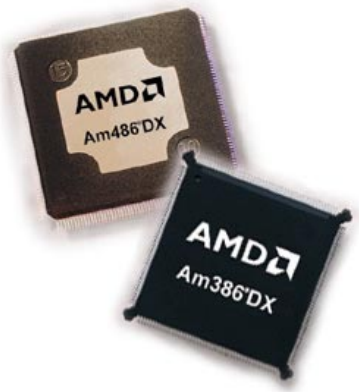
Systems in Silicon

Am486® Microprocessor Overview

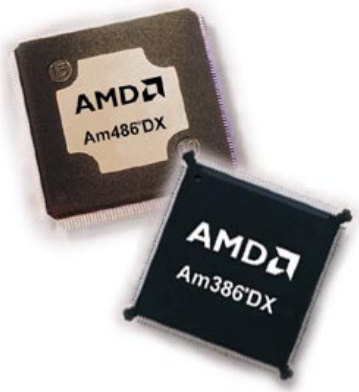
Am486DX5-133 / 5x86™ - P75, Am486DX4-100, Am486DX2-66, Am486DE2-66



Systems in Silicon

Advanced Micro Devices

AMD is the world's largest company that focuses exclusively on integrated circuits.



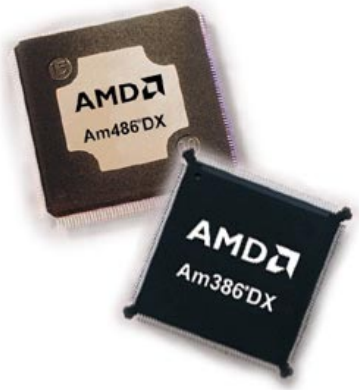
Systems in Silicon

E86 Embedded Processor Family

Leverage the billions of dollars of research and development on the world's dominant architecture:

