. Specifically, NexGen offers its family of processors at a far more affordable level. And if you don't need floating point capability, you don't have to buy it. Also unlike the Pentium, the Nx586 processor includes both the level-one and level-two cache controllers on chip— integration that's critical to maximizing performance and minimizing cost.

### Nx586 technology

#### Features

#### Benefits

#### ADVANCED 5TH GENERATION TECHNOLOGIES

- Superscalar Execution
- Double sized L1 code and data caches
- 2-level Branch Prediction
- 64-bit buses
- High performance floating point

*Provides 586-class performance*

#### NEXGEN ADVANTAGES RISC86 Microarchitecture

*Provides high performance and future extensibility*

#### On-chip L2 Cache Controller

*Provides maximum performance and lower PC costs*

#### Optional floating point coprocessor

*Lowers costs for most users who do not need floating point*

#### NEXGEN RECOGNIZED WORLDWIDE

*NexGen has received worldwide recognition for its Nx586 processor. These awards are for the "Most Innovative New Product of the Year" from the U.S. and Germany.*



# NexGen High Performance Processor Design

**NexGen delivers the most advanced x86 processor available today, incorporating many next generation technologies, to deliver the highest possible performance.**

The NexGen Nx586 processor is the first implementation of NexGen's innovative and patented RISC86 microarchitecture. The RISC86 microarchitecture is the first full application of RISC principles to the x86 instruction set. The Nx586 processor also includes Superscalar execution, on-chip Harvard architecture L1 code and data caches, branch prediction, 64-bit wide buses, and advanced floating point capabilities. Combined with the RISC86 design, NexGen's much more advanced branch prediction and private L2 cache bus extend the Nx586 processor technologies beyond the fifth generation. To ensure product quality, reliability, and high volume manufacturing, NexGen has entered into an agreement in which IBM Microelectronics™ is the primary manufacturer for the Nx586 processor family to produce a fully tested and packaged product.

## RISC86 MICRO-ARCHITECTURE

The Nx586 processor fully implements the industry standard x86 instruction set to be able to run the more than 50,000 applications now available. This implementation is accomplished through the use of NexGen's patented RISC86 microarchitecture. The innovative RISC86 approach dynamically decodes x86 instructions into RISC86 instructions. The RISC86 instructions are then executed with optimal parallelism in multiple execution units. The RISC86 instruction set was specifically designed by NexGen with direct support for the x86 architecture while obeying RISC performance principles. The Nx586 processor is the only production processor to incorporate this advanced technology (Intel has announced that its future P6 will incorporate similar technology). The RISC86 microarchitecture pioneered the use of many state-of-the-art computer science techniques to achieve very high performance, including register renaming, data forwarding, speculative execution, and out-of-order execution. Note that this approach is fundamentally different than RISC processors, which have no support whatsoever for the x86 instruction set architecture.

The benefits of this approach are several. First, the performance advantages of RISC design are applied to the x86 instruction set. Second, each execution unit can be smaller and more compact. Third, the execution units can be more specialized to give specific performance enhancements. Finally, it will be easier to add additional execution units in future designs. The RISC86 microarchitecture not only gives the Nx586 processor high performance today, but also allows for significantly higher performance in the future.

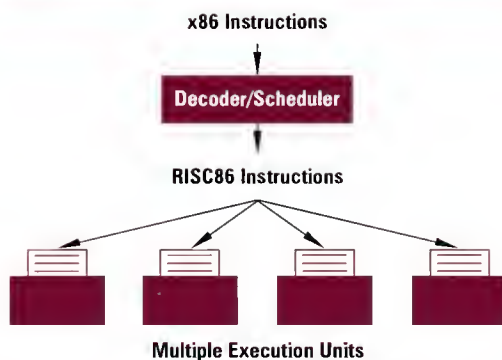
## SUPERSCALAR OUT-OF-ORDER EXECUTION

The superscalar Nx586 processor has four independent execution units which allow for higher performance computing. The Nx586 processor's RISC86 microarchitecture incorporates more advanced technologies including register renaming, data forwarding, and out-of-order execution for high performance and future extensibility.

