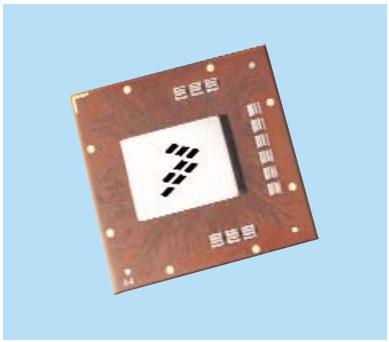
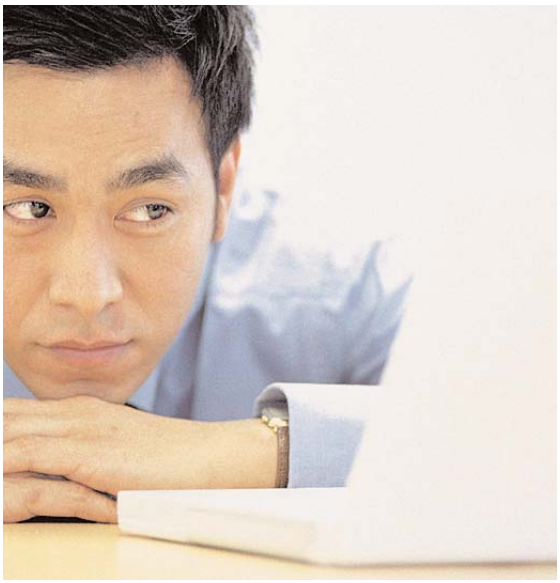
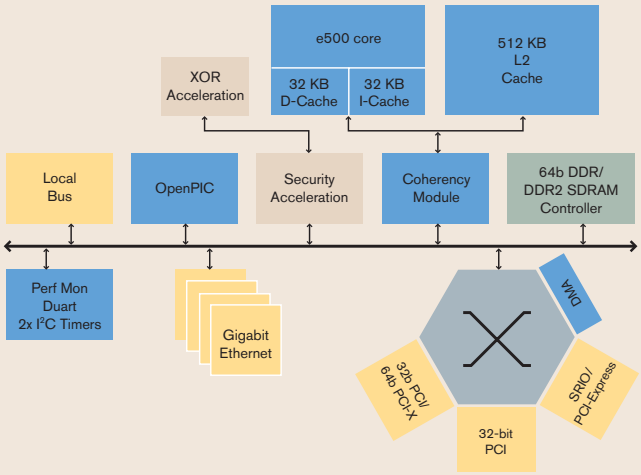
ted Communications Processors

Next-Generation PowerQUICC™ III Processors





MPC8548/E PRODUCT SOLUTION



Revolutionary and Evolutionary

Based on the scalable e500 system-on-chip (SoC) platform and PowerPC® processor core, the next-generation PowerQUICC™ III integrated communications processors are designed to deliver gigahertz-plus communications processing performance and advanced features with the exceptional integration and high-speed connectivity required by enterprise networking, telecom transmission and switching, 3G wireless infrastructure, storage and high-end imaging markets.

The processor is designed to offer clock speeds scaling up to 1.33 GHz throughout with headroom for 1.5 GHz, combining the powerful PowerPC processor core, enhanced peripherals and high-speed interconnect technology to balance processor performance with I/O system throughput.

Next-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 1.33 GHz, these new processors deliver a significant performance increase over current 130 nm PowerQUICC III devices, providing yet another level of best-in-class performance and uncompromising integration to the PowerQUICC Family.

The MPC8548/E, MPC8547/E, MPC8545/E and MP8543/E processors offer a wide range of high-speed connectivity options, including Gigabit Ethernet (GigE), serial RapidIO® interconnect technology and PCI Express. 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. These processors also feature next-generation double data rate (DDRII) memory controller, enhanced GigE support, double precision floating point and integrated security engines that support the Kasumi algorithm needed for 3G wireless security. In addition, support is provided for exclusive OR (XOR) acceleration needed for parity in storage applications.