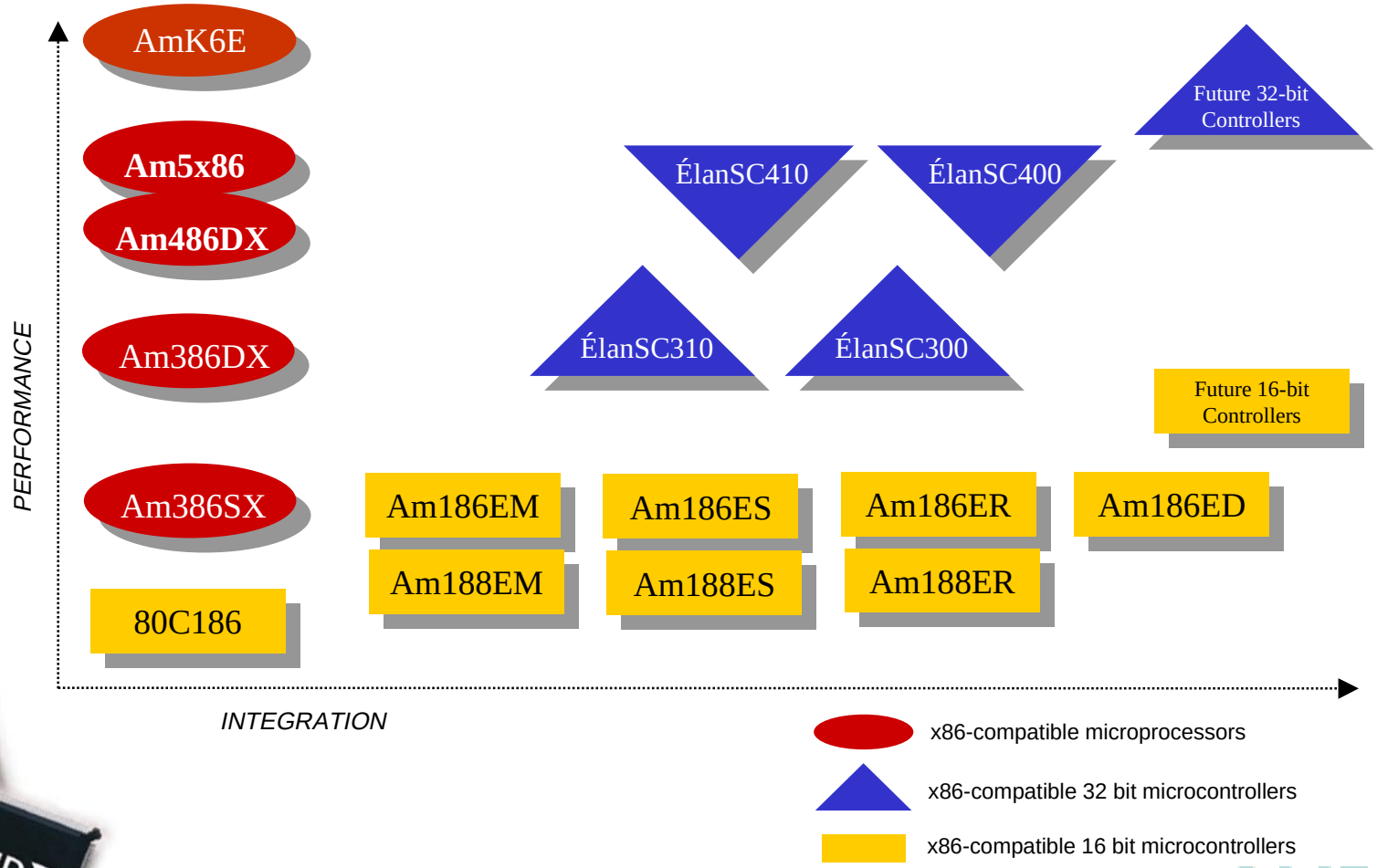
x86

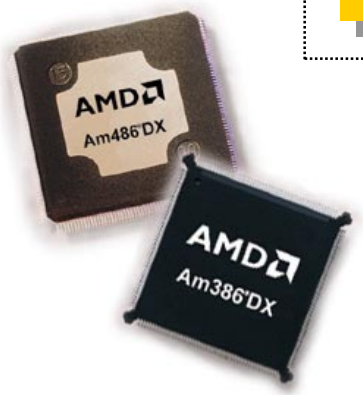
- Time-to-Market
- Price/Performance (System Cost)
- Software Compatibility
- Preserve Existing S/W Investment
- Broad, Established set of Tools
- Familiarity
- Long Term Support
- Assured Growth Path
- Code Compactness
- Integration



Systems in Silicon

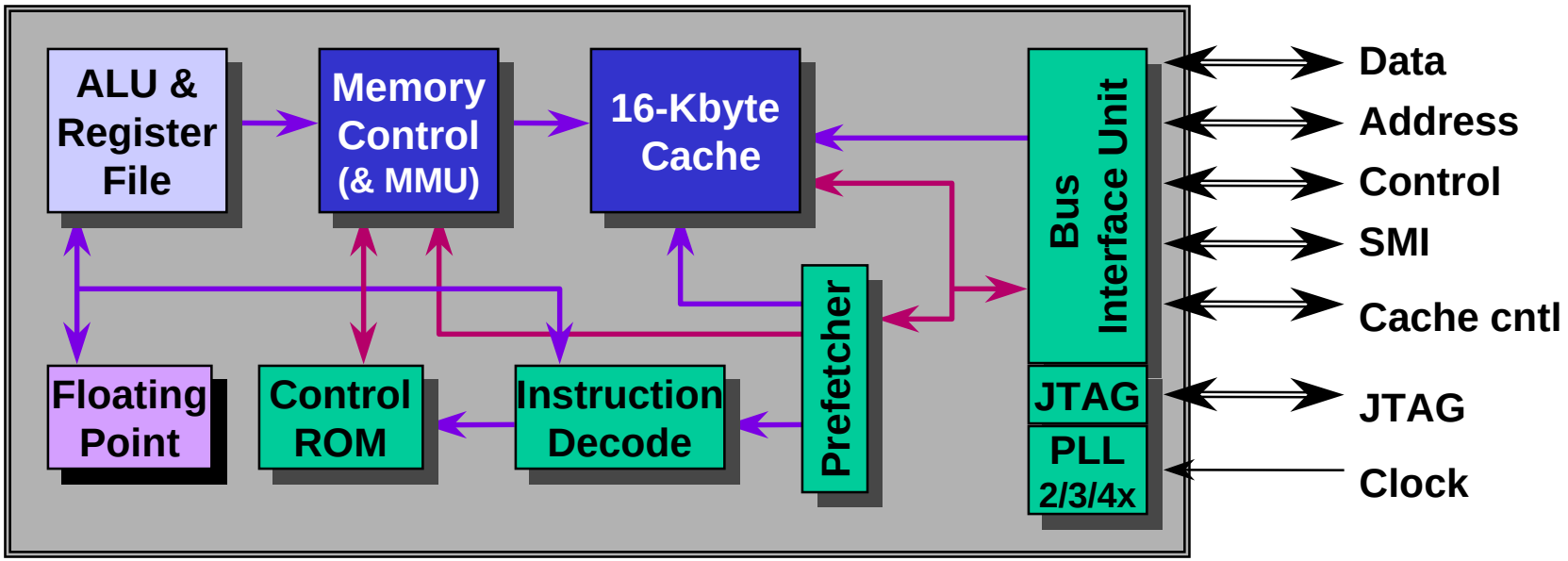
E86 Family of Microprocessors and Microcontrollers



