HEWLETT® PACKARD

HP 64767 Series Emulators for 25 MHz Intel 80C186/C188EA/EB/EC/XL, Processors

Product Overview

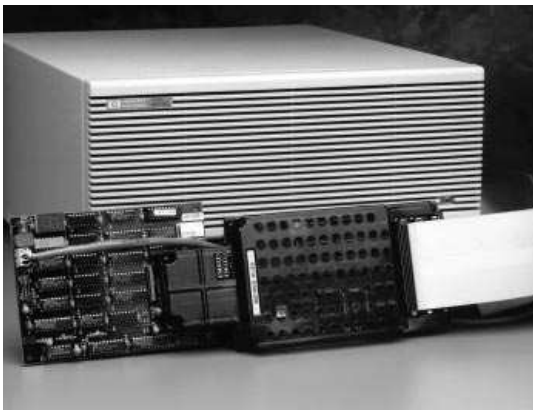
Description

The HP 64767 series active probe emulators support a broad selection of the Intel 80186/188 family of microprocessors through 20 MHz operation. These emulators support the 80C186EA/EB/EC/XL models as well as the 80C186 and 80186 versions. Designers using these Intel 16-bit embedded processors are assured of a full line of support with modular tools and software support on a wide range of design platforms. There is support for both 3 V (80L186Ex) and 5 V (80C186Ex) versions of the processors.

These emulators have active bondout-based probes to ensure maximum electrical and functional transparency, including dequeueing. Active probes also permit the use of a long 914 mm (36 in.) cable for easy target system access. The active probe emulators contain the microprocessor, emulation monitor, run-control circuits, and 1 Mbyte of emulation memory, covering the complete address space of the processor.

Features

- Real-time, zero-wait-state operation to 20 MHz
- Active probe includes one megabyte of emulation memory that covers the entire processor address space
- Emulation memory is fully dual-ported in 16 mappable blocks with 1 Kbyte resolution
- Demo board is supplied with the probe for easy performance verification
- Supports popular package configurations, including surface mount designs
- Support for 5 V and 3 V versions
- Full symbolic debug for fast, easy development and debug with HP user interfaces
- Flash EPROMs for easy firmware update
- Two independent RS-232-C ports, one with RS-422 support for high-speed upload and download
- LAN interface
- Unlimited software breakpoints
- Eight hardware breakpoints
- 1K, 8K, 64K, or 256K deep emulation bus analyzer
- Real-time analysis of address, data, and status/control information
- Real-time instruction dequeueing of the trace list
- Disassembly of the 80186 instruction set



- Symbols inserted in the trace list let you quickly understand code execution
- Analysis trace information includes trace line number, address (hex or symbol), data (hex), instruction opcode (hex or symbol operands), bus status, and time or state count (using the deep emulation bus analyzer). Time count and state count measurements are at full speed with HP 64767 series emulators using HP 64794 series emulation bus analyzers.
- Optional 1K deep, 64-channel emulation bus analyzer with a 16-channel external analyzer to probe target system hardware

Development tools for 80C186/C188EA/EB/EC/XL, 80C186/C188, and 80186/I88 processors
(including 5 V and 3 V versions)

PC	HP 9000/300/400	HP 9000/700	SunSPARC	
Emulator	HP 64767	HP 64767	HP 64767	HP 64767
Debugger/Emulator	MRI* Intermetrics*	HP B1495B Intermetrics*	HP B1495B	HP B1495B MRI* Intermetrics*
Debugger/Simulator	MRI*	HP B1494B	HP B1494B MRI*	HP B1494B MRI*
C and/or C++ Compilers	MRI† Borland† Microsoft† Intel† MetaWare High C Intermetrics	HP B1493A MetaWare High C Intermetrics	HP B1493B MRI*	HP B1493B MRI† Intermetrics
Assembler	MRI† Borland† Microsoft† Intel† Phar Lap Intermetrics	HP B1449B‡ Phar Lap Intermetrics	HP B1449B‡ MRI*	HP B1449B‡ MRI* Intermetrics
Linker/Loader	Paradigm† Systems and Software Inc.† Intermetrics	Phar Lap Intermetrics		Intermetrics

*Check with software vendor on availability. †C language connection validated by HP. ‡Assembler/linker.

Specifications

Processor compatibility:
Model 64767A: Intel 80C186EA/XL, 80C188EA/XL, 80C186/80C188, 80186, and 80188 (PGA and PLCC adapters included) (HP 64767AL for 3 V support)

Model 64767B: Intel 80C186EB and 80C188EB (PLCC adapter included) (HP 64767BL for 3 V support)

Model 64767C: Intel 80C186EC and 80C188EC (Adapters are ordered separately for 100-pin PQFP and 100-pin QFP packages) (HP 64767CL for 3 V support)

Electrical
Except as noted in the specifications, all electrical differences defined by Intel between the 80C186 and XL processors also apply to the HP 64767A/AL emulator as far as compatibility with processors is concerned. Refer to Intel compatibility documentation for differences between the processors.

