Intel-PXA255 processor board is (much) smaller than a credit card

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The Manufacturer Says ...

Strategic Test releases TRITON-XXS

World's smallest PXA255 embedded CPU card TRITON-XXS measures only 32mm x 59mm x 6.6mm and runs Linux or Windows CE.NET Boston--- Measuring just 1.25 x 2.3 x 0.26 inches, the TRITON-XXS from Strategic Test Corporation is a complete PXA255 computer that has been optimised for portable embedded designs where low-power consumption and extremely small size are critical. A complete Development Kit that allows the XXS to run out-of-the-box is available with Linux kernel 2.6 or Windows CE.NET pre-installed.

Designers of battery-operated devices will appreciate the unique implementation of "programmable core power", which means that the core operating voltage can be varied between 0.9 and 1.5V in order to save power.

eeProductCenter's Alex Mendelsohn Says ...

Wow! This is one tiny microprocessor board. If you're not careful, the flat cables, headers, and other interconnects and mounting hardware in a system built around one of these boards can occupy more room than the board itself!

As the press release on the left notes, ***Strategic Test***'s tiny board houses a 400-MHz *Intel PXA255* microprocessor. What it doesn't say is that the PXA255 is part of Intel's *XScale* processor family. That makes this an incredibly powerful and power-stingy multi-media-ready micro-board.

Moreover, Intel's XScale micro-architecture is based on the popular *StrongARM* core. In this iteration, the super-pipelined core is optimized for power-sensitive nomadic products, such as mobile Internet devices.

The Intel StrongARM and XScale architectures are also compatible with the widely used ARM (Advanced RISC Machines) architecture, meeting version v.5TE. That, in turn, guarantees quite a bit of software compatibility.

Lots Of Peripherals

The XXS is supplied with a 400 MHz PXA255 CPU, 64 Mbyte of low-power SDRAM, 32 Mbyte flash, a built-in LCD controller for direct connection to a display, a PCMCIA interface and two 100 pin surface mounted connectors that for the first time allows the full 32 bit memory address range to be accessed.

Other features include four high-speed serial interfaces (up to 4 Mbps), SPI, I^2C and AC'97 audio.

There are four different TRITON PXA255 CPU modules in the range allowing the designer to choose the most cost-effective features for their application. Other modules offer a variety of PXA255 cpu speeds, Ethernet interfaces and the extended operating temperature range (-40 to +85 degreesC) as standard.

The TRITON-XXS is available immediately from Strategic Test and is priced at $286 in 1000 quantities. Configurations of the XXS with less SDRAM and flash, or an extended operating temperature range are available with minimum order quantities of 100 pieces.

All TRITON modules are supplied with RedBoot pre-installed. The Development Kits are supplied with Linux or Windows CE.NET pre-installed and includes full source code. Technical support is provided at no cost for the product lifetime. Software updates are provided free of charge by download from Strategic Test's customer website.

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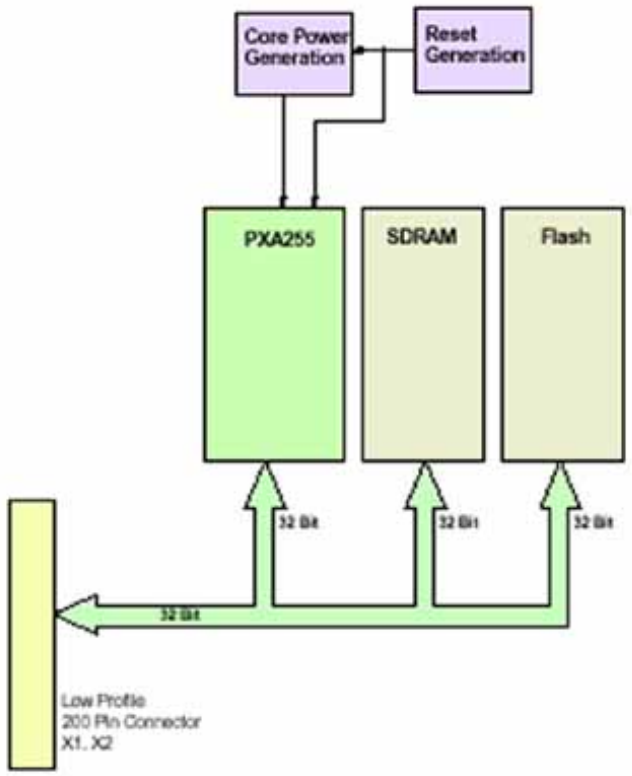
The power-managed PXA255 (dissipating about 3.5-mW in *Standby*) is also responsible for the rich I/O feature-set called out in Strategic Test Corp.'s press statement. The PXA255's integrated memory, PCMCIA controller, and *Compact Flash* controller works on a 100 MHz memory bus, addressing either 16-bit or 32-bit ROM, SDRAM, SMROM, flash, or SRAM arrays.



