AQrate™ Gen2 Ethernet PHYs

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

Product Overview

The Aquantia® GEN2 AQrate PHYs are low-power, high-performance, multi-gigabit 10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-TX transceivers. AQrate technology enables broad-based market adoption of multi-gigabit network connectivity through a wide range of cable types including Cat 5e, Cat 6, and Cat 6a or above. AQrate bridges the bandwidth gap between legacy cabling infrastructure designed for 1 Gbps data rates and new applications that demand bandwidth in excess of 1 Gbps with zero changes to legacy cabling or infrastructure, enabling the unabated roll-out of higher-speed connectivity solutions for Enterprise, Data Center, SMB/SOHO, Carrier, Automotive, and ISM (Industrial, Scientific, Medical) markets.

AQrate PHYs are compliant with both the IEEE® 802.3an/bz standard and the NBASE-TTM Alliance PHY Specification to perform all the physical layer functions required to implement 10GBASE-T/5GBASE-T/2.5GBASE-T/1000BASE-T/100BASE-TX transmission over 100 meters of twisted pair cabling. The AQrate PHY family integrates such 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.

Device Name	Speeds	Package
AQR407/AQR107	5-speed	10 Gbps/5 Gbps/2.5 Gbps/1 Gbps/ 100 Mbps
AQR408/AQR108	4-speed	5 Gbps/2.5 Gbps/1 Gbps/ 100 Mbps
AQR409/AQR109	3-speed	2.5 Gbps/1 Gbps/ 100 Mbps

Quad: The AQR407/AQR408/AQR409 are pin-compatible, multi-gigabit, quad-port PHYs housed in 19 mm flip-chip BGA packages enabling efficient, high-density design for high port-count and compact switches across a range of speed requirements.

Single: The AQR107/AQR108/AQR109 are pin-compatible, multi-gigabit, single-port PHYs that address multiple network connectivity applications and speed requirements. These devices are available in compact 7 mm x 11 mm flip-chip BGA packages featuring the Industrial (-40°C to +108°C) temperature operating range.

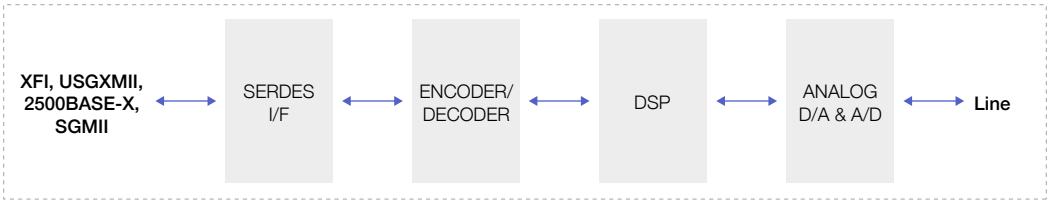
Applications

Aquantia's GEN2 AQrate multi-gigabit PHYs are a game changing technology enabling Enterprise, Data Center, SMB/SOHO, Carrier, Automotive, and ISM (Industrial, Scientific, Medical) markets to evolve beyond 1 Gbps to 5 Gbps and 2.5 Gbps data rates. The single-port product family is ideally suited for wireless access point backhaul, residential gateways/routers, client computing, and a myriad of networked device applications while the quad-port family permits efficient high-port density and compact switch design.

1 Minimum specification is ambient temperature, and the maximum is junction temperature.

Features	Benefits
• IEEE 802.3an/bz and NBASE-T featuring AQrate technology - 10GBASE-T: 100 meters over Augmented Cat 6 (Cat 6A) and Cat 7, 55 meters over Cat 6, and best effort over Cat 5e - 5GBASE-T, 2.5GBASE-T: over 100 meters of Cat 5e or better cabling	• Ability to support highest data rate possible with a given cable environment while reducing power and latency • 5G and 2.5G operation over legacy infrastructure, while delivering backward compatibility with existing equipment
• Energy-Efficient Ethernet (EEE) • MACsec (IEEE 802.1ae, MAC security standard) - Full support for Advanced Encryption Standard (AES-256) and stand-alone operation • PTP/1588v2 • Synchronous Ethernet (Sync-E), ITU-T standard in cooperation with IEEE	• EEE lowers overall power consumption and lowers equipment operating costs • MACsec provides for secure, encrypted data communications across networks • PTP/1588v2 provides for timing accuracy across the network • Sync-E synchronizes clock signals on the PCB
• Integrated Wake-on-LAN (WoL) Support - Compliant to Microsoft Network Device Class specification	• Integrated packet filtering enables sub-1W support in 100BASE-TX mode
• Built-in Thermal Management - On-chip thermal sensor with alarm and warning thresholds	• Enables deployment in thermally constrained environments
• Advanced Cable Diagnostics - On-chip high-resolution cable analyzer	• Enables the deployment of meaningful cable analysis tools for debugging installation problems
• High-Performance full KR (with autonegotiation)/ • XFI/USXGMII/2500BASE-X/SGMII I/F w/ AC-JTAC - Capable of rate adapting all rates into KR/XFI via PAUSE and 100M/1G into 2500BASE-X	• Ensures trouble-free operation over a range of interconnect scenarios • Comprehensive interface support - Supports legacy and next generation MACs/switches/processors
• Advance Loopback and Diagnostic Capability - Flexible on-chip BERT - Full 1-second packet counters and CRC-32 checkers	• Enables extensive system test and debug with remote loopback control
• Integrated MDI Filter and Advanced RFI Cancellation - Eliminates external filter components	• Robust Radio Frequency Interference (RFI) performance - Resilient operation when exposed to RFI

AQRATE PHY BLOCK DIAGRAM (PER-PORT)



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