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...ted Communications Processors

MPC8533E
# PowerQUICC™ III Processor

Revolutionary and Evolutionary

Based on the scalable e500 system-on-chip (SoC) platform and processor core, the third-generation PowerQUICC™ III integrated communications processors, built on Power Architecture™ technology, are designed to deliver gigahertz-class communications processing performance. The advanced features found on the PowerQUICC III family offer the exceptional integration and high-speed connectivity required by IP media processing and advanced multifunction imaging applications.

The MPC8533E combines a robust processor core, enhanced peripherals and high-speed interconnect technology to balance processor performance with I/O system throughput. It can achieve clock speeds scaling up to 667 MHz with headroom for 1.0 GHz.

Third-generation PowerQUICC III processors are based on Freescale's 90 nanometer (nm) silicon-on-insulator (SOI) copper interconnect process technology, which enables processors to deliver higher performance with lower power dissipation. At core speeds ranging from 667 MHz to 1 GHz, these processors deliver a significant performance increase over current 130 nm PowerQUICC III devices and provide a higher level of performance and uncompromising integration to the PowerQUICC family.

MPC8533E FAMILY BLOCK DIAGRAM
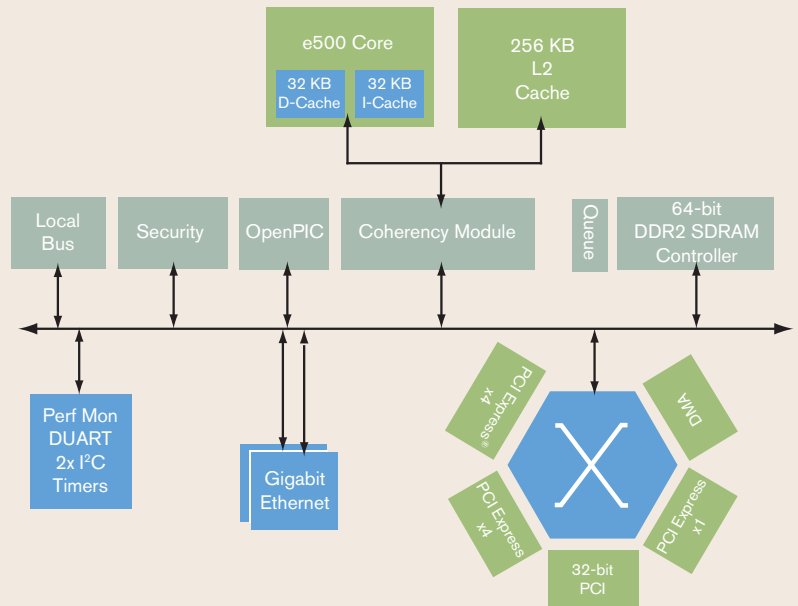
The MPC8533E processor offers a wide range of high-speed connectivity options, including Gigabit Ethernet (GigE) and multiple PCI Express® connections. Support for these high-speed interfaces enables scalable connectivity to network processors and/or ASICs in the data plane while the PowerQUICC III handles complex, computationally demanding control plane processing tasks. The MPC8533 also provides support for legacy PowerQUICC III interfaces such as PCI, I2C, dual universal asynchronous receiver/transmitters (DUART) and local bus connections. These processors also feature a next-generation double data rate (DDR2) memory controller, enhanced GigE support, e500 double precision floating point unit and the field-proven integrated security engine found on 90 nm PowerQUICC III devices.

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Key Features 1

The MPC8533E processor includes 256 KB L2 cache, an integrated security engine, 64-bit DDR or DDR2 scaling to 533 MHz data rate, 32-bit PCI, multiple PCI Express interfaces, local bus I/O interfaces and two GigE interfaces. The combination of these features makes this device an optimal communications processing solution for Ethernet-only or PCI Express interworking applications, such as enterprise networking and advanced multifunction printer (MFP) imaging applications.