Launched by Motorola

freescale semiconductor

NEXT-GENERATION POWERQUICC™ III PROCESSORS

	MPC8548/E	MPC8547/E	MPC8545/E	MPC8543/E
Core	1.2, 1.33, 1.5 GHz	1.2, 1.33 GHz	1.2, 1.0 GHz	800M, 1 GHZ
I-Cache/D-Cache	32 KB/32 KB	32 KB/32 KB	32 KB/32 KB	32 KB/32 KB
L2	512 KB	512 KB	512 KB	256 KB
Memory Controller	DDR1/DDR2/ FCRAM1/FCRAM2	DDR1/DDR2	DDR1/DDR2	DDR1/DDR2
Integrated Security Engine	Yes	Yes	Yes	Yes
XOR Acceleration	Yes	Yes	-	-
PCI	2 x 32-bit or 1 x 64-bit	1x64-bit	2 x 32-bit or 1 x 64-bit	1 x 32-bit
PCI-X	1 x 64-bit	1 x 64-bit	-	-
PCI EXPRESS	x8	x8	x4	x4
Serial RapidIO®	x4	-	x4	x4
GigE	4 GE	4 GE	2 GE	2 GE
Double Precision Floating Point	Yes	Yes	Yes	Yes

Wide Range of Applications

The four 90 nm PowerQUICC III processors include:

MPC8548/E networking/telecom processor—Key features include 512 KB L2 cache, integrated security engine, 64-bit DDR1/2 scaling to 667 MHz data rate, dual 32-bit PCI or 64-bit PCI-X, 4-bit serial RapidIO fabric technology and 4-bit PCI Express (or single 8-bit PCI Express 1.0a), local bus IO interfaces, and four GigE interfaces. The combination of these features makes this device an optimal communications processing solution for Ethernet-only or RapidIO interworking applications, such as enterprise networking, telecom transmission and switching and 3G wireless basestations. The security engine includes Kasumi algorithm acceleration, making the MPC8548/E an ideal choice for enhancing security protocol processing in 2.5G and 3G wireless network infrastructure. This device's integrated security also includes XOR acceleration, which enhances system performance by offloading the compute-intensive parity check in small-medium business enterprise (SME) and redundant array of inexpensive disks (RAID) storage applications.

MPC8547/E storage processor—Key features include 512 KB L2 cache, integrated security acceleration with capability, support for battery-backed 64-bit DDR1/2 scaling to 667 MHz data rate, 64-bit PCI-X, 4-bit PCI Express and four GigE interfaces. The device's XOR acceleration enhances system performance by offloading the compute-intensive parity checks in SMB and enterprise RAID storage applications.

MPC8545/E imaging processor—Key features include 512 KB L2 cache, 64-bit DDR1/2 scaling up to 533 MHz data rate, integrated security, dual 32-bit PCI/single 64-bit PCI, 4-bit PCI Express and two GigE interfaces. The MPC8545/E also offers double precision floating point, a capability that makes this device a high-performance processing solution for a wide range of imaging applications.

MPC8543/E general-purpose control processor—Key features include 256 KB L2 cache, integrated security, 64-bit DDR1/2 scaling up to 400 MHz data rate, 32-bit PCI, 4-bit serial RapidIO or 4-bit PCI Express, and two GigE interfaces. With clock frequencies scaling from 800 MHz to 1 GHz, this cost-effective device is ideally suited for a wide range of general-purpose embedded control applications, such as robotics, discrete manufacturing and process manufacturing control.

The MPC8548/E device is the first integrated communications processor to comply with the serial RapidIO interconnect specification, Revision 1.2, from the RapidIO Trade Association. The RapidIO serial fabric interface is ideal for connecting MPC8548 processors 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, such as those found in AdvancedTCA platforms. The RapidIO ecosystem is more than 50 members strong and includes industry-leading embedded vendors who provide host processors, DSPs, communications processors, backplane interfaces, switches, systems, tools, operating systems and services.

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

> 90 nm SOI technology

> High-performance enhanced e500 core

- Doubled L2 cache at 512 KB
- High internal processing bandwidth

> Integrated DDR, DDR2, FCRAM1 and FCRAM2 memory controller

> Four integrated Ethernet controllers (enhanced TSEC)

