



486/586 EPIC™ Computer with GPS and Data Acquisition SBC4495



Features

- ✓ Ready to run 486/586 computer
- ✓ Color flat-panel support
- ✓ 14-bit A/D & D/A, 24 bits digital I/O
- ✓ Four serial ports
- ✓ GPS module
- ✓ 10/100BASE-T Ethernet
- ✓ CardBus slot
- ✓ Extended temperature available
- ✓ PC/104 & PC/104-Plus available

The SBC4495 packs a fast 486DX processor with a large amount of industrial I/O into an EPIC™ form-factor board. The on-board GPS can be used to trigger simultaneous data acquisition in locations across the globe. Additionally, the GPS can provide accurate location and altitude.

For additional I/O expansion, the 32-bit CardBus (PC Card) slot allows many different devices to be added, such as modems or Wi-Fi.

With 1MB of on-board flash, accessible as a read/write disk, and 64MB of SDRAM, many large programs can be run. If additional storage capacity is required, the CompactFlash connector allows hundreds of megabytes of removable program and data storage.

If additional capabilities are needed, PC/104 expansion allows a wide variety of I/O cards to be stacked on the SBC4495.

Software Support

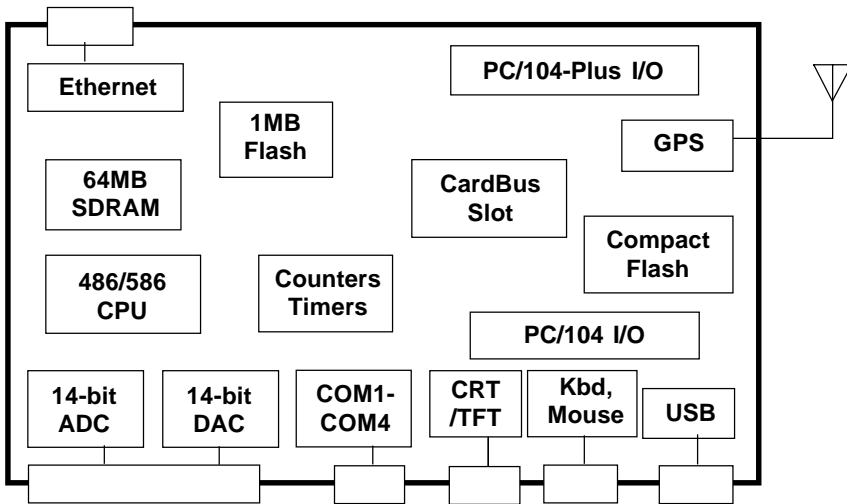
DOS emulation
MSDOS 5.0
Linux, VxWorks®,
Windows CE/98
RTOS
Comm Library, CommBLOK™
PID loop library, PidBLOK™
C, compilers
[Items above in Section 6]

Compatible Hardware

PC/104 expansion cards
[Items above in Section 4]
RS232/RS485 devices
Custom

Mounting/Packaging

Standoffs, STDOFF01
[Items above in Section 5]
Custom



Technical Details:

The SBC4495 core is an ST Microelectronics STPC Atlas processor running at 120 or 133 MHz. 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 cascaded 82C59A interrupt controllers, dual 16C550 UARTs, three 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 optional PC Card (CardBus) interface allows many different devices to be plugged into the SBC4495. Wireless networking capability can be added with Wi-Fi (802.11b) cards. A modem can be plugged in to allow remote data or code transfers. Ethernet PC Cards allow connection into a company's wired network. Almost any kind of PC Card can be added as long as the operating system supports it.

The data acquisition system on the SBC4495 provides eight analog inputs configurable for $\pm 5V$ or $\pm 10V$ ranges. The sampling is configurable to be triggered by an external input, an onboard pacer clock, or the GPS. If the GPS is used for triggering, multiple boards at various locations can have their data acquisition synchronized to within 190ns.

The 14-bit analog outputs have full-scale output range of 0V to 5V. The eight channels can be updated simultaneously.

The on-board GPS provides two benefits. It can determine the location of the system for mobile applications. Additionally, it has a pulse-per-second clock that is accurate to ± 95 ns. This can be used to synchronize data acquisition in geographically distant systems.

The memory subsystem on the SBC4495 allows many programs to be run without any external storage. 64 Mbytes of synchronous DRAM (SDRAM) is more than sufficient for many complex, protected-mode programs and operating systems.

The 1-Mbyte 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 hundreds of megabytes 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 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 CRT resolutions up to 1280 x 1024 and flat panel 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.

