

Real-Time Industrial Ethernet Switch (Low Cost) with RZ/N1S

▪ Overview

Customers in the industrial arena often require real-time Ethernet solutions, also called industrial Ethernet. Common standards are EtherCat, Powerlink, Sercos III, ProfiNet, Modbus TCP and others.

For a low-cost Industrial Ethernet switch or similar setup with fewer calculation performance requirements, the RZ/N1S MPU is a perfect fit because of its high integration, rich interfaces and integrated 6MB RAM. The RZ/N1D features an integrated Arm® Cortex®-M3 based R-In engine that offloads the main cores by working as a dedicated Gigabit Ethernet hardware RTOS/accelerator. External Flash memory can be attached by using a dedicated, second QSPI interface.

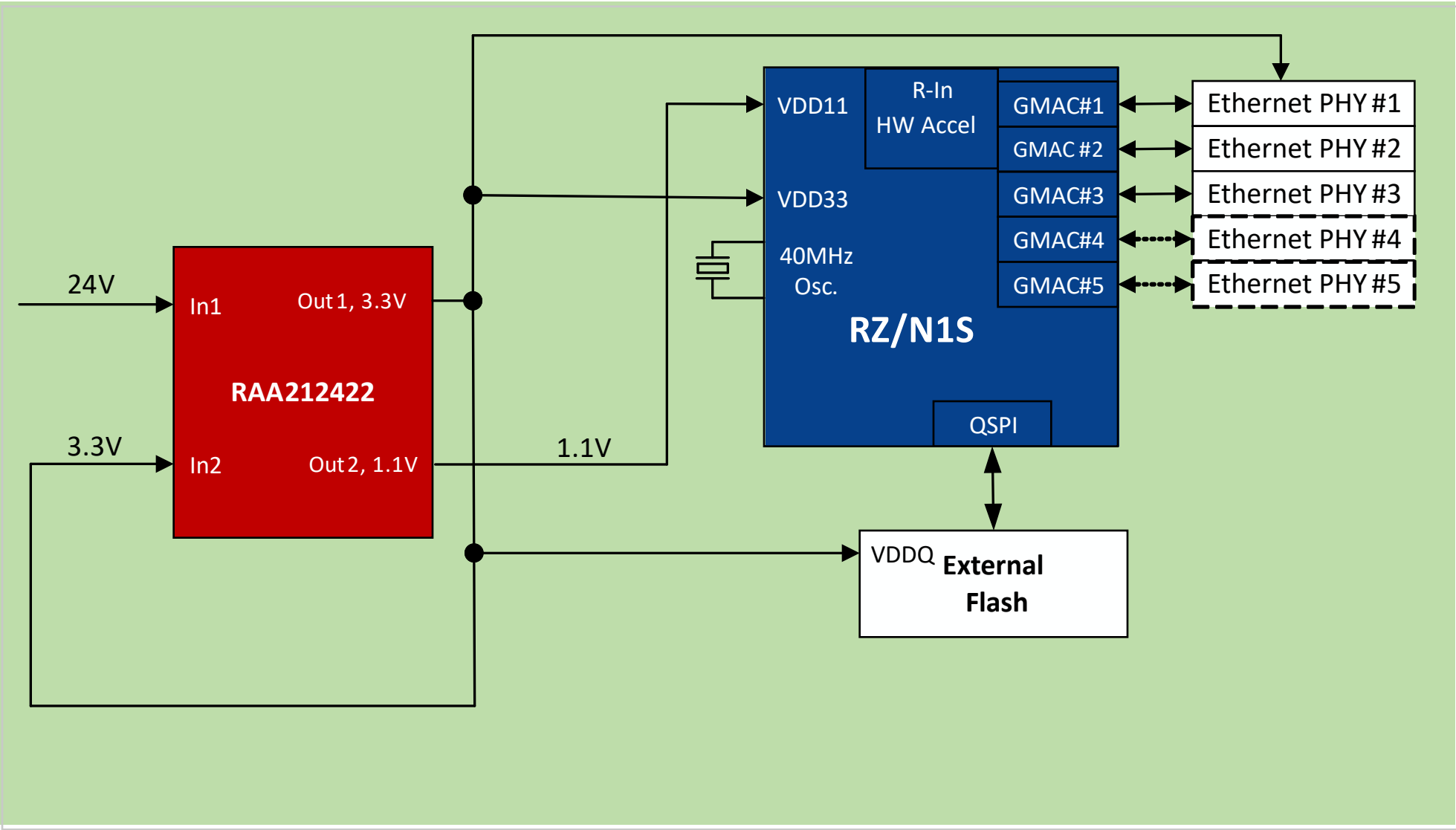
This solution demonstrates that a low-cost industrial Ethernet switch can be produced simply with an RZ/N1S MPU, up to 5 Ethernet PHYs, and a power supply. To power this setup, two precise power rails are required and can easily be achieved using our highly integrated RAA212422 dual-output buck regulator, which features integrated MOSFETs that provide a small PCB footprint solution.

