Marvell® AQRATE GEN4 Ethernet PHYs

10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-TX/10BASE-Te Ethernet PHYs

Overview

The Marvell® AQrate GEN4 PHYs are low-power, full-reach, high-performance, multi-gigabit 10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-TX/10BASE-Te Ethernet PHY transceivers. These high-performance devices enable the broad-based market adoption of multi-gigabit network connectivity through a wide range of cable types including Cat 5e, Cat 6, and Cat 6a. AQrate PHYs are compliant with the IEEE 802.3bz standard PHY Specification to perform all the physical layer functions that are required to implement 10GBASE-T/5GBASE-T/ 2.5GBASE-T/1000BASE-T/100BASE-TX/10BASE-Te transmission over more than 100 meters of twisted pair cabling. AQrate bridges the bandwidth gap between 1 Gbps data rates and new applications that demand bandwidth in excess of 1 Gbps with zero changes to legacy cabling or infrastructure. The Marvell® AQrate is a game changing technology enabling higher-speed connectivity solutions for Enterprise, Data Center, SMB/SOHO, Carrier, Automotive, and ISM (Industrial, Scientific, Medical) markets. The product family integrates features as Energy Efficient Ethernet (EEE), Precision Time Protocol (PTP)/1588v2, IEEE MAC Security (MACsec), supports all PoE standards up to 100W, and supports jumbo packets up to 16KB in all operating modes.

Octal

The AQR813/AQR814/AQR815 are pin-compatible, multi-gigabit, octal-port PHYs housed in 24 mm x 12 mm flip-chip BGA packages enabling efficient, high-density design for high port-count switches across a range of speed requirements.
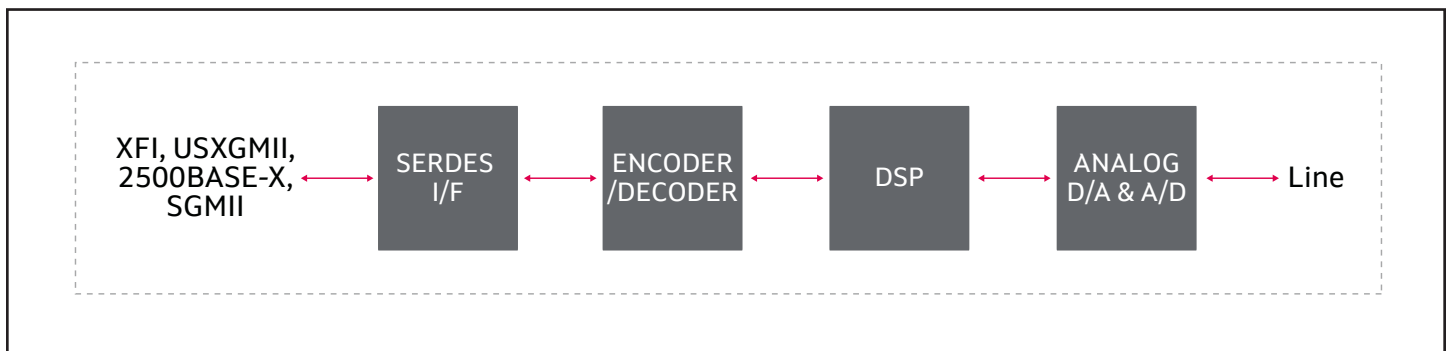
Quad

The AQR413C/AQR414C/AQR415C are pin-compatible, multi-gigabit, quad-port PHYs housed in 14 mm x 12 mm flip-chip BGA packages enabling efficient, flexible design for high port-count and compact switches across a range of speed requirements.

Single

The single-port devices are available in compact 7 mm x 7 mm or 7 mm x 11 mm flip-chip BGA packages. AQR113/AQR114/AQR115 and AQR113C/AQR114C/AQR115C are pin-compatible within the same package featuring multi-gigabit to address multiple network connectivity applications and speed requirements, and available in Industrial (-40°C to +108°C) temperature operating range as well as the Commercial (0°C to +108°C) temperature operating range.

Block Diagram

Key Features

Features	Benefits
IEEE 802.3an/bz and NBASE-T featuring AQrate technology, offering in Single, Quad and Octal 10GbE/5GbE/2.5GbE devices	• Ability to support highest data rate with legacy cable environment while reducing power and latency
1588v2 PTP Timestamping Synchronous Ethernet (Sync-E), ITU-T standard in cooperation with IEEE	• Accurate extraction of timing information for timing critical applications • Synchronizes clock signals between multiple devices on the PCB
IEEE 802.1ae MACSec with 256-bit (AES-256) key	• Provides secure, encrypted data communications across networks
Energy-Efficient Ethernet (EEE)	• Lowers overall power consumption and reduces equipment operating costs
Built-in Thermal Management On-chip thermal sensor with alarm and warning thresholds	• Enables deployment in thermally constrained environments
Advanced Loopback and Diagnostic Capability Advanced Cable Diagnostics	• Enables system test and debug with remote loopback control • On-chip cable analysis tools for debugging installation problems

Ordering Codes

Part Number	Speed	Package
AQR113C / AQR113	Single port, 10Gbps / 5Gbps / 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	7 x 7 mm / 7 x 11 mm
AQR114C / AQR114	Single port, 5Gbps / 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	7 x 7 mm / 7 x 11 mm
AQR115C / AQR115	Single port, 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	7 x 7 mm / 7 x 11 mm
AQR413C	Quad port, 10Gbps / 5Gbps / 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	14 x 12 mm
AQR414C	Quad port, 5Gbps / 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	14 x 12 mm
AQR415C	Quad port, 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	14 x 12 mm
AQR813D	Octal port, 10Gbps / 1Gbps / 100Mbps / 10Mbps	24 x 12 mm
AQR813	Octal port, 10Gbps / 5Gbps / 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	24 x 12 mm
AQR814	Octal port, 5Gbps / 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	24 x 12 mm
AQR815	Octal port, 2.5Gbps / 1Gbps / 100Mbps / 10Mbps	24 x 12 mm

Target Applications

Switches and Routers: The octal-port and quad-port family permits efficient high-port density and compact switch designs to enable connectivity beyond 1 Gbps to 2.5 Gbps, 5 Gbps and 10 Gbps data rates.

Wireless Access Points and Carrier Premises Equipment: The single-port product family is ideally suited for wireless access point backhaul, residential gateways/routers, and a myriad of networked device applications.

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