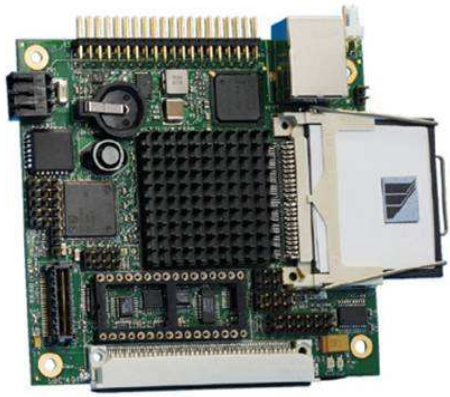
# 486/586 StackableUSB™ Computer with CompactFlash & Flat Panel SBC1496



## Features

- ✓ 120 or 133MHz
- ✓ CRT and flat panel output
- ✓ 64MB SDRAM
- ✓ StackableUSB 2.0 with six (6) hosts in stackable format or plug/cable format for remote client devices
- ✓ CompactFlash connector
- ✓ 10/100BASE-T Ethernet
- ✓ Two (2) serial ports
- ✓ -40° to +85° operation

StackableUSB

RoHS COMPLIANT

The SBC1496 packs a fast 486DX processor, lots of memory, and expandable storage onto a 104™ Form Factor industry standard. This PC compatible CPU includes the StackableUSB interface, which enables the SBC1496 to act as the host device for up to four (4) USB devices which can directly stack onto the CPU without cables or be used with cables for USB devices located remotely to the CPU. The SBC1496 has six (6) USB ports, four (4) OHCI at version 2.0, and two (2) OHCI at version 1.1.

The SBC1496 supports CRTs, color TFT flat panels, and touchscreens making it ideal for OEM applications requiring graphical interfaces. Additional I/O includes digital I/O lines, dual serial ports, EIDE, LPT, keyboard, and mouse. The on-board Ethernet controller enables this CPU to connect directly into Ethernet networks.

With 1MB of on-board flash, accessible as a read/write disk, and 64MB of SDRAM, many large programs can be run from memory. However, if additional storage capacity is required, the on-board CompactFlash connector can provide gigabytes of removable program and data storage.

### Software/Driver Support

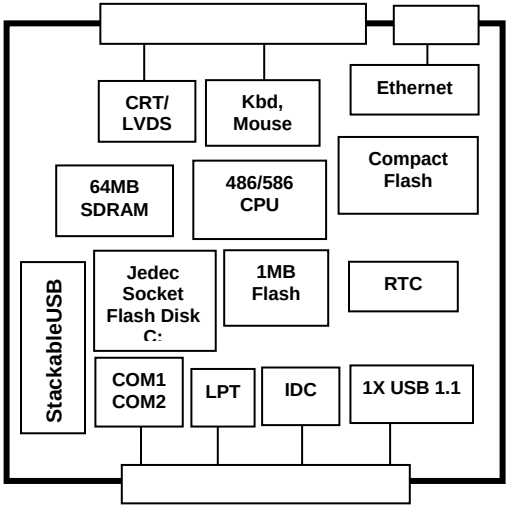
*DOS emulation; MSDOS 6.22*
*Linux*
*Windows C*
*RTOS; Comm Library;*
*CommBLOK™; PID loop library; PidBLOK™*
*C, compilers*

### Compatible Hardware

*StackableUSB Client devices*
*RS232/RS485 devices*

### Mounting/Packaging

*Standoffs, STDOFFUSB*




## *Technical Details:*

The SBC1496 core is an ST Microelectronics STPC Atlas processor running at 120 or 133MHz. The STPC 486DX processor core is clocked at a rate of 133MHz, and includes hardware floating-point math. While other 486DX systems access RAM with a 32-bit data bus, the Atlas accesses RAM with a 64-bit wide data bus, offering performance similar to low-end Pentium-based designs.

The Atlas allows compatibility with both real mode and 32-bit protected mode programs. The Atlas also integrates many PC-compatible peripherals. Dual USB ports, a keyboard and mouse controller, an EIDE controller, two (2) cascaded 82C59A interrupt controllers, dual 16C550 UARTs, three (3) timer/counters (82C54 compatible), and a dual DMA controller are all present. A hardware accelerated VGA controller, with support for both CRTs and TFT panels, is also implemented.

