

Marvell® Scalable mGig AQC113/AQC114/AQC114CS/AQC115C

PCIe 4.0 10GbE, 5GbE, 2.5GbE & 1GbE Scalable mGig Ethernet Controllers

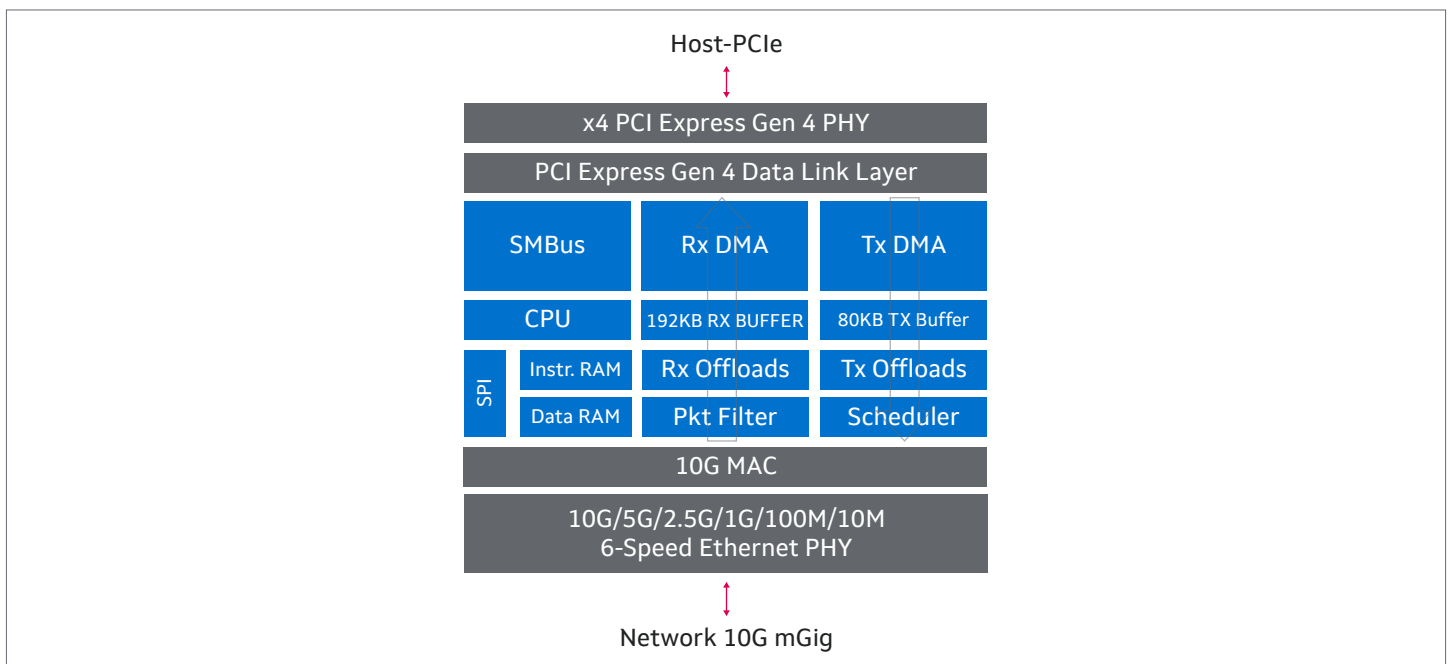
Overview

The Marvell® AQC113/AQC114/AQC114CS/AQC115C devices comprise a high-performance, Scalable mGig, Ethernet MAC+PHY Controllers designed to support the following network rates: 10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-TX/10BASE-T. When equipped with a PCI Express Gen 4 x4, this family of Scalable mGig Ethernet MAC+PHY Controllers easily handle the 10 GbE line-rate performance. The AQC113, AQC114, AQC114CS, AQC115C device family combines a mGig Ethernet MAC Controller with a full-reach, low-power, highperformance, multi-gigabit, single-port Gen 4 Ethernet Alaska PHY transceiver into a single, monolithic device that is designed using the latest 14nm, multi-gate, FinFET process technology.

Marvell Scalable mGig controllers are compliant with both the IEEE® 802.3an/bz standard and the NBASE-T™ Alliance PHY Specification to perform all of the physical layer functions required to implement transmission over 100 meters of twisted pair (TP) cabling.

Marvell Scalable mGig controllers integrates the following key features of Energy Efficient Ethernet (EEE), Precision Time Protocol (PTP)/1588v2, Synchronous Ethernet (Sync-E), a hardware-security enabled boot function, support for multi-purpose I/Os AQC113-AQC115C, support for all PoE standards up to 100W, and support for jumbo packets up to 16KB in all operating modes. The AQC113 support all six network rates (10G and down to the lowest rates), while the AQC114/114CS devices support five network rates (5G and down to the lowest rates), and the AQC115C (2.5G and down to the lowest rates). AQC113 and AQC114 devices are a scalable mGig, single-port device, and these are housed in a compact 12 mm x 14 mm, 0.8 mm pitch, 224-pin, flip-chip Ball Grid Array (FCBGA) package. The AQC114CS and AQC115C devices are pin-compatible, multigigabit, singleport PHYs, and all of these devices are housed in a compact 7 mm x 7 mm, 0.8 mm pitch, 64-pin, flip-chip Chip Scale (FCCSP) package.