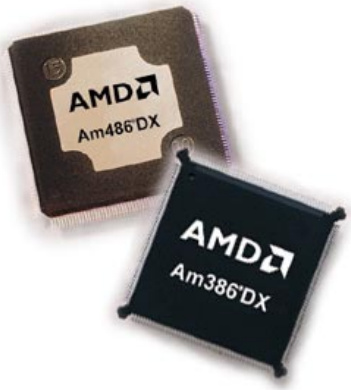


Systems in Silicon

Am486 Microprocessor

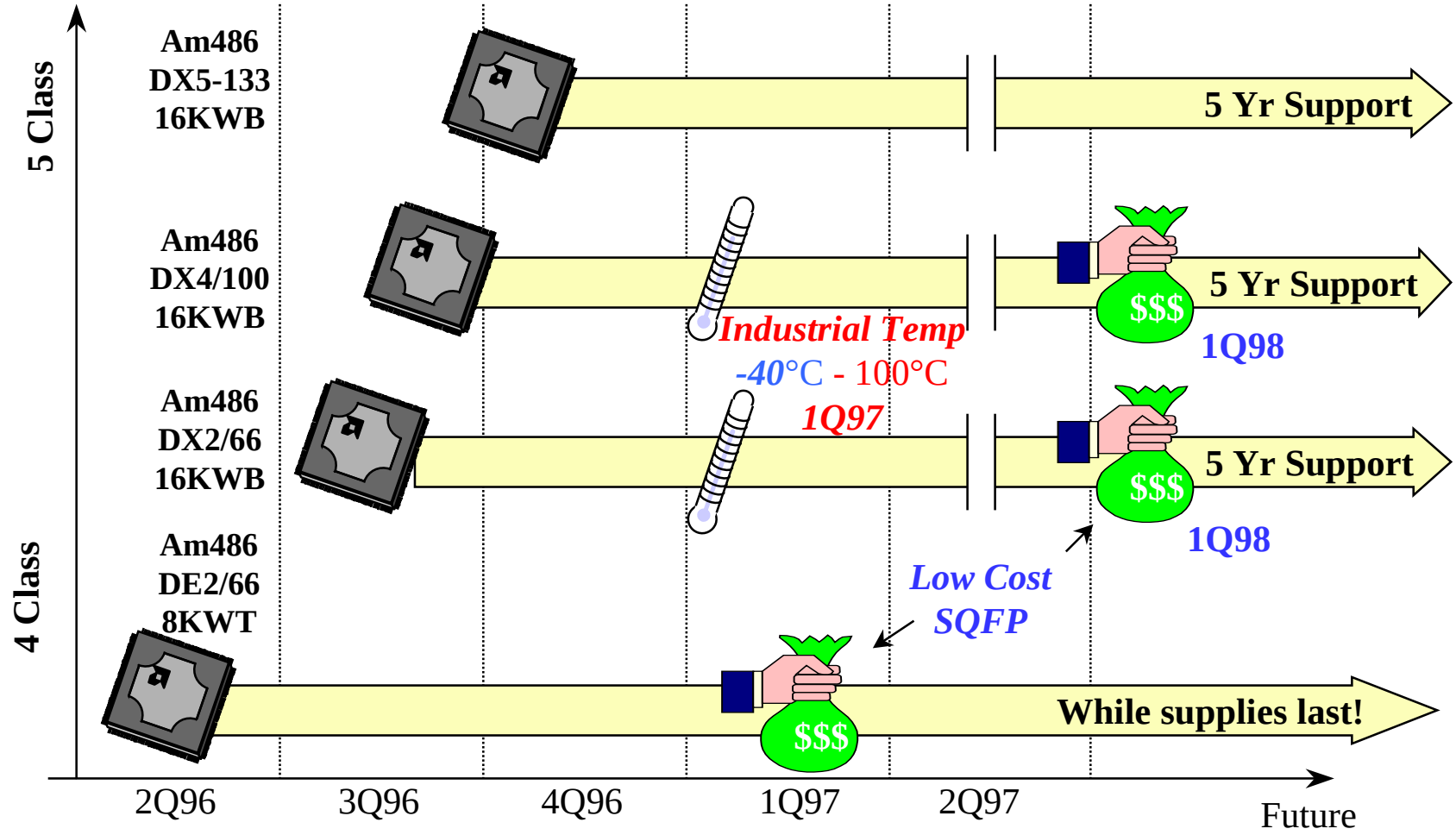


- Identical to standard 486DX products
- 16-Kbyte, write back / write through cache
- 3V core, 5V tolerant I/Os
- 2x, 3x, or 4x clock multiples (66, 100 and 133MHz)
- Available in 208 pin SQFP and 168 pin PGA



Systems in Silicon

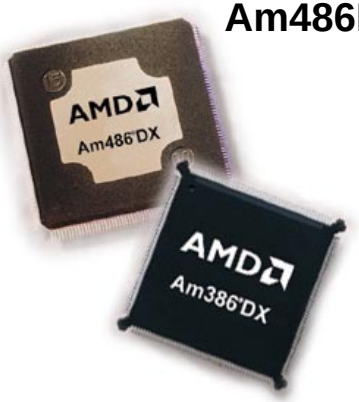
Am486 CPU Roadmap



Systems in Silicon

Am486 Differences

Processor	Speed	CLKMUL	Cache	Vcc	T_{CASE}	Package
Am486DE2	66	2x: (N.C.)	8k WT	3.0-3.6	85 only	PGA, SQFP (PDE / PDH)
Am486DX2	66	2x: (Pull Low)	16k WB/WT	3.0-3.6	85, 100 85, 100 **85 only**	PGA, SQFP (PDE), **SQFP (PDH*)**
Am486DX4	100	3x: (Pull High)	16k WB/WT	3.0-3.6	85,100 85,100 **85 only**	PGA, SQFP (PDE), **SQFP(PDH*)**
Am486DX5	133	4x: (Pull Low)	16k WB/WT	**3.3**-3.6 **3.15**-3.6	85 only	PGA, SQFP (PDE)