## INDUSTRY'S LARGEST L1 CACHE

586-class processors utilize separate Harvard architecture on-chip code and data caches for the level-one cache memory for superior performance. To take best advantage of the level-one

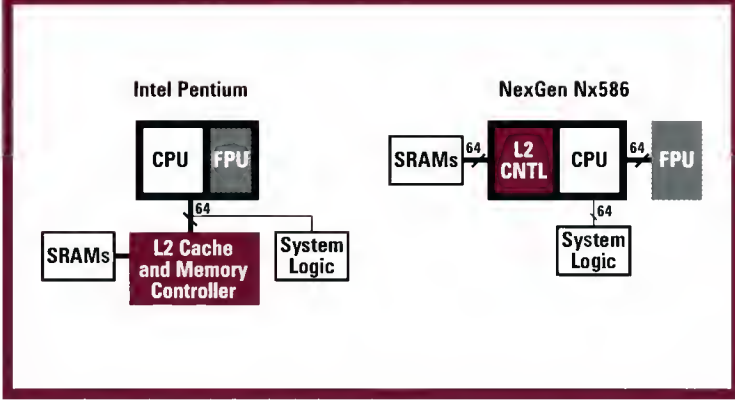
### NexGen's Patented RISC86 Microarchitecture



*NexGen's patented RISC86 microarchitecture dynamically decodes complex x86 instructions into RISC86 instructions, thus taking advantage of RISC performance principles. The Nx586 processor is the only shipping processor that incorporates such advanced technologies giving the processor its high performance levels.*



## Superior Partitioning



*The Nx586 processor incorporates an on-chip L2 cache controller with a private L2 cache bus and offers the floating point coprocessor optional. This ensures full performance, cuts PC costs, and gives you a choice about buying floating point.*

cache, the Nx586 processor includes the largest L1 cache on the market with 32-Kbyte of cache. It is organized into separate 16-Kbyte instruction and 16-Kbyte data caches compared to 8-Kbytes each for the Pentium. These caches keep key instructions and data close to the processing engines to increase overall system performance.

### ON-CHIP L2 CACHE CONTROLLER

Unlike the Pentium processor, the Nx586 processor incorporates a L2 cache controller on-chip with a private 64-bit bus to the L2 cache RAM. This assures the level two cache will always run at full performance today as well as in future higher clock rate Nx586 processors, thus providing higher CPU and system performance. (This is yet another technology that is incorporated into the Nx586 processor today that Intel says it will use in the P6).

### MULTIPLE BRANCH PREDICTION / SPECULATIVE EXECUTION

NexGen's RISC86 microarchitecture is the first to implement both multiple 2-level branch prediction and speculative execution. This advanced form of branch prediction enables the Nx586 processor to predict multiple application branches with over 90% accuracy. Speculative execution enables processing to continue uninterrupted down the predicted path.

### 64-BIT BUSES

586-class processors employ 64-bit buses—twice the size of the buses in previous-generation processors. The larger buses move data faster and therefore improve performance. The Nx586 processor employs 64-bit buses within the system including those between the Nx586 processor and the floating point coprocessor, the processor system bus, and the private L2 cache bus.

### OPTIONAL FLOATING POINT COPROCESSOR

In contrast to the Pentium design, the floating point coprocessor is an option. If you run business applications, you rarely need a floating point coprocessor. While the Intel Pentium architecture forces you to pay for it in all circumstances, the Nx586 processor leaves the option up to you.

However, if you require an FPU for your work, NexGen's floating point coprocessor is designed to provide very high performance operation, including two-clock 32-bit and 64-bit adds, subtracts and multiplies, the fastest of any x86 processor. Users of CAD programs and other technical and scientific applications can make good use of this high performance coprocessor.