Block Diagram



Key Features

Features	Benefits
Single-chip solution	<ul style="list-style-type: none">• Integrated PCIe, MAC+PHY minimizes board space and power usage
PCI Express Gen4, Gen3 or Gen2	<ul style="list-style-type: none">• Supports line rate up to 16.0 GT/s, 8.0GT/s and 5.0GT/s per lane
Supported bus width	<ul style="list-style-type: none">• Supports Gen 4 x1, Gen 3 x4, Gen 3 x2, or Gen 3 x1, Gen 2 x2
Message-Signaled Interrupts (MSI and MSI-X) and legacy INTx PCIe interrupts	<ul style="list-style-type: none">• Improves CPU utilization and network performance
Sideband SMBuse interface (Slave SMBus interface)	<ul style="list-style-type: none">• Communication and management function
Hardware-security enabled boot function	<ul style="list-style-type: none">• S devices support eFuse key hash programmed into the chip providing a secured boot feature for those devices running under a security-oriented operating system
External SPI FLASH interface with optional FLASH-less operation	<ul style="list-style-type: none">• Reduce BOM cost as one or no FLASH devices required• Enables firmware download/upgrade and FLASH image loading during manufacturing

PHY Features	Benefits
Integrated Marvell Alaska PHY featuring NBASE-T technology	<ul style="list-style-type: none">• Incorporates Marvell's Alaska PHY technology that delivers 10 GbE network connectivity speed through Cat 6a. It delivers 5 GbE and 2.5 GbE network connectivity speeds through 100 meters of Cat 5e, or better cabling, enabling higher data rates with zero change to legacy cabling
Energy Efficient Ethernet (EEE) support	<ul style="list-style-type: none">• PHY power savings
Advanced cable diagnostics	<ul style="list-style-type: none">• On-chip high-resolution cable analyzer
Audio Video Bridging (AVB) and PTP/1588v2	<ul style="list-style-type: none">• Management of time-sensitive traffic packets

MAC Features	Benefits
LSO, RSS, DCA and header checksum	<ul style="list-style-type: none">• Increased network performance and lower host CPU utilization
Wake-on LAN (WoL) power management	<ul style="list-style-type: none">• Supports lower power modes
Quality of Service (QoS) support	<ul style="list-style-type: none">• Up to eight traffic classes and Data Center Bridging (DCB)
Jumbo Frames (up to 16 Kbytes)	<ul style="list-style-type: none">• Improved network performance with reduced CPU utilization
IPv4/v6, IPv6/TCP, and IPv6/UDP checksum offload	<ul style="list-style-type: none">• Offloads calculations and improved CPU usage
Internet Control Message Protocol (ICMP)	<ul style="list-style-type: none">• Supports diagnostics, error and operational information messages
Address Resolution Protocol (ARP)	<ul style="list-style-type: none">• Resolves network layer addresses into link layer addresses
Multicast Domain Name System (mDNS)	<ul style="list-style-type: none">• Resolves host names to IP addresses
Transmission Control Protocol (TCP) Keepalives (KA)	<ul style="list-style-type: none">• Supports link checking between devices

Target Applications

Feature: Marvell AQtion power leading -edge solutions for motherboards, PCs, Workstations, docking station, NAS, Router, Gateways and other embedded applications

Drivers: Windows 10 and Windows 11 (64-bit) and Linux 3.10 and higher.

Utilities: ROM programming and Windows Installer

Boot Options: UEFI and PXE

Device	Description	Ordering Part Number
AQC113 & AQC114 (12 mm x 14 mm Package)		
AQC113	6-Speed Commercial Temperature Grade, RoHS 6/6*	AQC113-B1-C
AQC113	6-Speed Industrial Temperature Grade, RoHS 6/6*	AQC113-B1-I
AQC114	5-Speed Commercial Temperature Grade, RoHS 6/6**	AQC114-B1-C
AQC114	5-Speed Industrial Temperature Grade, RoHS 6/6**	AQC114-B1-I
AQC114CS & AQC115C (7 mm x 7 mm Package)		
AQC114CS	5-Speed Commercial Temperature Grade, RoHS 6/6**	AQC114CS-B1-C
AQC114CS	5-Speed Industrial Temperature Grade, RoHS 6/6**	AQC114CS-B1-I
AQC115C	4-Speed Commercial Temperature Grade, RoHS 6/6***	AQC115C-B1-C
AQC115C	4-Speed Industrial Temperature Grade, RoHS 6/6***	AQC115C-B1-I

*6-Speed = 10G/5G/2.5G/1G/100M/10M

**5-Speed = 5G/2.5G/1G/100M/10M

***4-Speed = 2.5G/1G/100M/10M



To deliver the data infrastructure technology that connects the world, we're building solutions on the most powerful foundation: our partnerships with our customers. Trusted by the world's leading technology companies for 25 years, we move, store, process and secure the world's data with semiconductor solutions designed for our customers' current needs and future ambitions. Through a process of deep collaboration and transparency, we're ultimately changing the way tomorrow's enterprise, cloud, automotive, and carrier architectures transform—for the better.

Copyright © 2022 Marvell. All rights reserved. Marvell and the Marvell logo are trademarks of Marvell or its affiliates. Please visit www.marvell.com for a complete list of Marvell trademarks. Other names and brands may be claimed as the property of others.

Marvell_AQtion AQC113/AQC114CS/AQC115C_PB Revised: 08/22