> Flexible high-speed interconnect interfaces

- Serial RapidIO interconnect technology
- PCI Express support

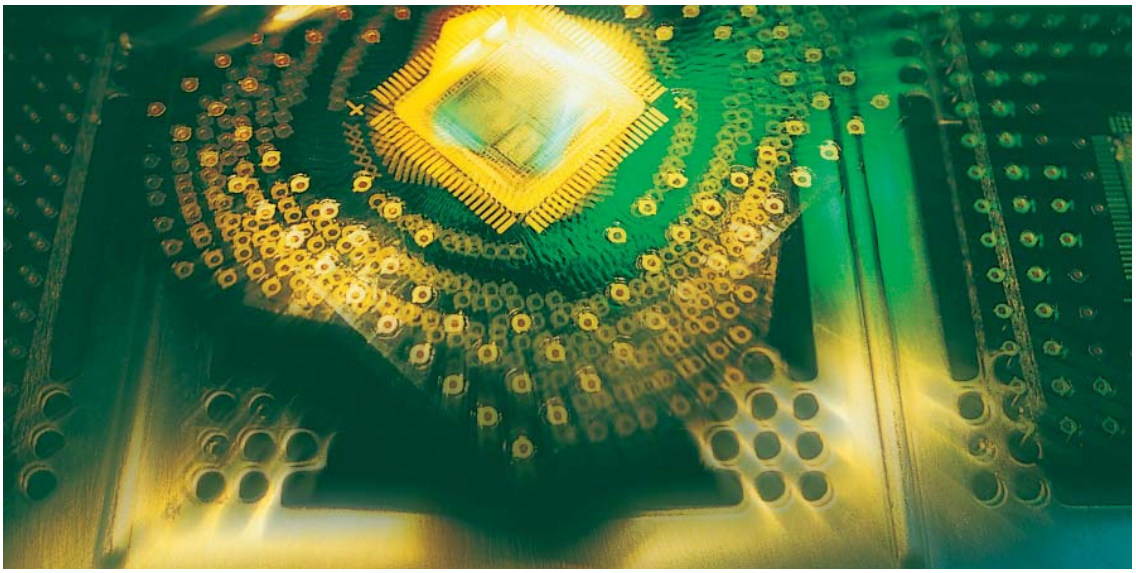
> Multiple-PCI interface support

> Integrated security engine

> Exclusive OR capability

High-Speed Connectivity

Freescale designed the MPC8548/E processor to offer a wide range of high-speed connectivity options, including GigE, serial RapidIO technology and PCI Express. Support for these high-speed interfaces enables scalable connectivity to network processors and/or ASICs in the data plane while the MPC8548/E handles complex, computationally demanding control plane processing tasks. The MPC8548/E also features a next-generation double data rate (DDR2) memory controller and 3G wireless encryption.



MPC8548/E Technical Specifications

> Embedded e500 core, scaling up to 1.5 GHz
  - Dual Dispatch superscalar, 7-stage pipeline design with out-of-order issue and execution
  - 3065 MIPS at 1333 MHz (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—512 KB (8-way set associative); 512 KB/256 KB/128 KB/64 KB can be used as SRAM
  - L1 and L2 hardware coherency
  - L2 configurable as SRAM, cache and I/O transactions can be stashed into L2 cache regions

> Integrated DDR memory controller with full ECC support, supporting:
  - 200 MHz clock rate (400 MHz data rate), 64-bit, 2.5V/2.6V I/O, DDR SDRAM
  - 333 MHz clock rate (up to 667 MHz data rate) DDR2 SDRAM

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

> Four on-chip triple-speed Ethernet controllers (GMACs) supporting 10- and 100-Mbps, and 1-Gbps Ethernet/IEEE®802.3 networks with MII, RMII, GMII, RGMII, RTBI and TBI physical interfaces.
  - TCP/IP checksum acceleration
  - Advanced QoS features

> General-purpose I/O (GPIO)

> Serial RapidIO and PCI Express high-speed interconnect interfaces, supporting
  - Single x8 PCI Express, or
  - Single x4 PCI Express and single 4x serial RapidIO

> On-chip network (OCeaN) switch fabric

> Multiple PCI interface support
  - 64-bit PCI 2.2 bus controller (up to 66 MHz, 3.3V I/O)
  - 64-bit PCI-X bus controller (up to 133 MHz, 3.3V I/O), or
  - Flexibility to configure two 32-bit PCI controllers

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

> Integrated four-channel DMA controller

> Dual I^2C and Dual Universal Asynchronous Receiver/Transmitter (DUART) support

> Programmable interrupt controller (PIC)

> IEEE 1149.1 JTAG test access port

> 1.2V core voltage with 3.3V and 2.5V I/O

> 783-pin FC-BGA package

PowerQUICC

With more than 5,000 design wins and as the market share leader in communications processors, Freescale's PowerQUICC processors are the ideal choice for your embedded networking and communication system needs. To learn more about Freescale's communications and networking embedded solutions, visit us on the Web: **www.freescale.com/powerquicc**.

Third Party Support

The next-generation 90 nm PowerQUICC processors are supported by CodeWarrior™ development tools from Freescale and by a comprehensive ecosystem of development tools, operating systems and applications from third-party vendors working through Freescale's Smart Networks Alliance Program.

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

MPC8548FS
REV 1

Launched by Motorola
freescale
semiconductor