The MPC8533E device is ideal for connecting high-speed DDR2 memory interfaces and peripherals in high-performance distributed systems. Examples include control plane processing, protocol processing and other compute-intensive applications requiring high-speed, peer-level communications with a low pin count. The MPC8533E is a full-featured, high-performance processor that can operate fanlessly for further support of power sensitive applications.

Key Advantages

> High level of integration and performance

> Consistent programming model across the PowerQUICC III family

> Flexible SoC platform for fast time to market

> Simplified board design

> Large L2 cache at 256 KB

> High internal processing bandwidth

> Integrated DDR and DDR2 memory controller

> Two integrated Ethernet controllers (enhanced TSEC) with wake-on-LAN capability

> Flexible high-speed interconnection interfaces/multiple PCI Express connections

> 32-bit PCI support

> Integrated security engine

High-Speed Connectivity

Freescale's MPC8533E processor is uniquely positioned to offer a wide range of high-speed connectivity options. The flexibility in the processor is due to highly integrated speed and latency optimized technology. The MPC8533E includes enhanced Three Speed Ethernet with TCP/UDP/IP Checksum Offload, direct FIFO mode for ASIC connectivity and support for multiple PCI Express interface options. The MPC8533E is a highly scalable control plane processor with the flexibility to connect and complement network processors that perform data plane processing. Concurrently, the MPC8533 also provides connectivity solutions for interfacing modern high-speed ASICs. With its e500 core built on Power Architecture technology, this compact PowerQUICC III handles complex, computationally demanding control plane processing tasks with ease. The MPC8533E processors also feature field-proven, next-generation DDR2 memory controllers and industry-leading hardware acceleration for encryption protocols.

MPC8533E Technical Specifications

> Embedded e500 core, initial offerings up to 667 MHz, targeting up to 1.0 GHz

  ▪ Dual dispatch superscalar, 7-stage pipeline design with out-of-order issue and execution

  ▪ 2,240 MIPS at 1.0 GHz (estimated Dhrystone 2.1)

  ▪ 36-bit physical addressing

> Enhanced hardware and software debug support

> Double-precision embedded scalar and vector floating-point APUs

> Memory management unit (MMU)

> Integrated L1/L2 cache

  ▪ L1 cache—32 KB data and 32 KB instruction cache with line-locking support

  ▪ L2 cache—256 KB (8-way set associative); 256/128/64/32 KB can be used as SRAM

  ▪ L1 and L2 hardware coherency

  ▪ L2 cache and I/O transactions can be stashed into L2 cache regions

> Integrated DDR memory controller with full ECC support, offering:

  ▪ 200 MHz clock rate (400 MHz data rate), 64-bit, 2.5V/2.6V I/O, DDR SDRAM

  ▪ 267 MHz clock rate (up to 533 MHz data rate), 64-bit, 1.8V I/O, DDR2 SDRAM

> Integrated security engine supporting DES, 3DES, MD-5, SHA-1/2, AES, RSA, RNG, Kasumi F8/F9 and ARC-4 encryption algorithms

> Two on-chip Three Speed Ethernet controllers (ETSECs) supporting 10 Mbps, 100 Mbps and 1 Gbps Ethernet/IEEE 802.3 networks with MII, RMII, RGMII and RTBI physical interfaces

  ▪ TCP/UDP/IP checksum acceleration

  ▪ Advanced QoS features

> General-purpose input/output (GPIO)

> PCI Express high-speed interconnect interfaces, supporting combinations of dual x4 and single x1 PCI Express

> On-chip network (OCeaN) switch fabric

> PCI interface support

  ▪ 32-bit PCI 2.2 bus controller (up to 66 MHz, 3.3V I/O)

> Local bus

  ▪ 166 MHz, 32-bit, 3.3V I/O, local bus with memory controller

> Integrated four-channel DMA controller

> Dual I²C and DUART support

> Programmable interrupt controller (PIC)

> IEEE 1149.1 JTAG test access port

> 1.0V core voltage with 3.3V and 2.5V I/O

> 783-pin FC-BGA package

Learn More: For more information about Freescale Semiconductor products, please visit **www.freescale.com**.