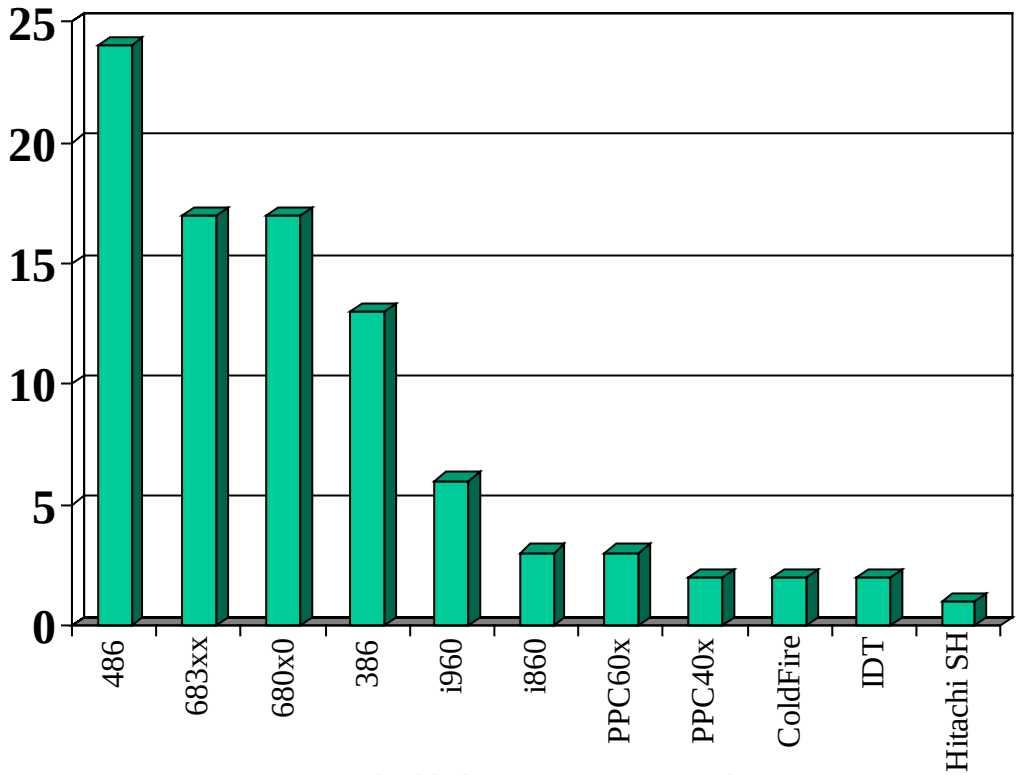
*** - New Low Cost (PDH-208) SQFP package available 1Q98**

Systems in Silicon

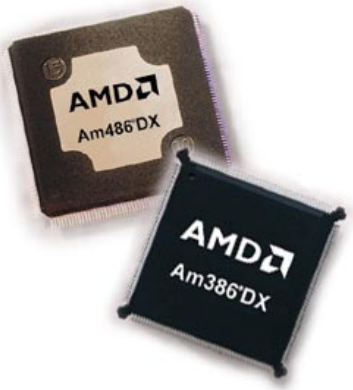
The 486 in Embedded Designs

Results From a Recent Study

Which 32-bit architectures have you used in the last 12 months for your embedded system?



