



AMD® Am186™ER and Am188™ER Microcontrollers



PRODUCT OVERVIEW

Highly-Integrated, High-Performance 80C186 Upgrades, with 32 Kbytes of Internal RAM

AMD's Am186ER and Am188ER microcontrollers are based on an enhanced 80C186 core with 32 Kbytes integrated RAM, and integrated peripherals—offering up to twice the performance of the 80C186 without increasing system cost. This makes the Am186ER and Am188ER controllers ideal upgrades for 80C186 designs requiring 80C186 compatibility, 32 Kbytes of RAM, increased performance, serial communications, and a glueless interface to external memory systems.

Designing with the Am186ER or Am188ER controller preserves your x86 software investment and makes sense from a systems point of view. The Am186ER and Am188ER controllers enable designers to reduce the size, power consumption, and cost of embedded systems, while increasing functionality and performance. The 32 Kbytes of integrated RAM stabilizes RAM supply and saves board space.

PRODUCT HIGHLIGHTS

Higher Performance, More Integration

- Includes all standard 80C186 peripherals, plus:
 - 32 Kbytes RAM
 - Glueless interface to external Flash, EPROM, SRAM, and PSRAM
 - Nonmultiplexed address/data bus
 - One asynchronous serial port
 - One synchronous serial interface
 - 32 programmable I/O's
 - Enhanced chip select functionality
 - 1x, 4x, or /2 CPU clock
 - Watchdog timer interrupt
 - Programmable clock output control
 - Interrupt controller
 - 16-bit reset configuration latch
- Power Save mode makes this controller ideal for power-sensitive embedded applications

Highly Integrated Design

- Optimized to offer lower system costs than standard 80C186 designs:
 - 32 Kbytes of integrated RAM instead of buying two external 32 Kbyte SRAMs
 - Enhanced bus interface with increased integration and nonmultiplexed address/data bus provide faster access to memory
 - Phase locked loop feature removes the requirement for a 2x clock input
 - Supports zero-wait state operation at 40 MHz with 70-ns external memory for higher performance

Enhanced Product Options

- Variety of speed and package combinations: 20-, 25-, 33-, and 40-MHz operating frequencies; TQFP and PQFP packaging
- 3.3-V ± 0.3-V operating range with 5-V tolerant I/O

PRODUCT DESCRIPTION

The Am186ER and Am188ER microcontrollers integrate peripherals such as 32 Kbytes of RAM, a DMA controller, external memory controller peripheral, chip select logic, serial controller, programmable I/Os, and timers to increase system functionality while reducing overall system cost. The external memory controller supports a glueless connection to external SRAM, EPROM, Flash, and pseudo-static RAM. The Am186ER and Am188ER microcontrollers also feature an innovative bus design that frees the processor to run at nearly twice the speed of standard 80C186 controllers—without an increase in external memory speed requirements.

The Am186ER and Am188ER controllers are designed to meet the most common requirements of embedded products developed for the private and public communication infrastructure, mass storage, office automation, industrial, and general embedded markets.

AMD is dedicated to continue offering you more varieties of the Am186ER microcontroller, as well as future E86™ family devices. For technical documentation, please call our literature ordering hotline at (800) 222-9323, or contact your local AMD sales office or AMD sales representative.

Feature	AMD 80C186 AMD 80C188	Am186EM Am188EM	Am186ES Am188ES	Am186ER Am188ER
Processor Core	Am186	Am186	Am186	Am186
Address Range	1 Mbyte	1 Mbyte	1 Mbyte	1 Mbyte
Internal RAM	0	0	0	32 Kbyte
Interrupts	10	13	16	13
DMA Channels	2	2	2	2
Timers	3	3	3	3
Memory Controller	Refresh	SRAM, Flash, ROM, PSRAM	SRAM, Flash, ROM, PSRAM	SRAM, Flash, ROM, PSRAM
Chip Selects	13	12	12	13
PIOs	0	32	32	32
Async. Serial Ports	0	1	2	1
Sync. Serial Ports	0	1	0	1
Voltage	3.3-V, 5-V	3.3-V, 5-V	3.3-V, 5-V	3.3-V***
Frequency (MHz)	10, 12.5, 16, 25*	20, 25, 33, 40**	20, 25, 33, 40**	20, 25, 33, 40

*3.3-V 80L186 and 80L188 controllers are available in 10-, 12.5-, and 16-MHz speeds.

**3.3-V Am186EMLV, Am186ESLV, Am188EMLV, and Am188ESLV controllers are available in 20- and 25-MHz speeds.

***3.3-V Am186ER and Am188ER controllers have 5-V tolerant I/Os.

Am186ER, Am188ER Microcontroller Value Proposition

Performance: Extends the performance range of existing 80C186/188 designs, meaning reduced size, power consumption, and cost of these embedded designs. In addition, 32 Kbytes of internal RAM offers a better match for many RAM requirements than external RAM.

Longevity: Preserves the customer's investment in x86 software and offers an integrated supply of 32-Kbyte RAM.

Development Support: Support foundation for x86 development has long been established in the PC industry.



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