P1 Series

P1010 and P1014 low-power communications processors

Freescale QorIQ communications platforms are the next-generation evolution of our leading PowerQUICC communications processors. Built using high-performance Power Architecture® cores, QorIQ platforms enable a new era of networking innovation where the reliability, security and quality of service for every connection matters.

QorIQ P1010 and P1014 Communications Processors

The QorIQ P1 platform series, which includes the P1010 and P1014 communications processors, offers the value of extensive integration and extreme power smarts for a wide variety of applications in the cost-sensitive networking, network attached storage, digital video surveillance and industrial segments. Based on 45 nm technology for low power implementation, the P1010 and P1014 processors provide a single-core, low-power solution for the 533 MHz to 800 MHz performance range, along with a trusted security platform and a rich set of interfaces. The P1010 and P1014 processors are perfectly suited for network attached

storage, digital video surveillance applications, cost-sensitive Ethernet switch controllers and industrial/factory automation applications with demanding power/thermal constraints.
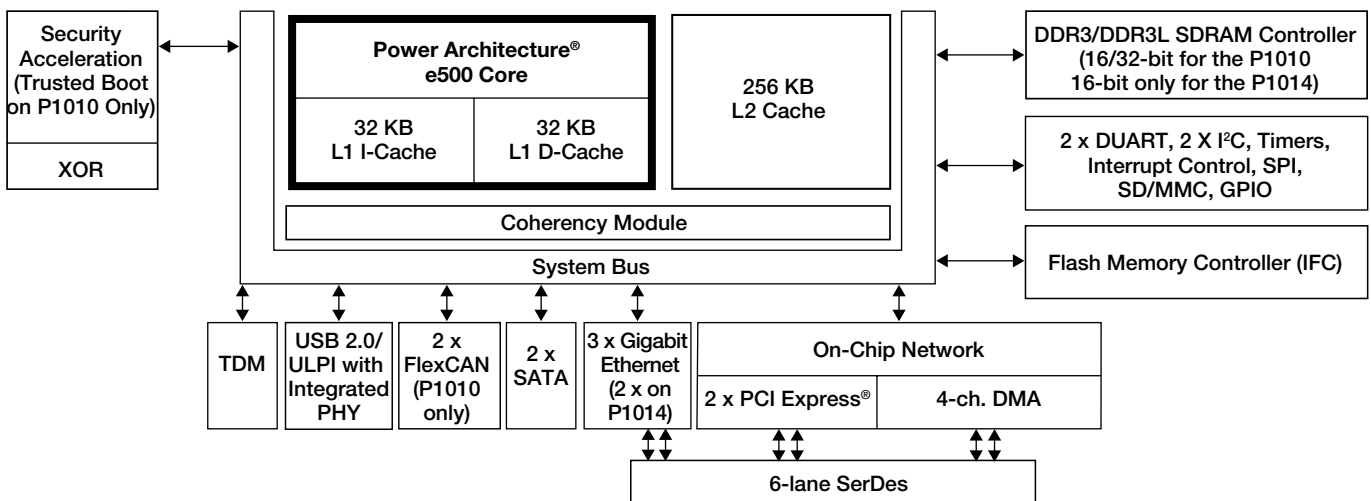
The QorIQ P1010 and P1014 processors are pin compatible. The P1014 is a more nimble derivative of the P1010 and targets the more cost-sensitive applications with a lower power envelop and sensible set of features. The P1010 adds trusted architecture and CAN controllers for additional versatility in the industrial segments. Scaling from 533 MHz to 800 MHz on a single core, the P1010 and P1014 deliver an impressive performance for the low end of the QorIQ portfolio.

The devices in these two platforms are software compatible, sharing the e500 Power Architecture core and peripherals, as well as being fully software compatible with the existing PowerQUICC processors. This enables you to create a product with multiple performance points from a single board design. The QorIQ P1010 single core processor supports a trusted platform architecture that enables an end to end

secure boot and code signing capability to protect the integrity of your firmware and prevent unauthorized use. Furthermore, CAN interfaces allow ease of implementation of industrial protocols and an easier fit into cost-sensitive industrial applications.

The P1010 and P1014 processors have an advanced set of features for ease of use. The 256 KB L2 cache offers incremental performance and enables the implementation of software fast path drivers to enhance networking performance for IP forwarding, NAT firewall and IP sec and achieve line rate on most usage cases. The integrated security engine supports the cryptographic algorithms commonly used in IPsec, SSL, 3GPP and other networking and wireless security protocols. The trusted architecture included in the P1010 provides additional platform security and prevents unauthorized usage or intrusion. The memory controller offers future-proofing against memory technology migration with support for low-power DDR3. It also supports error correction codes, a baseline requirement for any high-reliability system.