The SBC1496 supports the new StackableUSB specification which allows it to control up to five (5) StackableUSB peripheral cards without the use of a hub. This new stacking architecture provides a rugged StackableUSB interconnect architecture that eliminates the need for standard USB connectors and cables.

The memory subsystem on the SBC1496 allows many programs to be run without any external storage. 64Mbytes of synchronous DRAM (SDRAM) is more than sufficient for many complex, protected-mode programs and operating systems.

The 1Mbyte flash memory chip contains both the BIOS and a user application code space. The user space can be configured as a 768k read/write flash disk.

If a larger program or data storage space is required, or if removability is needed, the CompactFlash interface can provide gigabytes of storage. CompactFlash is used in the True IDE mode, where it is register-compatible with an EIDE hard drive. Thus, it does not require any special drivers for most operating systems.

The user byte-wide Jedec socket can accept a number of different devices. EPROM, 5v Flash, DiskOnChip™, or SRAM can all be plugged in. The SRAM can be battery-backed, which makes for fast storage for data that is updated often.

The VGA controller supports resolutions up to 1024 x 1024. It includes hardware acceleration for fast graphic updates. The output can drive a standard RGB CRT monitor, and an LCD flat panel display. Active matrix (TFT) LCD panels are supported, in 18-bit color. The LVDS interface is compatible with many displays and ensures that the signal integrity is maintained.

The Phillips 1561 USB 2.0 controller integrates USB OHCI cores, and Hi-Speed USB EHCI cores, that are compliant with USB 2.0 and USB 1.1 specifications. The 1561 can handle Hi-Speed USB transfer speed modes: High-speed (480Mbits/s), full-speed (12Mbits/s) and low-speed (1.5Mbits/s). The 1561 provides four (4) downstream ports that enable simultaneous connections of USB devices at different speeds.

Two (2) serial ports allow communication with many different devices. COM1 and COM2 are 16C550-compatible UARTs (with transmit and receive FIFOs). These serial ports are capable of speeds up to 115200 baud, have RS232 transceivers, and have RTS and CTS modem control lines. Additionally, COM1 is configurable for half-duplex RS485 communication with jumperable termination resistors.

The SBC1496 can support application development under numerous strategies. If 16-bit DOS or DOS-extended software is sufficient, Micro/sys offers a free DOS-compatible operating system preinstalled on the SBC1496. For a small royalty fee, true MSDOS 6.22 can be preinstalled. Powerful, cost-effective remote debug capabilities are provided through Borland's Turbo Debugger.

For true 32-bit application development, the SBC1496 supports a number of alternatives. Due to its PC-compatibility, 32-bit real time operating systems (RTOS) such as Linux, PharLap® ETS, and VxWorks® can be booted on the SBC1496. All support 32-bit linear protected mode operation, and have full tool suites available, including compilers and debuggers.

The firmware suite that is preinstalled in flash on the SBC1496 includes an industrial BIOS that allows configuration of many of its features. In addition to allowing configuration of the normal PC-compatible peripherals such as floppy drives and hard drives, it allows 768k of the system flash to be used as a read/write wear-leveled flash drive. Another feature of the BIOS is its ability to redirect the console out COM1, COM2, or the VGA/keyboard so that even "headless" systems can have a user console when needed for configuration or debug.

For pre-configured sets of options, Micro/sys can provide OEMs with a single part number for ordering. In addition, custom versions of the SBC1496 are available. Please call Micro/sys Technical Sales for details.

## *Specifications:*

**Mechanical**:

- PC/104 mounting holes
- 3.55" (plus I/O region) x 3.775" x .6"
- Installed CompactFlash card extends past edge of board opposite the StackableUSB connector
- If installed, Ethernet connector on top side has height of .535"

**Power Requirements:**

- +5v ±5% at 1.8A max, 1.3A typical (with Ethernet)
- +12v required only if used by PC/104 modules

| Power Connector | |
|---|---|
| Pin | Signal |
| 1 | +5V |
| 2 | +12V |
| 3 | GND |

**Environmental:**
- ❑ Operating range 0℃ to +70℃
- ❑ -40°to +85℃ storage
- ❑ 5%-95% relative humidity, non-condensing

**Processor Core Section:**
- ❑ STPC Atlas
- ❑ 120 or 133MHz clock rate
- ❑ Hardware floating point math
- ❑ AT-compatible timers, interrupts, DMA

