

Converged industrial networking for Industry 4.0

Layerscape® LS1028A Family of Industrial Applications Processors

Designed to enable the industrial IoT, the LS1028A family of industrial application processors integrate 3D graphics, TSN-enabled Ethernet networking, and high-performance PCIe® Gen 3.0 interfaces.

OVERVIEW

Support for 125 °C junction temperature, NXP's commitment to production for a minimum of 15 years, and industrial qualification makes this SoC family ideal for industrial applications that require reliability and long life in challenging environments.

TARGET APPLICATIONS

- Control and factory automation — robotics controllers, I/O controllers, motion controllers
- Transportation – Gateways, HMI, embedded controllers for mass transit and railways
- IoT gateways
- Networking gateways
- Programmable logic controllers (PLCs)
- Industrial PCs
- Avionics

HIGHLY INTEGRATED DESIGN

This family of SoCs integrates the high-performance Arm® Cortex®-A72 processor, Ethernet switching with TSN, Trust Architecture with Security Engine, and a 3D GPU with support for 4K display and integrated DisplayPort/ embedded DisplayPort interface.

TSN FOR CONVERGED NETWORKS IN THE INDUSTRIAL IoT

To make the Industrial IoT and Industry 4.0 a reality, manufacturers must interconnect operations technology (OT), such as manufacturing and automation systems, to their information technology (IT), including inventory, logistics, and customer relationship management systems. Enabling the flow of information between these two domains will increase efficiency and reduce product delivery times.

Time-sensitive networking (TSN) enables the convergence of the IT and OT, using gigabit Ethernet to enable high bandwidth and legacy IT equipment, but adding features such as time-aware shaping, frame pre-emption, and frame replication and elimination to ensure the OT network requirements are met. The LS1028A can support daisy chain or ring deployments with its TSN capable switch, or endpoint applications with the TSN capable Ethernet controller.

SECURITY

The LS1028A family of SoCs can implement trusted platforms using features provided by Trust Architecture such as secure boot, secure key storage, and tamper detection. The Security Engine (SEC) provides cryptographic acceleration for encrypted Ethernet communication and disk storage. The SEC also offloads public/private key transactions, with support for elliptic-curve cryptography (ECC).

INDUSTRIAL OPERATION

Fully qualified for industrial operation, the LS1028A family is designed and tested to run continuously in high-temperature environments for 10 years. Devices are available for extended temperature operation supporting a junction temperature between -40 and 105 °C, and are also available with support for junction temperatures up to 125 °C.

ENABLEMENT FOR FACTORY AUTOMATION

Open Industrial Linux® provides real-time processing performance on the LS1028A with support for bare-metal applications or Xenomai Linux with an RTOS co-kernel. Open Industrial Linux also provides protocol support for Time-Sensitive Networking and synchronization with IEEE® 1588.

PRODUCT LONGEVITY

The LS1028A is part of the NXP 15-year product longevity program, ensuring a stable supply of the LS1028A for long life industrial designs. Visit **www.nxp.com/productlongevity** for details.

DEVELOPMENT PLATFORM

The LS1028A reference design board (RDB) provides the ability to evaluate the capabilities of the LS1028A family of SoCs and get a jump-start on your embedded design. Contact your NXP sales representative for details.

RELATED SOFTWARE

- Linux SDK for Layerscape Processors
- Open Industrial Linux SDK with support for real-time applications
- CodeWarrior® Development Software for Arm v8 64-bit based Layerscape series processors
- Uboot
- UEFI