QorIQ P1010 and P1014 Block Diagram

□ Cores

The QorIQ P1010 and P1014 processors integrate a rich set of interfaces, including SerDes, Gigabit Ethernet, PCI Express® CAN controllers (P1010 only) and USB plus a USB PHY. The three 10/100/1000 Ethernet ports support advanced packet parsing, flow control and quality of service features, as well as IEEE® 1588 time stamping—all ideal for managing the data path traffic between the LAN and WAN interface. A TDM interface can support voice for legacy phone applications. Six SerDes lanes can be portioned across two PCI Express ports, the Ethernet and SATA ports for versatility and convenience. The PCI Express ports can provide connectivity to IEEE 802.11n radio cards for wireless support. USB, SATA or SD/MMC interfaces can be used to support local storage. An integrated USB PHY lowers the application bill of materials and provides proven performance. Two DUARTs and dual FlexCAN interfaces provide the flexibility required by demanding industrial applications including factory automation and control.

Target Applications

The P1010 and P1014 processors serve in a wide variety of applications. The devices are well-suited for low-cost networking and network attached storage applications. With an available junction temperature range of -40ºC to +125ºC, the devices can be used in power-sensitive industrial applications and outdoor environments less protected from the environment. The devices' primary target applications are networking attached storage and digital video surveillance where read/write performance to storage is paramount.

A low-cost router/switch application benefits from the combination of high general purpose performance as well as the networking performance provide by the software fast path networking drivers that accelerate IP forwarding, NAT firewall and IP sec applications to line rate on certain usage models with low power. The P1010 and P1014 devices offer a scalable platform to develop a range of products that can support the same feature set. Integrated 10/100/1000 Ethernet controllers with classification and QoS capabilities are ideal for managing the traffic between the LAN and WAN interface. PCI Express ports can provide connectivity to IEEE 802.11n radio cards for wireless support, TDM for legacy phone interfaces to support voice, the USB, SATA or SD/MMC interfaces can be used to support local or network attached storage and the CAN interface can be used to provide an interface for industrial protocols. The integrated security engine can provide encrypted secure communications for remote users with VPN support and the trusted platform provides an end to end solution for secure boot and code signing.

Technical Specifications

- Single e500 core, built on Power Architecture technology
  - 36-bit physical addressing
  - Double-precision floating-point support
  - 32 KB L1 instruction cache and 32 KB L1 data cache
  - 533 MHz to 800 MHz core clock frequency
- 256 KB L2 cache with ECC, also configurable as SRAM and stashing memory

- Three 10/100/1000 Mbps enhanced three-speed Ethernet controllers (eTSECs)
  - TCP/IP acceleration and classification capabilities
  - IEEE 1588 support
  - Lossless flow control
  - RGMII, SGMII
- High-speed interfaces (not all available simultaneously)
  - Six SerDes to 3.125 GHz multiplexed across controllers
  - Two PCI Express controllers
  - Two SGMII interfaces
  - Two SATA interfaces
- One USB controller (USB 2.0) with integrated PHY, host, OTG and device support
- Serial peripheral interface
- Trusted boot platform, integrated security engine (SEC 4.0)
  - Crypto algorithm support includes 3DES, AES, RSA/ECC, MD5/SHA, ARC4, Snow 3G, and FIPS deterministic RNG
  - Single pass encryption/message authentication for common security protocols (IPsec, SSL, SRTP, WiMAX)
  - XOR acceleration
- 16/32-bit DDR3/DDR3L SDRAM memory controller with ECC support
- Four-channel DMA controller
- Two I²C controllers, two DUARTs, timers
- Integrated flash controller (IFC) with enhanced capabilities to support large pages
- 32 general-purpose I/O signals
- Package: 425-pin TEPBGA1, 0.8 mm pitch, 19 mm x 19 mm

QorIQ Device	Top Core Frequency	L2 Size	DDR 3 Support	GE Ports	SATA	PCI Express®	Security	CAN
P1010	800 MHz	256 KB	16/32-bit @ 800 MHz	3	2	2	Trusted	2
P1014	800 MHz	256 KB	16-bit @ 800 MHz	2	2	2	No	No

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