**On-Board Memory:**
- ❑ 64MB Synchronous DRAM based at address 0
- ❑ 1MB of flash at top of memory map with BIOS and operating system installed; 768k available for user application
- ❑ JEDEC 32-pin socket for 128k/512k SRAM for battery-backed RAM, or DiskOnChip

**Watchdog Timer:**
- ❑ Program must refresh watchdog timer periodically, or system will be reset
- ❑ Enabled through software

**Keyboard, Mouse, and Speaker:**
- ❑ PS/2-compatible keyboard port
- ❑ PS/2-type mouse port
- ❑ AT-compatible TTL speaker output

**SVGA Video Output:**
- ❑ CRT and color LCD outputs
- ❑ Resolutions to 1024 x 1024
- ❑ Direct connect to TFT flat panels
- ❑ 3.3V 18-bit panel color support
- ❑ LVDS (PanelLink/FPD-Link) drivers

**USB:**
- ❑ Four (4) USB 2.0 OHCI ports, StackableUSB connector
- ❑ Transfers at 480, 12, or 1.5Mbit/sec
- ❑ One (1) USB 1.1 OHCI port, StackableUSB connector
- ❑ One (1) USB 1.1 OHCI port, Main I/O connector

**COM1-COM2 Serial Ports:**
- ❑ Two (2) async serial ports, PC- compatible
- ❑ 16550-compatible
- ❑ RTS and CTS modem controls
- ❑ RS232 on all channels
- ❑ COM1 RS485 half duplex

**Serial Port Connector**

| Pin | Signal | Signal | Pin |
|---|---|---|---|
| 1 | RX COM1 | RTS COM1 | 2 |
| 3 | TX COM1 | CTS COM2 | 4 |
| 5 | - | - | 6 |
| 7 | GND | RX COM2 | 8 |
| 9 | RTS COM2 | TXCOM2 | 10 |
| 11 | CTS COM2 | - | 12 |
| 13 | - | GND | 14 |

**User Interface Connector**

| Pin | Signal | Signal | Pin |
|---|---|---|---|
| 1 | GND | TXCLK+ | 2 |
| 3 | TXCLK- | GND | 4 |
| 5 | TXOUT2+ | TXOUT2- | 6 |
| 7 | GND | TXOUT1+ | 8 |
| 9 | TXOUT1- | GND | 10 |
| 11 | TXOUT0+ | TXOUT0- | 12 |
| 13 | GND | GND | 14 |
| 15 | TFT VCC | TFT VCC | 16 |
| 17 | TFT PWM | TFT EN3.3V | 18 |
| 19 | GND | GND | 20 |
| 21 | MOUSE CLK | MOUSE DTA | 22 |
| 23 | +5V | +5V | 24 |
| 25 | KBD DTA | KBD CLK | 26 |
| 27 | SPKR | - | 28 |
| 29 | - | I2C CLK | 30 |
| 31 | 12C DTA | HSYNC | 32 |
| 33 | GND | VSYNC | 34 |
| 35 | GND | BLUE | 36 |
| 37 | GND | GREEN | 38 |
| 39 | GND | RED | 40 |

**Digital I/O:**
- ❑ Six (6) LVTTL bi-directional signals
- ❑ 5v-tolerant

**Parallel Printer Port:**
- ❑ Bi-directional LPT standard

**Real Time Clock:**
- ❑ RTC with on-board battery
- ❑ Driver software in BIOS

**CompactFlash Interface:**
- ❑ Supports Type I CompactFlash
- ❑ Operates in True IDE mode
- ❑ CF+ cards not supported
- ❑ Not hot-swappable

**Development Kit:**
- ❑ SBC with all options installed
- ❑ Complete cable set
- ❑ Documentation, schematics, sample software

**External Connections:**
- ❑ 80-pin connector for IDE, USB, LPT, and digital I/O
- ❑ 14-pin header for COM1-COM2
- ❑ 40-pin header for CRT, flat panel, key-board, mouse, speaker
- ❑ 3-pin removable terminal strip for power input