Source: Embedded Systems Programming

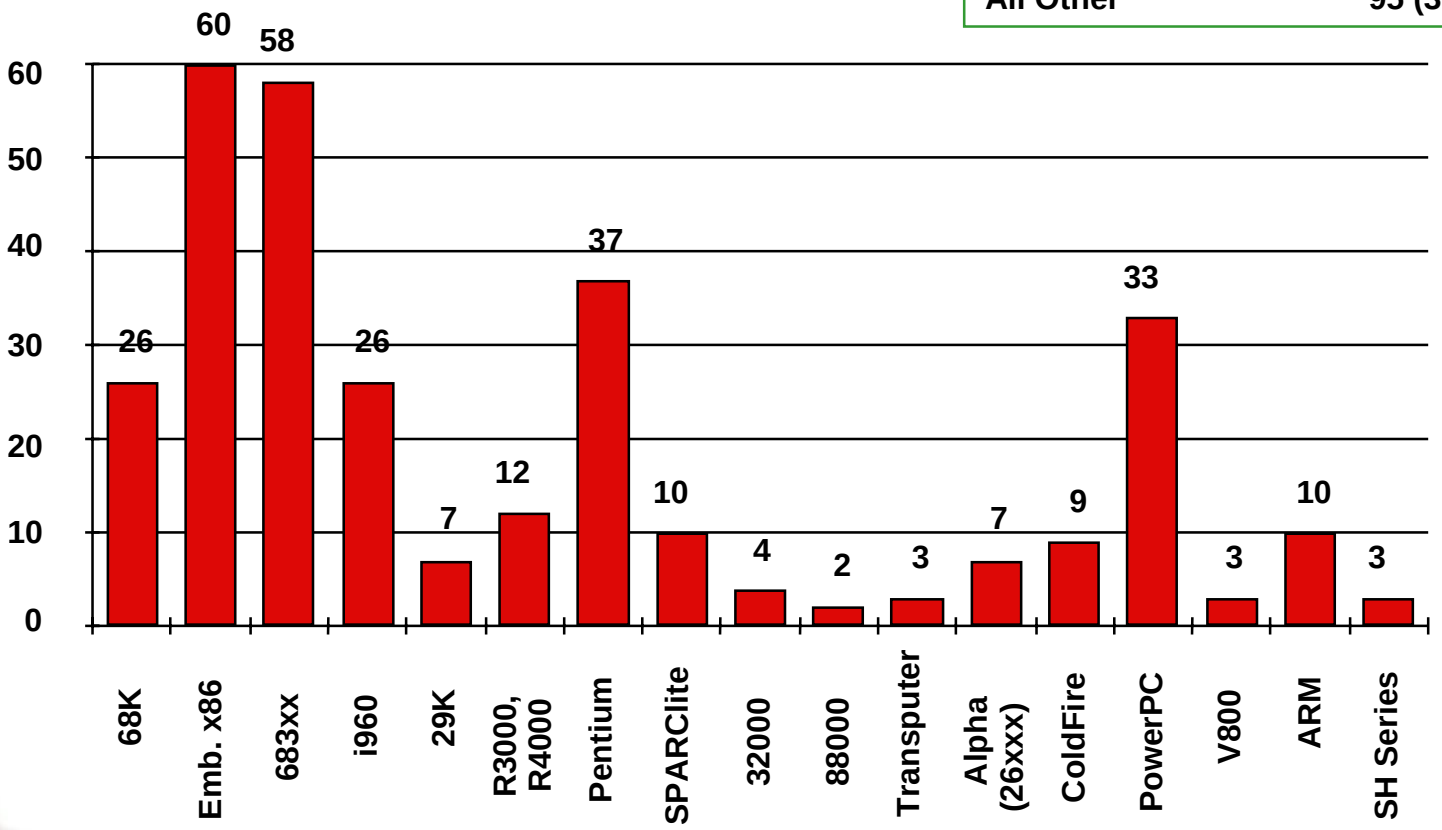


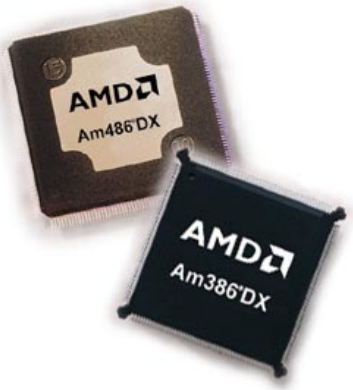
Systems in Silicon

EE Times Survey Data

32-bit Future Designs

All x86	97 (32%)
All 68K	84 (27%)
All PowerPC33 (11%)	
All Other	95 (30%)





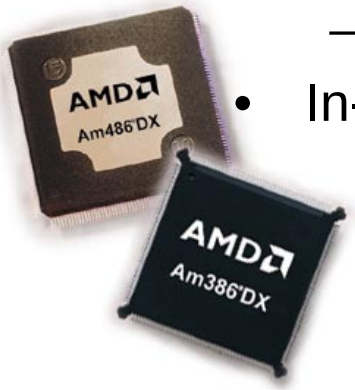
Source: EE Times '96

AMD

Systems in Silicon

Am486 Popular Market Segments

- Networking Routers
  - Indoor Only, Perf. / Cost
- Telecom PBX Switches
  - Mainframes / Line Cards
  - Indoor only / In-Outdoor
- Digital Set Top Box / Consumer Appliance
  - Performance and Cost
- Mobile Computers
  - Power / Size / Integration
  - Performance / Cost
- In-Flight Entertainment
- Japanese Word Processors & Pen PCs
  - Cost, Cost, Cost…
- POS Terminals
- Industrial PC
  - Industrial Temp./ Reliability
  - Software Compatibility
  - Scalable Cost / Performance
- Embedded PC / Controller
  - All combinations
- PC Upgrades
  - Commodity $ PGA

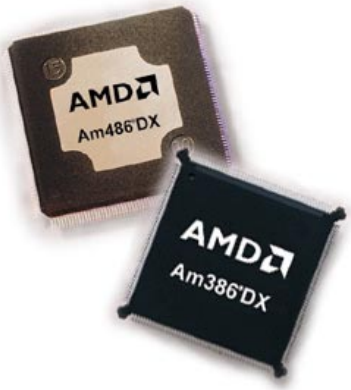


Systems in Silicon

Why are so many customers using the Am486 in embedded designs?

- **Time to Market**
  Take advantage of the many useful peripherals, standards, software packages, and tools that have already been developed for the PC market
  - Chip Sets and core logic
  - PCI, Local Bus and ISA busses
  - VGA / NTSC / PAL graphics controllers
  - Ethernet, USB, “Super I/O” chips, Etc.

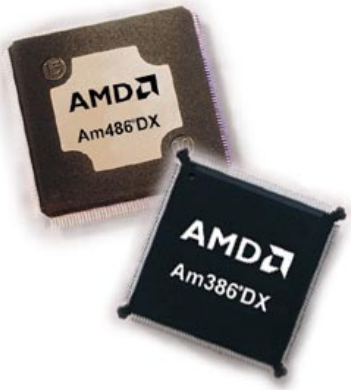
In most cases the driver software and protocol stacks are already written and available for the x86 architecture!



Systems in Silicon

Why are so many customers using the Am486 in embedded designs?

