

QorIQ LS1
Processor Family

QorIQ LS1020A and LS1022A Communications Processors

Dual-core solutions for power-sensitive networking and industrial applications

OVERVIEW

The QorIQ LS1020A and LS1022A processors are cost effective, power-efficient and highly integrated system-on-chip designs that extend the reach of the value-performance product line for enterprise and consumer networking applications. Incorporating dual ARM® Cortex®-A7 cores with ECC protection running up to 1.2 GHz, the QorIQ LS1020A and LS1022A processors are engineered to deliver outstanding efficiency, delivering over 7,000 CoreMarks® of performance, as well as virtualization support, advanced security features and a broad array of high-speed interconnects and serial connectivity options ever offered in a sub-3 W processor.

CORE COMPLEX

The QorIQ LS1020A and LS1022A processors both integrate dual ARM Cortex-A7 cores running up to 1.2 GHz (600 MHz on the LS1022A) with ECC- protected L1 and L2 caches. The dual cores each feature 32 KB of L1 instruction and data cache and share up to 512 KB of coherent L2 cache, as well as single-bit error detect and correction for both L1 and L2 caches. Both ARM Cortex-A7 cores in the LS1020A and LS1022A processors feature the NEON SimD module and dual-precision floating-point unit (FPU). The DDR memory controller supports 8-, 16- or 32-bit type 3L and four memory devices at up to 1,600 MHz (LS1022A limited to DDR3L at up to 1,033 MHz).

TARGET APPLICATIONS

- Enterprise AP routers for 802.11ac/n
- I/O line cards
- Controllers
- Security appliances
- IoT gateways
- Building automation
- Smart energy

UNPARALLELED INTEGRATION

The QorIQ LS1020A and LS1022A devices are engineered to deliver outstanding efficiency, delivering over 7,000 Coremarks, and were designed specifically to enable a new class of power-sensitive applications by bringing together highly efficient ARM® cores and over twenty years of NXP® networking expertise and to offer a high level of integration under 3 W. With ECC protection on both L1 and L2 caches, Secure Boot and ARM TrustZone, QUICC Engine support (on LS1020A), USB 3.0 (on LS1020A), and a broad assortment of peripheral and I/O features, these processors devices are purpose-built for multicore platforms that must perform more securely, intelligently and efficiently without sacrificing performance.

SYSTEM INTERFACES AND NETWORKING

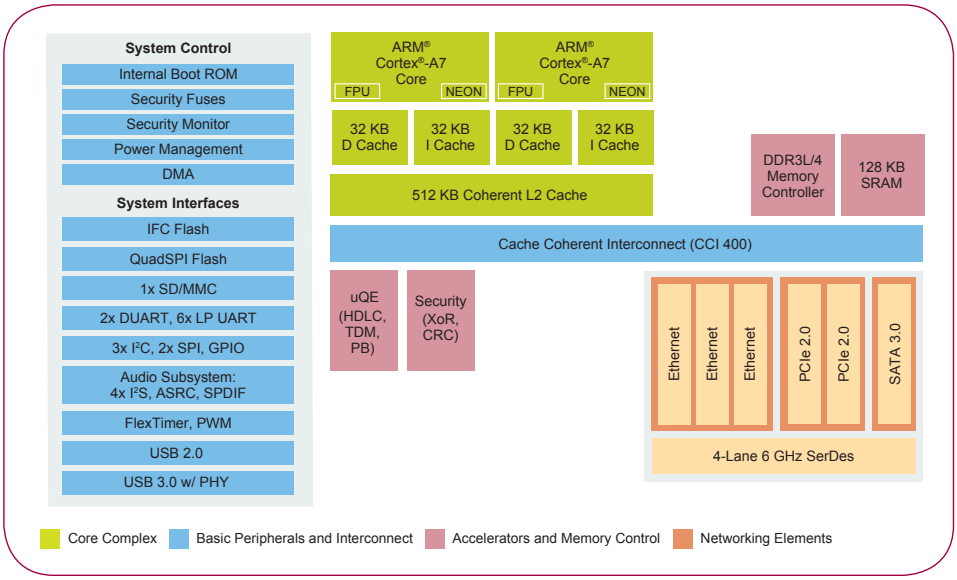
A four-lane, 6 GHz multi-protocol SerDes provides support for high-speed interfaces, including up to three Gigabit Ethernet ports with IEEE® 1588 support, dual DMA- controlled PCI Express® generation 2.0 ports and a single SATA 3.0 port. The QorIQ LS1020A also features dual USB controllers—one supporting SuperSpeed USB 3.0 with an integrated PHY, the other supporting USB2.0 functions. Additional interfaces include QuadSPI, IFC and support for SD/MMC. For network audio applications, the LS1020A also includes support for both ASRC and SPDF. For power-constrained applications, the LS1022A provides support for CAN and UART-based industrial protocols. Serial IO includes three I2C and two SPI interfaces on both the LS1020A and LS1022A.