**Main I/O Connector**

| Pin | Signal | Signal | Pin |
|---|---|---|---|
| A1 | GND | IDE RESET# | B1 |
| A2 | USB D0- | GND | B2 |
| A3 | USB D0+ | IDE D7 | B3 |
| A4 | USB VCC | IDE D8 | B4 |
| A5 | GND | IDE D6 | B5 |
| A6 | NC | IDE D9 | B6 |
| A7 | NC | IDE D5 | B7 |
| A8 | USB VCC | IDE D10 | B8 |
| A9 | GND | IDE D4 | B9 |
| A10 | GPIO0 | IDE D11 | B10 |
| A11 | GPIO1 | IDE D3 | B11 |
| A12 | GPIO2 | IDE D12 | B12 |
| A13 | GPIO3 | IDE D2 | B13 |
| A14 | GPIO4 | IDE D13 | B14 |
| A15 | GPIO5 | IDE D1 | B15 |
| A16 | GND | IDE D14 | B16 |
| A17 | - | IDE D0 | B17 |
| A18 | GND | IDE D15 | B18 |
| A19 | RS485+ | GND | B19 |
| A20 | RS485- | - | B20 |
| A21 | +5V | IDE DRQ | B21 |
| A22 | LPT STB# | GND | B22 |
| A23 | LPT AFD# | IDE IOW# | B23 |
| A24 | LPT D0 | GND | B24 |
| A25 | LPT ERR# | IDE IOR# | B25 |
| A26 | LPT D1 | GND | B26 |
| A27 | LPT INIT# | IDE IORDY | B27 |
| A28 | LPT D2 | GND | B28 |
| A29 | LPT SLIN# | IDE DACK# | B29 |
| A30 | LPT D3 | GND | B30 |
| A31 | GND | IDE IRQ | B31 |
| A32 | LPT D4 | IDE IO16# | B32 |
| A33 | LPT D5 | IDE DA1 | B33 |
| A34 | LPT D6 | IDE PDIAG# | B34 |
| A35 | LPT D7 | IDE DA0 | B35 |
| A36 | LPT ACK# | IDE DA2 | B36 |
| A37 | GND | IDE CS1# | B37 |
| A38 | LPT BUSY | IDE CS3# | B38 |
| A39 | LPT PE | IDE DASP# | B39 |
| A40 | LPT SLCT | GND | B40 |

## *Ordering Information:*

**OEM Single Board Computers:**

| | |
|---|---|
| SBC1496 | 486/586 CPU, 133MHz, 64MB RAM, 1M Flash |
| SBC1496-1 | 486/586 CPU, 133MHz, 64MB RAM, 1M Flash, 10/100 BASE-T Ethernet |
| SBC1496-ET | 486/586 CPU, 120MHz, 64MB RAM, 1M Flash, -40° to +85°C operating temperature |
| SBC1496-1-ET | 486/586 CPU, 120MHz, 64MB RAM, 1M Flash, 10/100 BASE-T Ethernet, -40° to +85°C operating temperature |
| CS1496 | Complete cable set |
| 1496OPT40 | Color TFT (LVDS) panel support |

**Related Products:**

| | |
|---|---|
| CA4089 | Breakout cable to two (2) COM port connectors |
| CA4097 | Breakout cable for EIDE, USB, LPT, Digital I/O |
| CA4098 | Breakout cable for CRT, Kbd, mouse, speaker, TFT panel |
| KA1010-1 | Keyboard, Mouse breakout |
| RAM128 | 128RAM device |
| RAM512 | 512RAM device |
| SBCOPT16ST | Stackthrough PC/104 |
| CF-FL128 | 128MB CompactFlash Card |
| CF-FL256 | 256MB CompactFlash Card |
| CF-FL512 | 512MB CompactFlash Card |
| USB3368 | 8 port USB adapter board with StackableUSB stackthrough connector |

Cables nominally 15", other lengths available
StackableUSB trademark Micro/sys, Inc.

**Development Board Kits***

| | |
|---|---|
| DK1496-1-ET-x86 | 486/586 CPU, 120MHz, 64MB RAM, 1M Flash, 10/100 BASE-T Ethernet, -40° to +85°C operating temp, DOS-installed Windows-ready development kit |
| DK1496-1-ET-WinCE | 486/586 CPU, 120MHz, 64MB RAM, 1M Flash, 10/100 BASE-T Ethernet, -40° to +85°C operating temp, WinCE-ready development kit |
| DK1496-1-ET-Linux | 486/586 CPU, 120MHz, 64MB RAM, 1M Flash, 10/100 BASE-T Ethernet, -40° to +85°C operating temp, Linux-ready development kit |

**See Development Kit Specifications*