Maximum clock speed:
25 MHz with no wait states required for emulation or target memory. 3 V versions of the 80C186Ex processors have a maximum speed of 18 MHz.

Minimum clock speed: 1 MHz.
Power: 250 mA max from target system; all other power supplied by card cage.

Vcc range: 4.5 V to 5.5 V for HP 64767A/B/C; 2.7 V to 3.6 V for HP 64767AL/BL/CL.

Environmental
Temperature: operating, 0° to +40°C (+32° to +104°F); nonoperating, -40° to +70°C (-40° to +158°F).

Altitude: operating/nonoperating, 4600 m (15,000 ft).

Relative humidity: 15% to 95%.

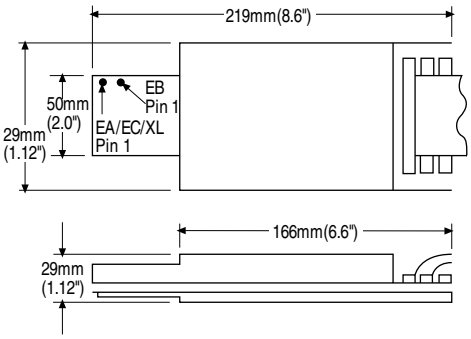
Regulatory compliance
(When installed in HP 64700 card cage)

Electromagnetic interference:
CISPR 11:1990/EN 55011 (1991): group 1 class A
IEC 801-2:1991/EN 50082-1 (1992): 4 kV CD, 8 kV AD
IEC 801-3:1984/EN 50082-1 (1992): 3 V/m, 80% modulation, 26 MHz-1000 MHz
IEC 801-4:1988/EN 50082-1 (1992): 0.5 kV signal lines, 1 kV power lines

Safety: self-certified to UL 1244, IEC 348/HD 401 S1, CSA-C22.2 no.231 Series-M89

Physical
Cable length: probe to card cage approx 914 mm (36 in.)

Probe dimensions:



Below are specifications for the HP 64767A/B/C that differ from the specifications for the Intel 80C186EA/EB/EC/XL processors.

DC specifications	Min	Max
Input low voltage	-0.5V	0.8V
Input high voltage (HP 64767A)	2.0V	Vcc +0.5V
Input high voltage (HP 64767B/C)	0.7*Vcc	Vcc +0.5V
Output high voltage		
AD pins 15 thru 0: -15 mA	2.4V	
AD pins 15 thru 0: -300 uA	Vcc -0.2V	
HP 64767A other pins: -200 uA	Vcc -0.5V	
HP 64767A other pins: -2.4 mA	2.4V	
HP 64767B/C other pins: -2 mA	Vcc -0.5V	
Low level input current (HOLD)	-250 uA	
High level input Current (HOLD)		100 uA
Pin capacitance		approx 30 pF

AC specifications (at Vcc=5V)		
Read data setup time (Tdvcl)	15 ns	
Read data hold time (Tcldx)	8 ns	
Address valid delay (Tclav)	4 ns	32 ns
Data valid delay (Tcldv)	4 ns	32 ns
Address valid to ALE low (Tavll)	(Tclch -15 ns)	
Address valid to clock high (Tavch)	-5 ns	
Address float delay (Tclaz)		30 ns
Address float to LRD active (Tazrl)	-10 ns	
Data valid delay (Tcldv)	4 ns	32 ns
CLKOUT frequency	1 MHz	20 MHz

Below are specifications for the HP 64767AL/BL/CL that differ from the specifications for the Intel 80L186EA/EB/EC processors.

DC specifications	Min	Max
Input low voltage	-0.5V	0.8V
Low level input current (HOLD)	-250 uA	
High level input current (HOLD)		100 uA
Power supply current		250 mA
Pin capacitance		approx 30 pF

AC specifications (at Vcc=3V)		
Read data setup time (Tdvcl)	25 ns	
Read data hold time (Tcldx)	8 ns	
Address valid delay (Tclav)	4 ns	35 ns
Data valid delay (Tcldv)	4 ns	35 ns
Address valid to ALE low (Tavll)	Tclch -15 ns	
Address float delay (Tclaz)		30 ns
Address float to LRD active (Tazrl)	-10 ns	
Data valid delay (Tcldv)	4 ns	35 ns
CLKOUT frequency	1 MHz	13 MHz

Electrical Notes

1) A target system NMI request may be delayed by three clock cycles while running user code or indefinitely while running in the background monitor. NMI requests received while in the background monitor are latched and delivered to the emulation processor after exiting the monitor. Other external interrupts will not be serviced while in the background monitor and are not latched by emulation hardware. These interrupts must remain asserted until acknowledged by the emulation processor.