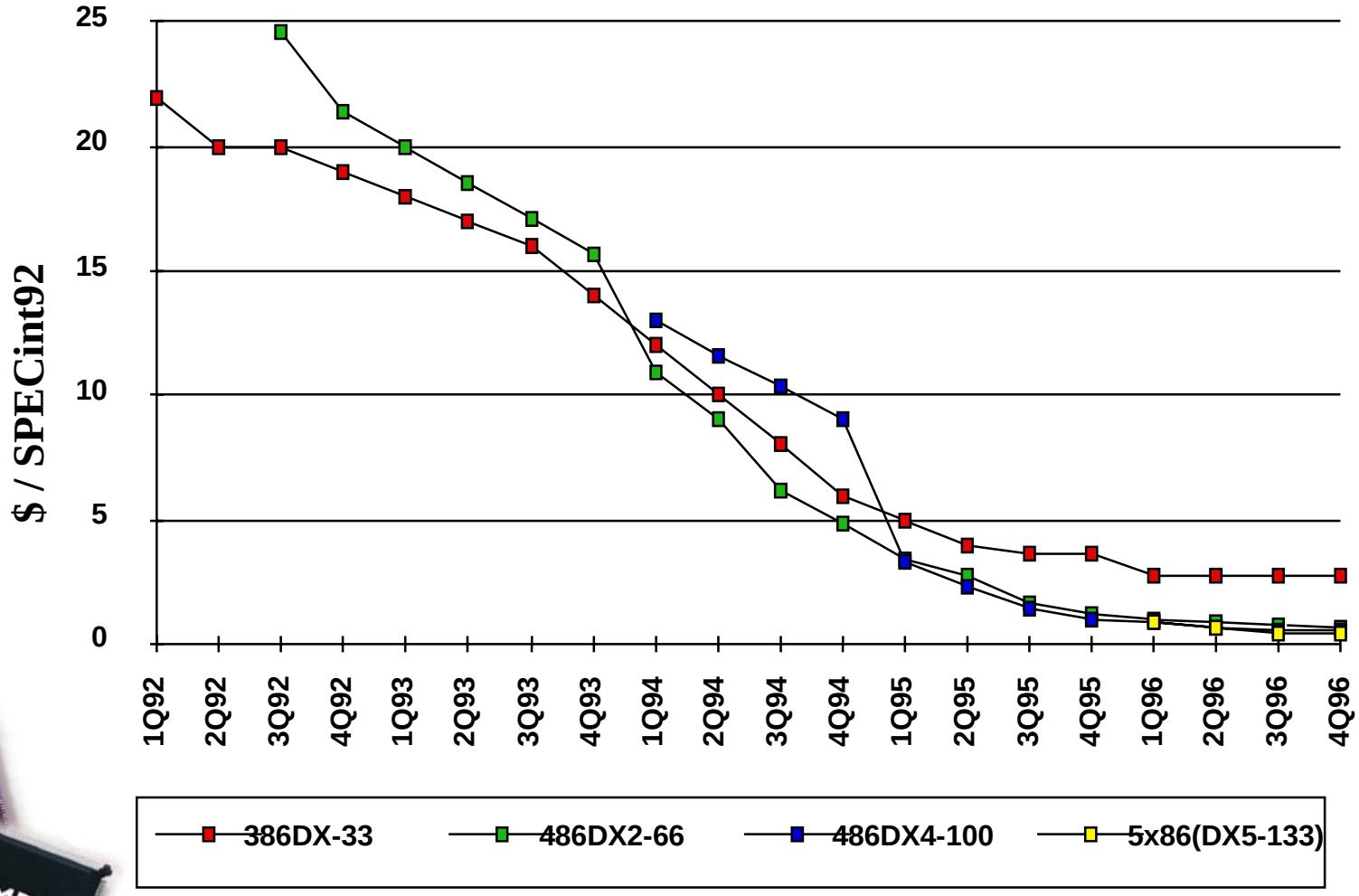
- **Price/Performance**
  - Unlike many embedded processors, the Am5x86(TM) and Am486 have already amortized their development costs over the tens of millions of units shipped to PC customers. 78 Million in '96 and 91 Million shipped in '97
  - The Am5x86(TM) (486DX5-133) is the fastest 486 processor on the market. It offers *5th generation performance at a 4th generation price and system design*
  - Wide range of pin and software compatible options from the DX2-66 in the Low Cost package to the Am5x86

