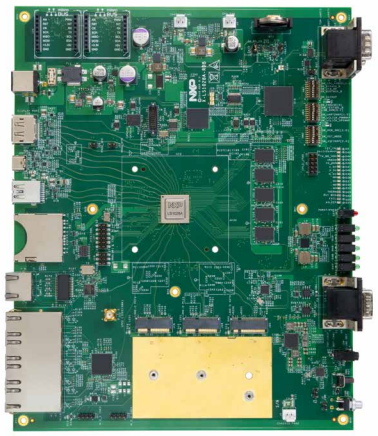
Converged Industrial Networking for Industry 4.0

LS1028A Reference Design Board

Designed to enable the convergence of information technology and industrial traffic on a standard Ethernet network with integrated support for IEEE TSN, the LS1028A family of industrial application processors include 3-D graphics, multi-channel audio, TSN-enabled Ethernet networking, and high performance PCIe Gen 3.0 interfaces.

PROCESSOR OVERVIEW

As industrial OEMs design solutions for Industry 4.0, they must converge the operations technology (OT) domain with their information technology (IT) infrastructure. Operations Technology networks require guaranteed and timely delivery of packets, not the typical best-effort approach used in IT networks today. At the same time, current technologies in the OT domain are often limited to 10-100 Mbps, and do not have the bandwidth to support new technologies being applied to manufacturing, such as high-definition video. Time-sensitive networking supports legacy IT equipment and OT equipment on the same network, enabling Gigabit bandwidth while simplifying network deployment and management.



LS1028ARDB

The LS1028A family is designed for industrial applications that require high reliability and long life in challenging environments, and includes industrial qualification, support for 125° C junction temperature and NXP's commitment to production for a minimum of 15 years.

REFERENCE DESIGN BOARD

The LS1028A reference design board (RDB) is an evaluation and development kit featuring the LS1028A industrial application processor and supports many of the features of the LS1028A SoC. The RoHS-compliant LS1028ARDB is an ideal platform to start on for industrial gateway, HMI, and industrial control designs. The board can be used as a starting place for software development and as a reference for the final hardware design, helping to reduce time-to-market. The board comes in an enclosure, allowing easy deployment for demonstrations and test beds.

BOARD HARDWARE FEATURES

Processor

- LS1028A SoC with two 32-/64-bit Cortex® v8-A72 CPUs running at up to 1.3 GHz

Memory

- 4 GB DDR4 SDRAM soldered down memory
- 32-bit DDR4 bus with data rates up to 1600 MT/sec
- Supports double-bit error detection and single-bit error correction ECC (4-bit check word across 32-bit data)

Storage

- 8 GB eMMC 5.0
- Full size SD card slot
- 512 MB QSPI NAND flash
- 256 MB XSPI NOR flash

Ethernet

- One RJ45 connector for 1 Gbps Ethernet with TSN and 1588 (SGMII)
- Four RJ45 connectors for 1 Gbps Ethernet switch with TSN and 1588 (QSGMII)

USB

- One USB 3.0 connected to a Type A connector
- One USB 3.0 connected to a Type C connector

PCI Express and SATA

- Two M.2 type E slots with PCIe x1 (Gen 1/2/3)
- One M.2 type B slot with SATA 3.0 (resistor mux with one type E slot)

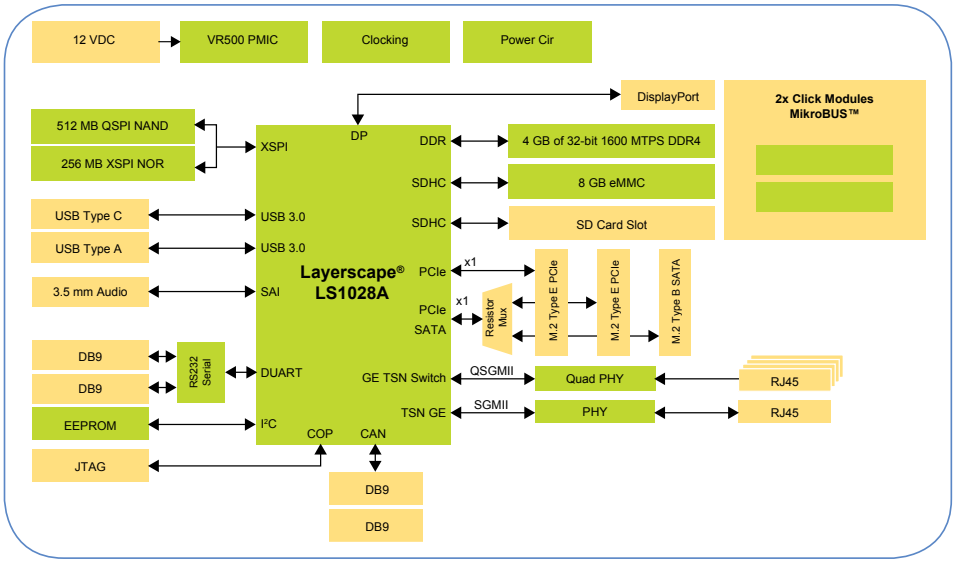
Basic Peripherals and Interconnect

- One DisplayPort interface
- Two CAN interfaces connected to DB9M connectors
- Two RS232 interfaces connected to DB9M connectors
- One 3.5 mm audio out interface

Expansion

- Two MikroBUS™ sockets

LS1028ARDB BLOCK DIAGRAM



HARDWARE KIT CONTENTS

The LS1028ARDB hardware kit contains:

- A LS1028ARDB board with enclosure
- 12 VDC power supply
- Universal power adaptor
- USB Serial Converter – USB A Male - DB9 Female
- USB Cable USB C Male – USB A Female
- Ethernet Cable – RJ45 – RJ45 straight through wiring
- Serial Cable – DB9 Female – DB9 Female
- SD Card 16 GB

SOFTWARE ENABLEMENT

Time-sensitive networking drives a need for real-time processing. The LS1028A supports various real-time operating systems (RTOSs). Open Industrial Linux provides real-time performance with Xenomai Linux, and application software for configuring and managing the TSN features on the LS1028A.

Another trend is toward smartphone-inspired man-machine interfaces. For that reason, the LS1028A integrates a GPU and LCD controller. Moreover, securing the industrial IoT is a paramount concern for manufacturers. The NXP Trust Architecture is designed to help OEMs and their customers secure their platforms and prevent them from running unauthorized software. Secure boot is available with the Layerscape SDK with reference source code.

- Boot Loader
  - Boot from SPI NOR, SPI NAND, SD Card, eMMC
  - uboot
  - UEFI
  - Secure boot support
- Linux®
  - Layerscape SDK
  - Open Industrial Linux® SDK with support for Real-Time applications
- Tools
  - CodeWarrior Development Software for Arm® v8 64-bit based Layerscape Series Processors
  - GNU tool chain

www.nxp.com/LS1028A

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