▪ System Benefits

- Highly integrated, low-cost industrial Ethernet (switch) solution with R-In offload engine / HW accelerator
- Easy to use, high efficiency dual in/out DC/DC converter, providing all required voltages
- Low BOM count and small PCB space

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Device Category	P/N	Key Features
MCU	RZ/N1S	Industrial Ethernet MPU Arm® Cortex®-A7 + Cortex®-M3 with large integrated RAM (6MB) and QSPI for external Flash
Power	RAA212422	Dual channel 40V / 1.1A and 5.5V / 1.5A synchronous buck regulators

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RZ/N1S Industrial Ethernet MPU

Arm® Cortex®-A7 + Cortex®-M3

500 MHz Cortex®-A7 + R-IN Engine 125 MHz Cortex®-M3

- Proven R-IN engine as HW accelerator for Industrial Ethernet communication
- Internal oscillator for 40MHz crystal, i.e. no external clock required

6MB SRAM integrated

- Additional RAM can be attached by QSPI, but in many cases not needed

Integrated up to 5 port Ethernet Switch

External Storage interface

- 2x QSPI, 2x SDIO/eMMC
- Several storage devices can be chosen based on application requests

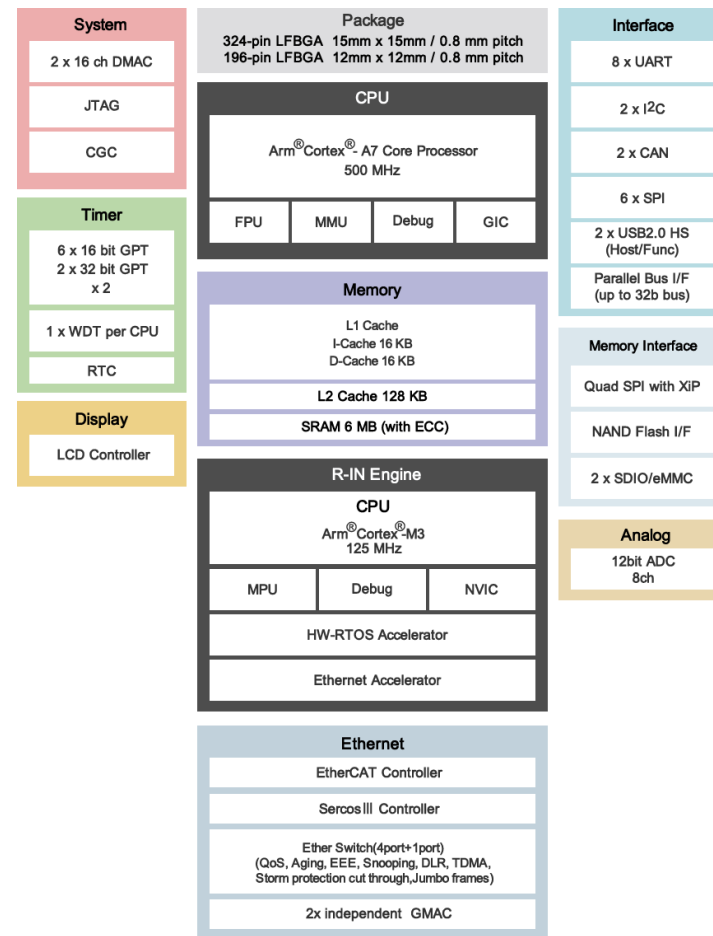
LCD controller, Multiple Timers, RTC

Rich interfaces:

- up to 2x USB2.0, 2x CAN, 8x UART, 6x SPI etc.

Temperature range -40..+110°C

Name	P/N	Package	PRP IEC62439-3
RZ/N1D	R9A06G033VGBA	196BGA	--
	R9A06G033NGBG	324BGA	PRP compliant



RAA212422

Dual channel 40V 1.1A and 5.5V 1.5A synchronous buck regulators

Dual Channel Buck Regulator

- Offers design flexibility
- Allows the usage of 12V and 24V ACDCs

High Integration, Internal high-/ and low-side MOSFETs

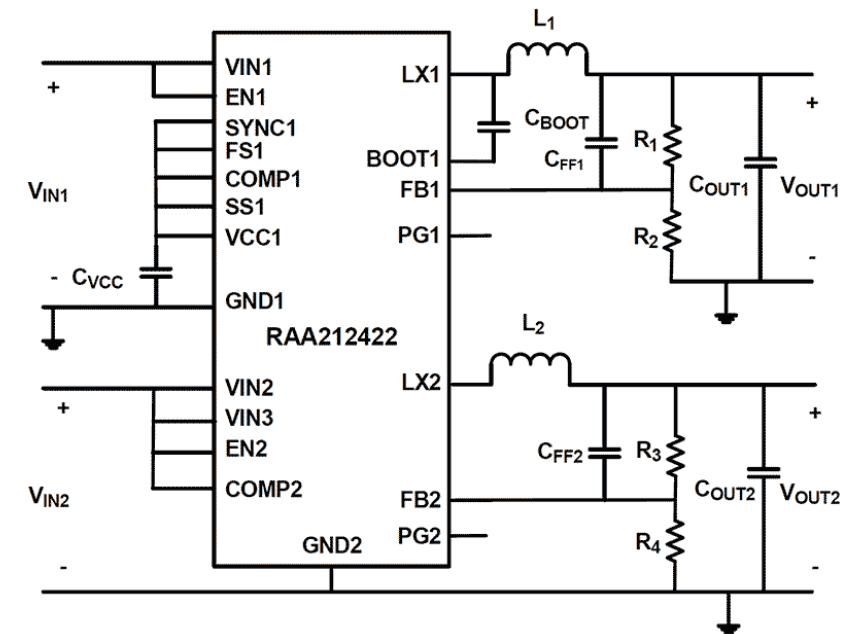
- Small solution size

Switching Frequency up to 2 MHz

- Smaller passive components, thus solution size
- Better transient response

Internal/External compensation

- Design simplicity and flexibility



Part #	VIN	IOUT	Package
RAA2124224GN	3V to 40V 2.7V to 5.5V	1.1A 1.5A	3 x 6mm, QFN22