Four serial ports allow communication with many different devices. COM1 through COM4 are

16C550-compatible UARTs (with transmit and receive FIFOs). These serial ports are capable of speeds up to 115200 baud, have RS-232 transceivers, and have RTS and CTS modem control lines. Additionally, COM1 is configurable for half-duplex RS-485 communication with jumperable termination resistors.

The PC/104 connector provides support for both 8-bit and 16-bit expansion boards and operates with standard PC/104 bus protocol and timing. The default configuration is non-stackthrough connectors, allowing the SBC4495 to be the bottom card in a stack. The stackthrough option (SBCOPT16ST) allows the SBC4495 to be plugged into a custom-designed OEM I/O board as an automation component.

The SBC4495 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 SBC4495. For a small royalty fee, true MSDOS 5.0 can be preinstalled. Powerful, cost-effective remote debug capabilities are provided through Borland's Turbo Debugger.

For true 32-bit application development, the SBC4495 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 SBC4495. 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 SBC4495 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 SBC4495 are available. Please call Micro/sys Technical Sales for details.

Specifications:

Mechanical:

- EPIC™ standard
- 4.53” x 6.50” x .6”
- Installed CompactFlash card or PC Card extends past edge of board

Power Requirements:

- +5v ±5% at 1.9A typical, 2.4A max
- +12v required only if used by PC/104 modules

Environmental:

Part Number	Board Airflow*	Operating Temp.
SBC4495, -1	0 cfm	0° to +48°C
SBC4495, -1	17 cfm	0° to +70°C
SBC4495-ET	0 cfm	-40° to +85°C
SBC4495-1-ET	0 cfm	-40° to +85°C

* Using 80mm fan

- 40° to +85°C storage
- 5%-95% relative humidity, non-condensing

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

Processor Core Section:

- STPC Atlas CPU
- 120 or 133 MHz clock rate
- Hardware floating point math
- AT-compatible timers, interrupts, DMA

On-board Memory:

- 64M Synchronous DRAM based at 0
- 1M 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

COM1-COM4 Serial Ports:

- Four async serial ports, PC compatible
- 16550-compatible
- RTS and CTS modem controls
- RS232 on all four channels
- COM1 RS485 full duplex
- COM3 can be routed to GPS

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

Serial Port Connector 2			
Pin	Signal	Signal	Pin
1	RX COM3	RTS COM3	2
3	TX COM3	CTS COM3	4
5	-	-	6
7	GND	RX COM4	8
9	RTS COM4	TX COM4	10
11	CTS COM4	-	12
13	-	GND	14

RS485 Connector			
Pin	Signal	Signal	Pin
1	TX+	TX-	2
3	RX+	RX-	4
5	GND	GND	6
7	-	-	8
9	-	-	10

SVGA Video Output:

- CRT and color LCD outputs
- CRT Resolutions to 1280 x 1024
- TFT resolutions to 1024 x 1024
- Direct connect to TFT flat panels
- 3.3V 18-bit panel color support
- LVDS (PanelLink/FPD-Link) drivers

Keyboard, Mouse, and Speaker:

- PS/2-compatible keyboard port
- PS/2-type mouse port
- AT-compatible TTL speaker output

Digital I/O:

- 24 bits of TTL-level, byte selectable I/O from 82C55 chip
- 470-ohm current limiting resistors

Real Time Clock:

- RTC with on-board battery
- Driver code in BIOS

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	TFTEN5V	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	-	-	30
31	-	HSYNC	32
33	GND	VSYNC	34
35	GND	BLUE	36
37	GND	GREEN	38
39	GND	RED	40

Analog Inputs:

- Eight channels with 14-bit resolution
- Jumperable for input ranges of $\pm 10V$ or $\pm 5V$
- Channels are capable of simultaneous sampling
- 0.35 μs track/hold acquisition time
- 2.4 μs conversion time per channel
- Sampling can be triggered by timers, external pin, or GPS
- On-board sensor for temperature compensation

Analog Outputs:

- Eight channels with 14-bit resolution
- Output range of 0-5V
- Simultaneous output update

Digital I/O Connector			
Pin	Signal	Signal	Pin
1	DIOPA0	DIOPA1	2
3	DIOPA2	DIOPA3	4
5	DIOPA4	DIOPA5	6
7	DIOPA6	DIOPA7	8
9	DIOPB0	DIOPB1	10
11	DIOPB2	DIOPB3	12
13	DIOPB4	DIOPB5	14
15	DIOPB6	DIOPB7	16
17	DIOPC0	DIOPC1	18
19	DIOPC2	DIOPC3	20
21	DIOPC4	DIOPC5	22
23	DIOPC6	DIOPC7	24
25	GND	GND	26

