Overview

Transmeta™ Crusoe™ Processor for Embedded Applications

Transmeta, the leader in efficient computing, offers a line of low power, high-performance processors designed to meet the unique requirements of embedded applications. The Transmeta Crusoe is an energy efficient processor built upon innovative technology that provides embedded devices a performance per watt ratio that is unmatched by any other x86-based processor in its class.

Available in a variety of low power versions, the Transmeta Crusoe processor is ideal for applications that require high performance processing within small and thermally constrained environments. Its inherently energy efficient design allows gigahertz processor speeds without the need for active cooling and external CPU fans. Integrated power management technology further enhances efficiency by dynamically scaling both processor frequency and voltage according to the instantaneous demands of the computer system.

Transmeta Crusoe processors provide full x86-compatible software execution and seamless operation with all standard x86-compatible operating systems including Microsoft Windows®, Linux, and a variety of real time operating systems (RTOS) from companies including LynuxWorks™, MontaVista™, QNX®, Red Hat™, and Wind River®. Transmeta works closely with partners, customers and commercial laboratories to ensure validated ineroperability and continued adherence to high quality and reliability standards.

- **High Performance with Low Heat Dissipation**
  - A family of energy efficient processors for every performance/thermal requirement
- **Highest System Quality and Reliability**
  - All CrusoeSE processors are rated for 24/7, 10yr operating life
  - Fan-less designs enhance system reliability
- **High Integration for Small Form Factor designs**
  - Integrated northbridge functionality reduces board real estate
- **Transmeta stands committed to Embedded Product Lifecycles**
  - Extended Product Availability
  - Comprehensive Engineering and Marketing support

Transmeta Crusoe and Crusoe SE processors are designed for embedded applications in the areas of office automation, networking/communications, storage, server-based computing, science and medicine, transportation, automotive/telematics, and industrial automation. Some example devices in these markets include: thin clients, blade servers, printers and copiers, point-of-sale, smart displays, hand held and portable consumer devices, ultra-personal computers, set top boxes and many other applications.

Crusoe SE

A Special Embedded version of the Transmeta Crusoe processor — the Transmeta Crusoe SE processor — enables embedded designs that require superior reliability. To support a wide range of embedded applications, processors are rated to run at full speed over the entire operating temperature range of 0ºC to 100ºC twenty four hours a day, seven days a week. Product life is rated to exceed 10 years while running at these performance and environmental extremes.