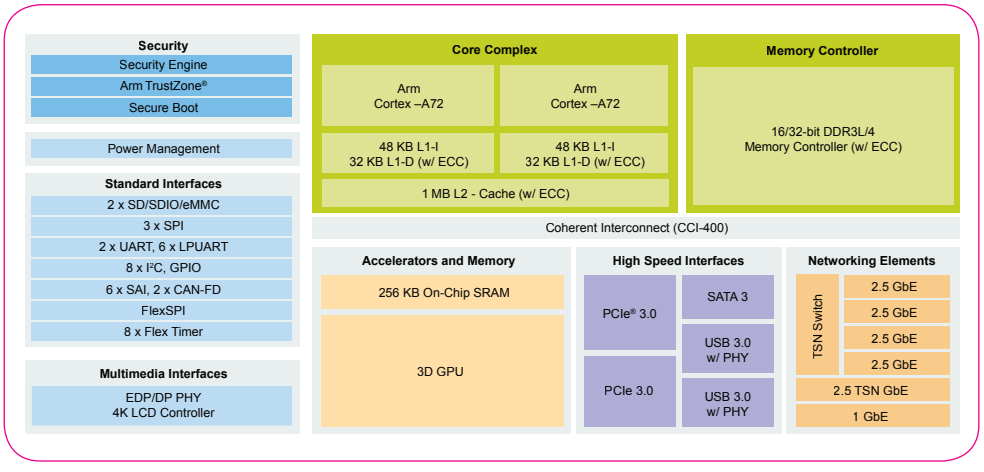
FEATURE LIST

FEATURES	BENEFITS
Dual 64-bit Arm®v8 Cortex®-A72 Cores with NEON™ SIMD and floating point unit	High single-threaded floating point and integer performance for control applications
4 Switched TSN-enabled Ethernet interfaces 10/100/1000/2500 Mbit/s	Low latency, deterministic Ethernet communications for OT and IT systems, deployed in daisy-chain, ring, or star topologies
1 TSN-enabled Ethernet Interface 10/100/1000/2500 Mbit/s	TSN endpoint capabilities for control applications, with scalable bandwidth
1 Ethernet Interface 10/100/1000 Mbit/s	Low-power Ethernet for IT or console communications
Integrated 3D GPU, 4K LCD Controller, DP/eDP Phy	High-resolution graphics for human machine interfaces
Trust Architecture	Secure key storage, use secure boot to create a trusted platform for industrial IoT applications
Security Engine with Cryptographic Offload	Cryptographic and public key hardware accelerators offload math-intensive operations from the CPU
2 x PCIe® Gen 3.0 controllers, up to four SerDes lanes running at 8 GHz root, complex and endpoint support	High-bandwidth, low-latency communication to host processors, industrial communication ICs, and Wi-Fi® chipsets for gateways
2 x USB 3.0 interfaces with integrated PHY host and device mode support	High-speed USB allows interconnection to many different peripheral devices, and the integrated PHY removes additional components from the design
4 x 10 GHz SerDes lanes	Flexible interconnect to support SATA 3.0, PCIe 3.0, 1 Gb and 2.5 Gb Ethernet

LS1028A SOC FAMILY — SCALABLE PROCESSING WITH GRAPHICS

FEATURES	LS1028A	LS1027A	LS1018A	LS1017A
Arm® core	2 x Cortex®-A72	2 x Cortex-A72	1 x Cortex-A72	1 x Cortex-A72
DDR	32-bit/16-bit DDR3L/ DDR4 + ECC	32-bit/16-bit DDR3L/ DDR4 + ECC	32-bit/16-bit DDR3L/ DDR4 + ECC	32-bit/16-bit DDR3L/ DDR4 + ECC
GPU	1 x GC7000UltraLite	-	1 x GC7000UltraLite	-
Ethernet	4 x 2.5 G/1 G switched Eth (TSN enabled) 1 x 2.5 G/1 G Eth (TSN enabled) 1 x 1 G Eth	4 x 2.5 G/1 G switched Eth (TSN enabled) 1 x 2.5 G/1 G Eth (TSN enabled) 1 x 1 G Eth	4 x 2.5 G/1 G switched Eth (TSN enabled) 1 x 2.5 G/1 G Eth (TSN enabled) 1 x 1 G Eth	4 x 2.5 G/1 G switched Eth (TSN enabled) 1 x 2.5 G/1 G Eth (TSN enabled) 1 x 1 G Eth
PCIe	2 x Gen 3.0 Controllers (RC or EP)	2 x Gen 3.0 Controllers (RC or EP)	2 x Gen 3.0 Controllers (RC or EP)	2 x Gen 3.0 Controllers (RC or EP)
USB	2 x USB 3.0 with PHY (Host or Device)	2 x USB 3.0 with PHY (Host or Device)	2 x USB 3.0 with PHY (Host or Device)	2 x USB 3.0 with PHY (Host or Device)

LAYERSCAPE LS1028A BLOCK DIAGRAM



To learn more, visit nxp.com/LS1028A

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