COMPLETE ENABLEMENT, RICH ECOSYSTEM

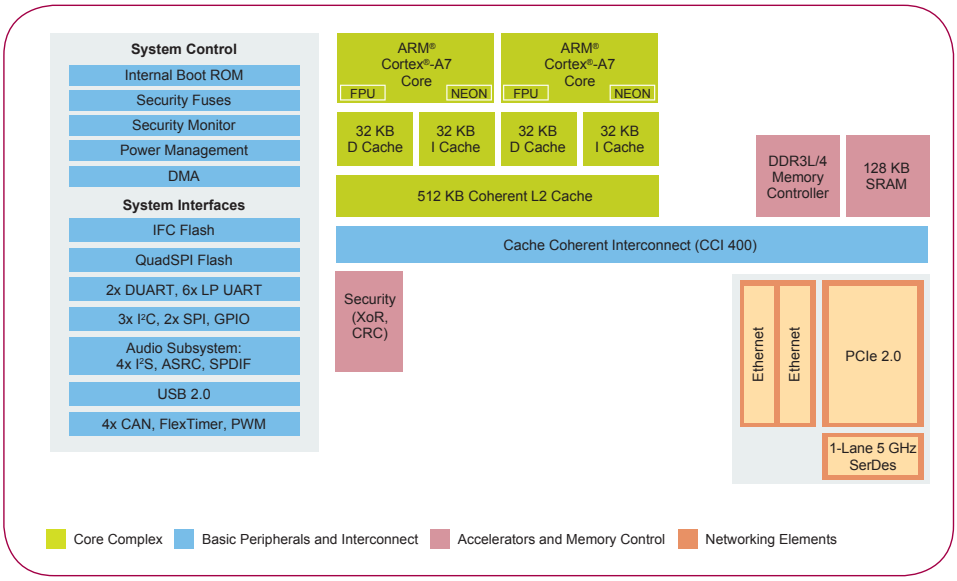
For customer evaluation, the QorIQ LS1020A and LS1022A processors are supported by the TWR-LS1021A development platform, based on the modular Freescale Tower System that features an integrated on-board probe for further cost savings. The TWRLS1021A evaluation boards include a Linux® 3.12 software development kit, with optimized drivers to support peripherals and a free 90-day evaluation license for CodeWarrior for ARM development tools.

All QorIQ LS series devices are supported by our extensive third-party ecosystem. In conjunction with our expertise and worldwide support infrastructure, the ecosystem helps customers accelerate their migration from both competitive solutions and from legacy Freescale devices, preserve investment costs and reduce time to market.

QorIQ LS1020A BLOCK DIAGRAM



QorIQ LS1022A BLOCK DIAGRAM



CODEWARRIOR DEVELOPMENT SUITES FOR NETWORKED APPLICATIONS

LS Tower Suite Level: This suite was created to give you an economic, yet complete full-featured development tool for QorIQ LS development when the LS part is in a Freescale Tower Board configuration. The tools in this suite have no limitations other than they will only work with the Tower Board.

Developer Suite Level: This suite is the primary suite for customers who develop with multicore processors built on Power Architecture including, QorIQ

LS series devices and QorIQ Qonverge SoCs as well as DSPs based on StarCore technology. It is for designers with full system responsibility but no need for the extra costs of the specialist and architect features.

Specialists Suite Level: This suite is designed so you can do more than just compile and debug. Tools in this suite are useful for customers creating products for every market. Get all the software included in the Developer Suite plus additional boardanalysis tools. These tools can be used by all customers in any market but not everyone in a customer's organization needs these tools.

Architect Suite Level: This suite would best be used by personnel who have a need to dig deep into the networking aspects of a development project. In this suite, you will get all the software in the Specialist Suite plus software tools designed to give networking experts the extra capability to find out how their system is really working.

Learn more at www.nxp.com/CW4NET

QorIQ LS1020A AND LS1022A PROCESSOR FEATURES

Dual ARM Cortex-A7 cores	Power efficiency, engineered to deliver over 7,000 Coremarks at 1.2 GHz. Typical total system power of 3 W for improved performance without increased power utilization (under 2 W for LS1022A).
Integrated security engine, supporting Secure Boot and Trust Architecture	Based on the QorIQ SEC 5.5 hardware accelerated security engine, to provide defense in depth for customer applications
ECC-protected L1 and L2 cache memories	The QorIQ LS1 family devices are the only processors in their class with ECC-protected caches and coherent 512 KB L2, adding performance and meeting networking requirements for high reliability.
Optimized power/performance for embedded, fanless applications	Delivers processing performance required for next-generation 802.11ac and networking/industrial applications while staying within current POE power budget
Rich connectivity and peripheral features including PCI Express Gen2, USB 3.0, SATA 3, IFC, QuadSPI (LS1022A also includes CAN support)	High versatility that enables high bandwidth connectivity for ASICs, 4G/LTE, SATA and low-cost NAND/NOR flash
QUICC Engine	Proven support required for industrial, building and factory protocols such as PROFIBUS, HDLC and TDM
Support for hardware based virtualization	Enables partitioning of CPU resources on low-power parts for increased system productivity
DDR3L/4	First in its class to offer support for DDR4 memory, ensuring continued performance efficiency

www.nxp.com/QorIQ

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Document Number:
LS1020ALS1022AFS REV 3 cc

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