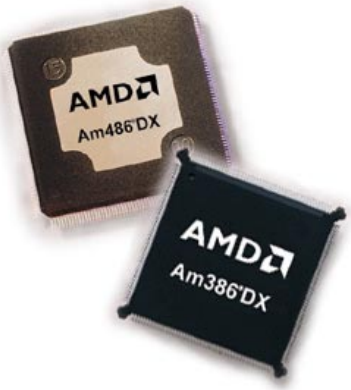


AMD

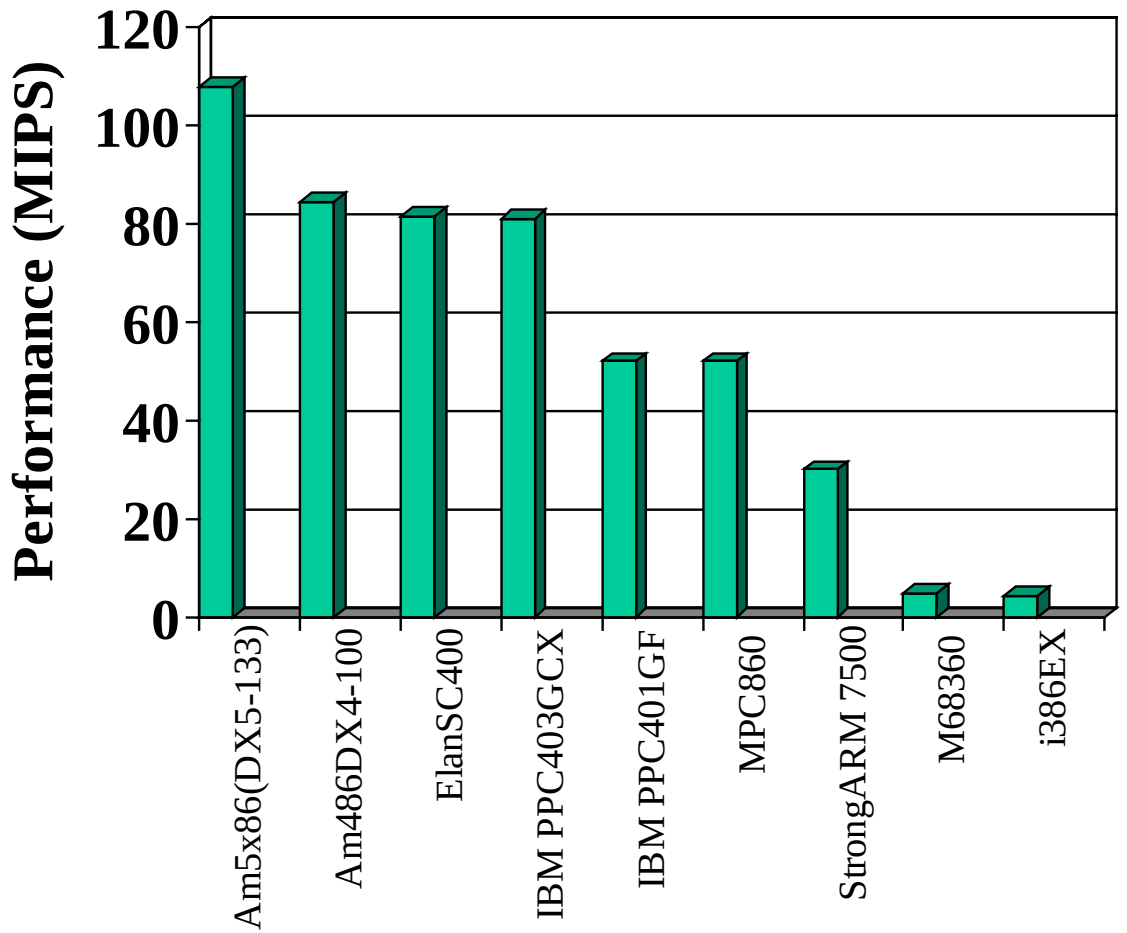
Systems in Silicon

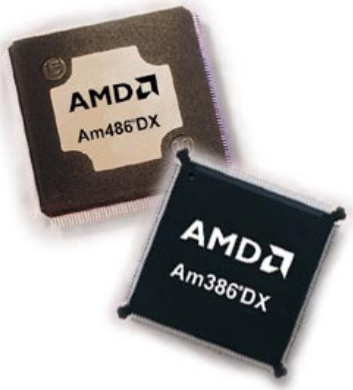
x86 $ /SPECint92 over Time





Performance

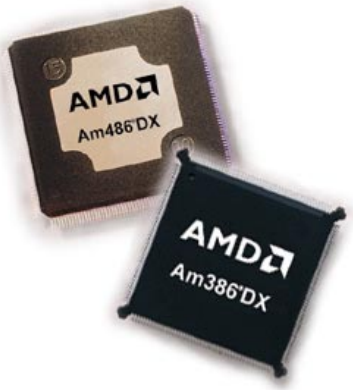




Systems in Silicon

Why are so many customers using the Am486 in embedded designs?

- **Software Compatibility**
  - x86 is the Architecture with the widest support of Operating Systems and Software Applications Programs.
- **Broad, Established Set of Development Tools**
  - The x86 Architecture has the widest range of highly refined software development tools with great values / price.

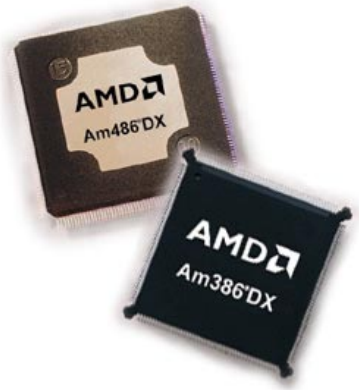


Systems in Silicon

Why are so many customers using the Am486 in embedded designs?

- **Familiarity**
  - Most engineers are already familiar with x86 hardware, software, and design tools.

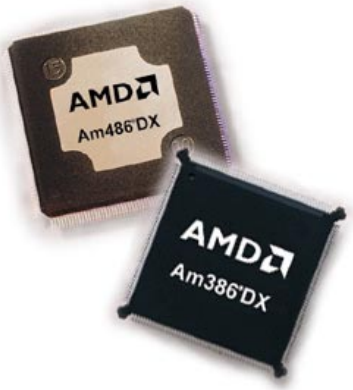
- **Long Term Support and Integration**
  - AMD's Logic Products Division is committed to supporting the embedded market with a long term and stable supply of competitively priced microprocessors and microcontrollers.