### IBM PROVIDES ADVANCED MANUFACTURING

IBM Microelectronics™, one of the world's leading semiconductor suppliers, is the manufacturer of NexGen's Nx586 processor. The Nx586 processor is manufactured using IBM Microelectronics' 0.5 micron CMOS silicon technology, up to 5 layers of metal interconnect, 8-inch silicon wafers, and "flip-chip" packaging technology. This is the one of the most advanced volume production technologies available in the industry offering extremely high quality, reliability, performance, and affordability. The combination of IBM's advanced semiconductor process technologies and NexGen's advanced CPU design technologies has yielded the industry's smallest die size. This allows NexGen to offer its products at affordable prices with superior performance.

### Specifications

Product Offerings	Performance Level	Byte v2.4	Landmark v2.0	Clock Rate	L2 Cache Clock Rate
	P100	5.84	582	93 MHz	93 MHz
	P90	5.42	526	84 MHz	84 MHz
For Comparison					
Pentium Processor 100		2.98	573	100MHz	66MHz
Pentium Processor 90		2.78	518	90MHz	60MHz
L1 Cache		On-chip 16 Kbyte Instruction On-chip 16 Kbyte Data			
L2 Cache		On-chip write-back controller for 256 Kbyte or 1 Mbyte L2 cache			
Manufacturing Technology		0.5 micron CMOS			
Transistor Count		Nx586 processor		3.5 million	
		Nx586 processor w/FPU		4.2 million	
Die Size		118 mm <sup>2</sup>			

Landmark's SPEED 2.0 is a test of a processor's instruction execution, caching, and memory performance.

The BYTE v2.4 CPU benchmark suite is a test of CPU/memory subsystem performance.

# Fully x86 compatible



Extensive tests assure that the Nx586 processor family is fully binary software compatible with the x86 software base. So the Nx586 processor family runs the more than 50,000 DOS, Windows, OS/2 and UNIX applications. Thousands of satisfied NexGen customers will agree.

You're assured of compatibility because NexGen and one of the largest independent testing laboratories, XXCAL, have run thorough suites of diagnostic tests. The tests covered trillions of instruction cycles and employed all of the most popular software applications and peripherals, as well as every major PC operating system and networking protocol. All of the tested software and hardware run properly on the Nx586 processor family. The Nx586 processor family has passed XXCAL's most rigorous compatibility test suites and received their highest award: The Platinum Certification.

In addition, NexGen has performed additional rigorous tests to earn the right to display the 'Microsoft Windows-Compatible' logo, IBM's OS/2 compatible logo and the Novell "Yes, It runs with NetWare" logo. When you see these logos, you can be sure of Nx586 processor compatibility.

## THE BETTER SOLUTION

NexGen produces the most advanced x86 processors available today. The Nx586 processor provides leadership 5th generation x86 performance and is designed to make Nx586 processor based PCs affordable. This straightforward tradeoff analysis makes it clear that NexGen delivers on the 586 promise for mainstream PC users.

Based on industry standard application benchmarks, NexGen's processors offer superior performance at the most affordable prices. NexGen's product naming was designed to make it clear to end-users how NexGen products compare to each other running actual applications, utilizing a "P" for Performance followed by a relative performance score.

For more information on the Nx586 family of processors and the NxVL™ and NxPCI™ system logic chips, call 1-800-8NEXGEN (1-800-863-9436), or reach us on the Web at <http://www.nexgen.com>. In Europe call 33 (1) 60.72.12.30.

### Nx586 Family: Most Advanced x86 Processor Technology

	NexGen Nx586	Intel Pentium
<b>5th Generation Performance Elements</b>		
Superscalar Execution	■	■
Separate On-Chip L1 Code and Data Caches	16K + 16K	8K + 8K
Branch Prediction	■	■
64-bit Buses	■	■
High Performance Floating Point	■	■
<b>NexGen Advantages</b>		
RISC-86™ Microarchitecture	■	
RISC Core	■	
Register Renaming	■	
Data Forwarding	■	
Speculative Execution/Backout	■	
Out-of-Order Execution	■	
On-chip L2 Write-Back Cache Controller	■	
Optional FPU	■	
Multiple 2-level Branch Prediction	■	

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Part Number: NxDOC-MC001-03-U 7/95

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