PC Card Interface Option:

- 16-bit and 32-bit cards (CardBus) supported
- Supports type I, II, or III
- 82365SL-compatible register set
- Up to five memory windows and two I/O windows for 16-bit cards
- Up to two memory windows and two I/O windows for 32-bit cards

GPS:

- Supports three popular protocols: TSIP (Trimble Standard Interface Protocol), TAIP (Trimble ASCII Interface Protocol), and NMEA 0183.
- Horizontal Accuracy: <6m (50%), <9m (90%)
- Altitude Accuracy: <11m (50%), <18m (90%)
- Pulse-per-second Accuracy: $\pm 95\text{ns}$

Analog Input Connector			
Pin	Signal	Signal	Pin
1	AD_AD1	AGND	2
3	AD_AD2	AGND	4
5	AD_AD3	AGND	6
7	AD_AD4	AGND	8
9	AD_AD5	AGND	10
11	AD_AD6	AGND	12
13	AD_AD7	AGND	14
15	AD_AD8	AGND	16

Analog Output Connector			
Pin	Signal	Signal	Pin
1	DA_DA1	DA_DA2	2
3	DA_DA3	DA_DA4	4
5	DA_DA5	DA_DA6	6
7	DA_DA7	DA_DA8	8
9	AGND	AGND	10

Timer/Counter Connector			
Pin	Signal	Signal	Pin
1	CLK0/1	GATE0	2
3	OUT0	ADSTART	4
5	CLK2	GND	6
7	OUT2	GND	8
9	GATE2	GND	10

PC/104 Interface:

- Non-stackthrough PC/104 connectors
- Standard mounting holes
- 8-bit and 16-bit PC/104 module support
- Full IRQ and DRQ support
- Stackthrough option available (SBCOPT16ST)

PC/104-Plus Interface:

- Non-stackthrough PC/104-plus connectors
- Full 32-bit PCI-type transfers supported
- Stackthrough option available (SBCOPT120ST)

CompactFlash Interface:

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

DK4495 Development Kit:

- Free with first SBC4495 purchase
- Breakout cables to COM1-COM2
- Breakout cable to CRT, keyboard, mouse, speaker
- Download cable and utilities
- Documentation, schematics, sample software

External Connections:

- 40-pin header for IDE
- 10-pin header for USB
- 26-pin header for digital I/O
- 14-pin header for COM1-COM2 RS232
- 14-pin header for COM3-COM4 RS232
- 10-pin header for COM1 RS485
- 10-pin header for timer/counter
- 16-pin header for analog input
- 10-pin header for analog output
- 40-pin header for CRT, flat panel, keyboard, mouse, speaker
- 3-pin removable terminal strip for power input

Ordering Information:

Single Board Computer:

SBC4495	486/586 CPU, 133MHz, 64MB RAM, 1M Flash
SBC4495-1	486/586 CPU, 133MHz, 64MB RAM, 1M Flash, 10/100BASE-T Ethernet
SBC4495-ET	486/586 CPU, 120MHz, 64MB RAM, 1M Flash, -40 to +85C operating temperature
SBC4495-1-ET	486/586 CPU, 120MHz, 64MB RAM, 1M Flash, 10/100BASE-T Ethernet, -40 to +85C operating temperature
DK4495	No charge development kit, available with first order only
SDK-Linux	Linux kit (requires Ethernet and SBC4495OPT50)
4495OPT11	14-bit 8-channel A/D converter
4495OPT12	14-bit 8-channel D/A converter
4495OPT19	GPS module
4495OPT23	PC Card slot (not available in extended temperature)
4495OPT25	MS-DOS in flash
4495OPT40	Color TFT (LVDS) panel support
4495OPT50	Linux startup kernel in flash

Related Products:

CA4089	Breakout cable to two DB9 COM port connectors
BA4098	Breakout cable assembly for CRT, Kbd, mouse, speaker, TFT panel
RAM128	128k RAM device
RAM512	512k RAM device
SBCOPT16ST	Stackthrough PC/104
SBCOPT120ST	PC/104-Plus Stackthrough Option, 120-pin

PCC-WIFI11B	802.11b Wireless PCMCIA card
CF-FL128	128MB CompactFlash Card
CF-FL256	256MB CompactFlash Card
CF-FL512	512MB CompactFlash Card

Cables nominally 15", other lengths available.

CommBLOK, PidBLOK trademark Drumlin
IBM, PC trademark IBM Corp.
MSDOS, Microsoft trademark Microsoft Corp.
Turbo Debugger trademark Borland International
VxWorks trademark Wind River