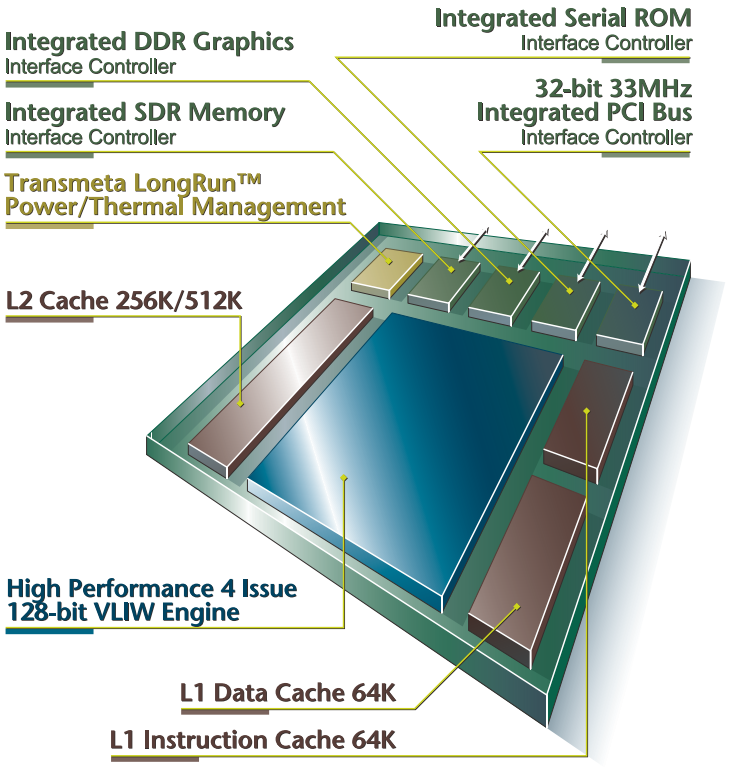
Transmeta Crusoe Processor Model TM5500	**Transmeta Crusoe Processor Model TM5800**	**Transmeta Crusoe SE Processor Model TM55E**	**Transmeta Crusoe SE Processor Model TM58E**
• 667MHz • 128KByte L1 Cache (64KByte L1 cache and 64KByte L1 D-cache) • 256KB L2 write-back cache • Integrated Northbridge - 64-bit, 133MHz DDR memory controller - 64-bit, 133MHz SDR memory controller - 32-bit, 33MHz, 3.3V PCI bus • MMX Instruction Support • 0.13µm process • Compact 474-pin Ceramic BGA Package • Max TDP: 5.1W (includes Northbridge power)	• 800MHz - 1GHz • 128KByte L1 Cache (64KByte L1 I-cache and 64KByte L1 D-cache) • 512KB L2 write-back cache • Integrated Northbridge - 64-bit, 133MHz DDR memory controller - 64-bit, 133MHz SDR memory controller - 32-bit, 33MHz, 3.3V PCI bus • MMX Instruction Support • 0.13µm process • Compact 474-pin Ceramic BGA Package • Max TDP: 6.8 - 9.0W (includes Northbridge power)	• 667MHz • 128KByte L1 Cache (64KByte L1 I-cache and 64KByte L1 D-cache) • 256KB L2 write-back cache • Integrated Northbridge - 64-bit, 133MHz DDR memory controller - 64-bit, 133MHz SDR memory controller - 32-bit, 33MHz, 3.3V PCI bus • MMX Instruction Support • 0.13µm process • Compact 474-pin Ceramic BGA Package • Max TDP: 5.1W and 6.2W (includes Northbridge power) • Supports T-junction temperatures of 100C • Rated for 24/7 operation for 10 years	• 800MHz & 933MHz • 128KByte L1 Cache (64KByte L1 I-cache and 64KByte L1 D-cache) • 512KB L2 write-back cache • Integrated Northbridge - 64-bit, 133MHz DDR memory controller - 64-bit, 133MHz SDR memory controller - 32-bit, 33MHz, 3.3V PCI bus • MMX Instruction Support • 0.13µm process • Compact 474-pin Ceramic BGA Package • Max TDP: 6.8W-9.0W (includes Northbridge power) • Supports T-junction temperatures of 100C • Rated for 24/7 operation for 10 years

Transmeta™ Crusoe™ Processor Core

At the heart of the Transmeta Crusoe processor lays a very streamlined, efficient 128-bit VLIW (Very Long Instruction Word) hardware engine. Surrounding that heart is the Code Morphing Software (CMS), a software engine that works in tandem with the VLIW hardware engine to morph and execute x86 instructions in native VLIW code. This innovative approach has led to a number of compelling advantages, the largest of which is the reduction in the number of power hungry logic transistors. This streamlining of processor design allows Transmeta to greatly improve performance-to-power consumption while allowing heat dissipation to be kept to a minimum.

Transmeta Crusoe Processor

Block Diagram



Integrated Northbridge Controller

Transmeta further reduces electrical consumption and thermal requirements within the system by integrating Northbridge controller functionality directly onto the processor core. This functionality—consisting of SDR and DDR DRAM memory controllers, a serial ROM interface, and a PCI bus interface—eases system design, reduces board space, and enhances performance. As a separate chip, a Northbridge chipset consumes 2–3 watts of additional power whereas the Transmeta Crusoe processor consumes just a fraction of that.

Code Morphing Software (CMS)

CMS—the software component of the Transmeta Crusoe processor—translates x86 instructions into highly optimized and extremely fast VLIW native instructions which are then processed with great efficiency. These translations are stored and reused in subsequent execution, further enhancing performance over standard x86 architectures.

Transmeta LongRun® Power Management

Transmeta LongRun is a power management technology that further reduces thermal constraints by dynamically adjusting the operating voltage and clock frequency of the processor core based on application demands. By evaluating the demand on the processor, LongRun delivers just enough performance to satisfy the workload at hand. This conserves power and improves battery-life. If desired, LongRun can be configured to deliver different performance characteristics depending on the application, making it possible for designers to build smaller enclosures than were previously possible. Best of all, Transmeta LongRun technology provides more responsiveness than conventional power management schemes used by operating systems and is completely transparent to the end-user.

x86 COMPATIBILITY · LOW power · flexibility DESIGN · PURE performance · HIGH reliability

For more information, visit **www.transmeta.com**

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