Intel Puts P55C on Mobile Module

Processor Daughtercards Will Speed Transition to P6 Notebooks

by Linley Gwennap

In an attempt to change the way notebook PCs are designed, Intel has announced the first of a planned series of Mobile Modules. These small boards contain the CPU, level-two cache, and "north bridge" of the system-logic chip set, bringing all the processor-specific circuitry into a self-contained unit. As a result, notebook designers who adopt the initial P55C module will be able to upgrade their designs to future Intel processors simply by plugging in a new module. This method short-circuits the extensive design work re-quired by previous processor shifts and should accelerate the appearance of P6 notebooks.

Initial Module Includes P55C Processor

The first product in the line contains a P55C processor, 256K of burst SRAM for the L2 cache, and the 82439TX system controller chip, which is part of the new 430TX chip set *(see* 1102MSB.PDF*)*. The processor is available at either 150 or 166 MHz, the two clock speeds currently supported in the mobile P55C line. The two-sided module also includes a voltage regulator, clock generator, and assorted resistors and bypass capacitors.

The small PC board connects to the motherboard via two 140-pin connectors. These 280 pins include 108 signals to interface to DRAM, 56 PCI signals, 9 "sideband" signals for the 430TX chip set, and 68 power and ground pins. All connections between the CPU, L2 cache, and north bridge are contained within the module.

As Figure 1 shows, the module is fairly densely packed. System vendors that adopt the module will give up perhaps a small amount of PC board area and essentially no weight. The maximum height of the module is 8 mm, with an additional 2 mm under the board due to the connector height.
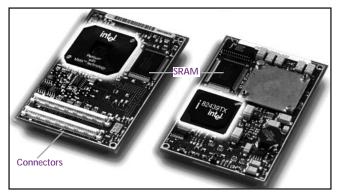

Figure 1. Intel's Mobile Module is a two-sided PC board measuring 2.5" × 4". The bottom (left) shows the footprint of the CPU, one SRAM chip, and the connectors; the top (right) shows the CPU heatsink, the other SRAM, and the 82439TX system-logic chip.

For a full-size notebook system, the module should not affect the external form factor, but it could be more difficult to fit into a smaller mobile system.

The benefits of the module are in its upgradability. In the past, every notebook system needed a significant amount of design work due to differences in processor pinout, voltage, and power requirements. The first systems designed for the new module will require an equivalent amount of work, but future systems can move to new processors simply by installing a different type of module, as long as Intel maintains the same specifications.

Paving the Road for P6 Notebooks

Intel has committed to delivering compatible modules for future processors through the initial mobile P6 processor. We believe this includes both the Tillamook (200/233-MHz P55C) and Mobile Deschutes (P6) processors. Even though Deschutes will use a different package, different processor bus, and different supply voltage than the P55C, the module shields notebook designers from these concerns. We expect P6 notebooks to ship within a quarter of the Mobile Deschutes launch (sometime in 1H98); in contrast, it took nearly a year after the Mobile Pentium intro for a significant number of Pentium notebooks to reach the market.

The module strategy seems ideal for field upgradability: in theory, a service center or even a sophisticated end user could remove a P55C module and install a P6 module. Intel, however, says it won't market modules in this way.

Intel hopes that, within a few years, the majority of notebook systems will use processor modules. Although the mobile market has been dominated by a few large vendors selling expensive systems, the number of system vendors has expanded recently, with some offering mobile systems for under $1,000. By simplifying the design task, Mobile Modules should encourage continued proliferation and price cutting in this growing market segment. ◉

Price & Availability

The 1,000-piece list price of Intel's Mobile Module is $71.80, not including the processor or chip set. For a 150-MHz P55C processor with 256K of cache and the 430TX chip set, the total price is $440; the same board with a 166-MHz P55C totals to $643. Both modules are currently sampling, with production expected by the end of February. For more information, contact your local Intel sales office or access the Web at *www.intel.com.*