The chip's *system control module* also includes 17 general-purpose interruptible I/O ports, a realtime clock, and watchdog and interval timers. The IC also packs an interrupt controller, a reset controller, and two on-chip oscillators.

Turbo Mode

The PXA255 can also run in so-called Turbo mode. That enables the device to scale its performance, to high performance, or low performance, as necessary, in a single clock cycle.

That degree of clock throttling can lower dissipation and extend a battery's lifetime---while still meeting expected processing performance for an application or part of an application. Strategic Test claims that the inherent power-management of the Intel chip permits it to potentially dissipate less than half the power, at the same performance levels, of an Intel *StrongARM SA-1110* chip.

Other features of the TRITON-XXS board itself include a JTAG controller, and operation from a single 3.3-V source.

Open-Source Support

The press release briefly refers to *Redboot*, but doesn't say what that is. Redboot is a bootstrap environment that was developed precisely for low-power embedded systems such

as Strategic's boards.

Based on the *eCos Hardware Abstraction Layer*, RedBoot supports download and execution of embedded applications, accessed either serially or on an Ethernet connection. These applications include embedded Linux as well as eCos-specific applications.

For its part, the eCos realtime operating system itself is open-source and royalty-free. The highly configurable nature of eCos lets the operating system be readily customized for optimum run-time performance and the best hardware resource footprint. A thriving Web community has grown up around eCos, too.

Back to Redboot. It can be flash-updated and network booted, and it supports Ethernet download and debug. RedBoot can also retrieve Internet Protocol parameters (via BOOTP or DHCP), and program images downloaded using TFTP. Images can also be downloaded serially, using the good ol' X-modem or Y-modem communications programs.

RedBoot can also be used to communicate with *GDB* (GNU Debugger) to debug applications via serial or Ethernet, including the ability to interrupt a running application started by GDB. An interactive command-line interface is provided to permit management of flash images, image download, and RedBoot configuration. For unattended or automated startup, boot scripts can also be stored in flash.

Four Hardware Options

As Strategic Test notes, there are four different TRITON PXA255 CPU modules available. The *TRITON LP* module uses a DIMM format. It measures 2.7-in. x 1.46-in (67.6 mm x 36.6 mm), with an installed Z-height of 292 mils (7.3 mm).

The *TRITON ETN SBC* is also a DIMM-format module. It includes a Fast Ethernet port and four serial I/O interfaces, together with an additional 200-pin expansion interface. It's the same size as the LP module. Lastly, there the *TRITON-UCB*. It was the first available PXA255 DIMM module from Strategic. The TRITON-UCB is available with CPU speeds of 300-MHz or 400-MHz, and with a choice of 32 Mbytes or 64 Mbytes of SRAM. It includes 32 Mbytes of flash.

There are two board-level development kits available. *Development Kit-1* supports the TRITON-UCB. It's a hardware reference platform with a Compact Flash card socket, selectable true IDE or CF modes, and an RS-232 interface and connector as well as a JTAG interface. It includes an on-board 10/100 Mbit/s Ethernet controller, and is supplied with Linux, Windows CE.NET, or QNX operating systems. *Development Kit-2* supports the TRITON-LP, TRITON-ETN, and TRITON-XXS modules. It also packs a Compact Flash card socket, can run in IDE or CF modes, and has similar I/O to the Kit-1 board, including Ethernet connectivity.

It also packs Universal Serial Bus (USB) hooks, and can operate as a USB *Device* (Slave), or as a USB *Host controller*. It also lets you connect a Toshiba 4-in. VGA LCD display.

A universal 40-pin flat cable LCD header connector is also provided, as well as two 100-pin *Samtec* connectors that make direct connection to the Triton-LP, Triton-ETN, and Triton-XXS modules. The header connectors make all of the Triton module pins available for external use. The Kit-2 also provides a buffered address and data bus, and a daughterboard slot for device extensions.

Quite a few vendors are supplying PXA255 boards these days, and Strategic Test's wares seem like very viable contenders for pre-fabbed and tested embedded modules for portable and other low power applications. For quite a bit less than $300, the new TRITON-XXS products beg your scrutiny.

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