Systems in Silicon

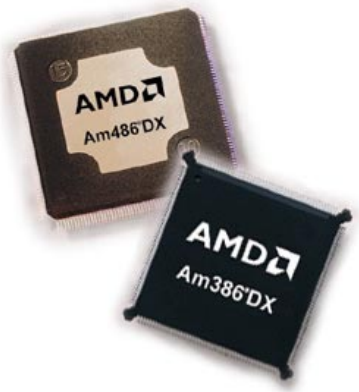
Why are so many customers using the Am486 in embedded designs?

- **Upgrade Roadmap**
  - The x86 architecture has the broadest family of software compatible processors in the world.
  - Desk top PC volume supports technology investment that subsidizes embedded processors.
    - High speed cores available
      - Frequencies now above 300 MHz
      - Performance comparable to RISC
    - Shrinking geometries
      - Lower and lower power
      - Packaging advances



Systems in Silicon

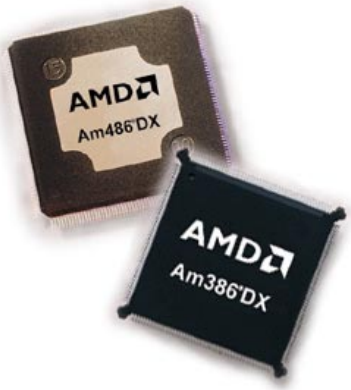
Backup Slides
FusionE86 Partners



Systems in Silicon

Third Party Support

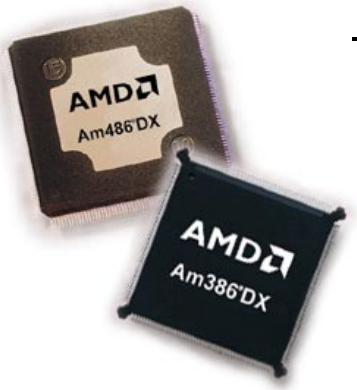
- **BIOS**
  - Eurosoft, Ltd.
  - General Software
  - Phoenix Technologies
  - System Soft, Inc.
- **DOS**
  - Datalight
  - General Software
  - IBM
  - Microsoft
  - PharLap Software



Systems in Silicon

Third Party Support

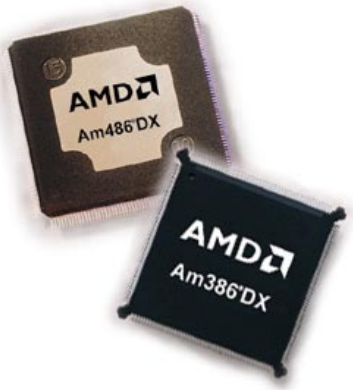
- **Real Time Operating Systems (RTOS)**
  - Embedded Systems Products
  - Integrated Systems
  - JMI Software
  - KADAK Products
  - Microtec Research
  - Pacific Softworks
  - QNX Software Systems
  - US Software
  - Wind River Systems



Systems in Silicon

Third Party Support

- **Emulation Tools**
  - Applied Microsystems Corp.
  - Grammar Enginer
  - Microtek International
- **Debugging and Testing Support**
  - Hewlett Packard
- **Chip Set Support**
  - Acer Labs
  - Integraphics Systems
  - S-MOS
  - Trident Microsystems
- **Software Support**
  - Chronology
  - Eagle Design Automation
  - Synopsis (Logic Modeling)



Systems in Silicon

Third Party Support

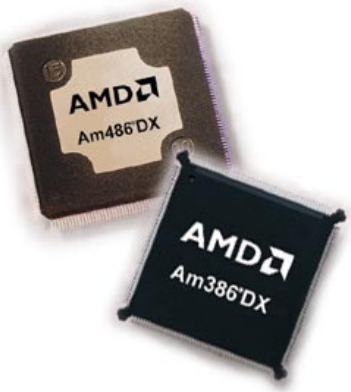
Evaluation Boards / Development Platforms

US / Europe:

- Acer Labs (ALi)
- Adastra Systems
- American Preditor
- Ampro Computers
- boards AG (Mikron)
- Digital-Logic
- Hectonic
- JUMPtec
- Real Time Devices
- Shuttle Computer
- S-MOS
- VersaLogic
- WinSystems
- Ziatech

Asia / Pacific:

- Winco Electronic Co. LTD Phone : +886-2-2688-8666
- SMT Electronic Co. LTD Phone : +886-3-325-3033
- Shing-Yunn Electronic Co. LTD Phone : +886-2-908-9980



AMD

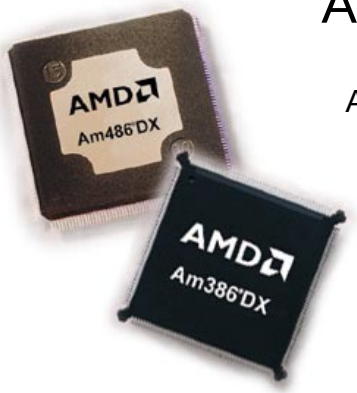
Systems in Silicon

Third Party Support:
Acer Laboratories, Inc.

Acer Labs (ALi) is providing two resources which will facilitate the use of the Am486 in embedded designs.

- **Long Term Chipset Support**
  Contact ALi to obtain a guarantee of long term support on their FinALi chipset.

- **Design Examples**
  ALi is allowing AMD to release a copy of their M1489 motherboard schematic. This shows how to implement an Am486-based design with a PCI bus.



AMD does not guarantee the full functionality of the design nor can AMD provide technical support for this design. AMD will have internally developed designs available in 2H98.

Block Diagram