2) The RESIN signal is delayed by approximately 500 ns between the target system and the emulation processor.

3) ALE will continue to be asserted to the target system during background monitor bus cycles although no other bus status or control signals will be asserted.

Ordering information

Terminal-based emulation system for 80C186EA/EB/XL processors

Model	Description
64767A(5v)	Active probe emulator with 1 Mbyte of emulation memory for
64767AL (3V)	80C186EA/XL processors (includes demo board and PLCC adapter)
64767B (5V)	Active probe emulator with 1 Mbyte of emulation memory for
64767BL (3V)	80C186EB processors (includes demo board and PLCC adapter)
64767C (5V)	Active probe emulator with 1 Mbyte of emulation memory for
64767CL (3v)	80C186EC processors (PQFP or QFP adapters ordered separately)
64748C	Emulation control card
64706A	48-channel, 1K deep emulation bus analyzer card
64700B	Card cage

Emulation system options

64703A	64-channel, IK deep emulation bus analyzer card with 16 bits of external state/timing analysis (workstation hosted)
64704A	80-channel, 1K deep emulation bus analyzer card
64701A	LAN card for HP 64700A
64037A	RS-422 interface card for PC compatibles
64708A	Software performance analyzer card, software and firmware revision C.05.02 or above (supported on HP 9000 workstations and Sun SPARCstations; HP B1487A software required)
64023A	CMB cable (4m long; includes three 9-pin connectors)
64794A	8K deep emulation bus analyzer card, 80-channel
64794C	64K deep emulation bus analyzer card, 80-channel
64794D	256K deep emulation bus analyzer card, 80-channel

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Software for workstations

For each software model number ordered, purchase one media option and at least one license option for each concurrent user.

Embedded debug environment

B3050B	Emulator/analyzer
B1494B	Debugger/simulator
B1495B	Debugger/emulator
B1487A	Software performance analyzer (requires HP 64708A)
B1418B	HP Branch Validator
B3082B	Custom real-time operating system measurement tool

Advanced cross language tools

B1449A	Assembler/linker
B1443A	ANSI C cross compiler

Media and license options

	Opt AAH	HP 9000 Series 300/400 manuals/media (DDS DAT tape)
	Opt AAX	HP 9000 Series 300/400 manuals/media (1/4-inch cartridge tape)
	Opt UBX	HP 9000 Series 300/400 single-user license
	Opt AAY	HP 9000 Series 700 manuals/media (DDS DAT tape)
	Opt UBY	HP 9000 Series 700 single-user license
	Opt AAV	Sun SPARCstation manuals/media (1/4-inch cartridge tape)
	Opt UBK	Sun SPARCstation single-user license

Software for PCs

B3623A	Real-time C debugger	
	Opt AJ4	IBM 3-1/2" media and manuals
	Opt AJ5	IBM 5-1/4" media and manuals
	Opt UDY	IBM single-user license

Software support

HP provides software upgrades through the purchase of the software materials subscription (SMS) service. Contact your HP field engineer for more information, as well as for configuration information, supported processor speeds, and latest software options.

Adapters and extenders

E3419A	Flexible cable extender for 80C186EB
E3422A	Flexible cable extender for 80C186EA/XL
E3412A	PGA to PQFP 80-pin adapter assembly for 80C186EA (includes transition board, extender, PQFP target adapter, and one hex wrench)
E3413A	PGA to PQFP 80-pin adapter assembly for 80C186XL (includes transition board, extender, PQFP target adapter, and one hex wrench)
E3414A	PGA to PQFP 80-pin adapter assembly for 80C186EB (includes transition board, extender board, PQFP target adapter, and one hex wrench)
E3432A	100-pin PQFP adapter for 80C186EC (square)
E3424A	100-pin QFP adapter for 80C186EC (rectangular)

Part number

64761-87602	Extender and one hex wrench for 80186EA/EB/XL (supplied with PGA to PQFP adapters)
64761-87603	Additional SMT adapter for 80186EA/EB/XL (supplied with PGA to PQFP adapters)
1200-1253	PGA adapter for 80C186EA/XL (supplied with HP 64767A)
1200-1694	PGA to PLCC adapter for 80C186EA/XL (supplied with HP 64767A)
E3419-87602	PGA to PLCC adapter for 80C186EB (supplied with HP 64767B)

Note: The PQFP SMT adapter should be assembled on the target board during the surface mount process for optimum connection to the target board.

For more information on Hewlett-Packard Test & Measurement products, applications or services please call your local Hewlett-Packard sales offices. A current listing is available via Web through Access HP at http://www.hp.com. If you do not have access to the internet, please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

United States:
Hewlett-Packard Company
Test and Measurement Organization
5301 Stevens Creek Blvd.
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Santa Clara, CA 95052-8059
1 800 452 4844

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Hewlett-Packard Canada Ltd.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
(905) 206 4725

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P.O. Box 999
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