AQUANTIA

Leading the Multi-Gig Revolution in Automotive

AQcelerate Automotive Ethernet Controllers

Product Overview

Aquantia AQcelerate Automotive Ethernet controllers implement the necessary electronic circuitry to communicate among the GPUs/CPUs, switches, sensors and ECUs make up the In-Vehicle Network (IVN) for autonomous vehicles. Moving to Level 4/5 autonomous driving requires an IVN that can support:

- **Increasing bandwidth** requirements to support the increasing number of sensors and high-resolution cameras.
- **Redundancy** of all the function-critical components and systems to provide the utmost levels of safety.
- **Simplification** – moving from multiple network/interfaces into an industry proven, coherent, secure network that supports all the required features of autonomous driving.

The AQVC100, AQVC107, AQVC108 and AQVC109 are based on Aquantia's industry-leading Ethernet controller technology. The AQVC107, AQVC108, and AQVC109 integrate both the MAC and PHY in one package, while the AQVC100 is an Ethernet MAC. By having both options, the system designer has the flexibility to either place the GPU/CPU and switch on a single board for chip-to-chip communication within the IVN in the case of the AQVC100, or to have those components connect via Automotive cable – for board to board communication - using the AQVC107, AQC108, and AQV109.

To provide the most flexible design options and meet the needs of the autonomous driving ecosystem, this first generation of Aquantia Ethernet Controllers supports data rates of 2.5Gbps, 5Gbps and 10Gbps.

The AQVC100, AQVC107, AQVC108, and AQVC109 are Automotive qualified based on AEC-Q100 industry standard.

Applications

Target applications supported by the AQVC100, AQVC107, AQVC108, and AQVC109, together with Aquantia Automotive PHYs, include:

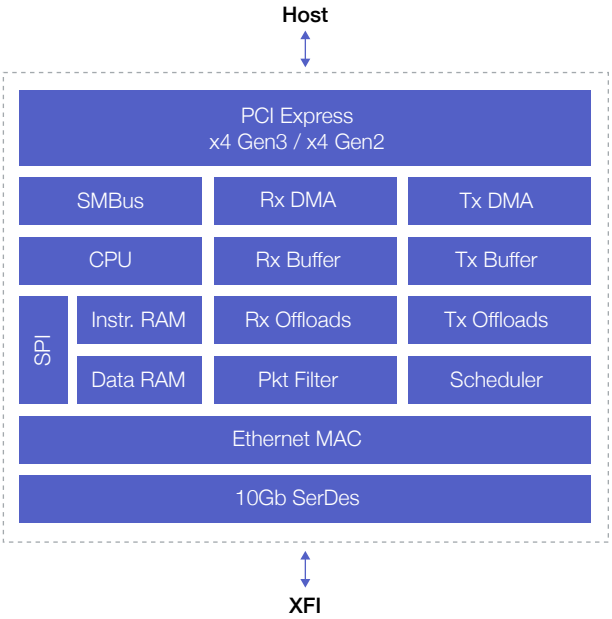
- Advanced Driver Assistance System (ADAS)
- High-resolution front & rear-view cameras
- Surround view & parking assist systems
- Radar, Lidar & Sonar
- Advanced telematics
- Audio video bridging
- Infotainment

The AQVC100 PCI Express Ethernet MAC

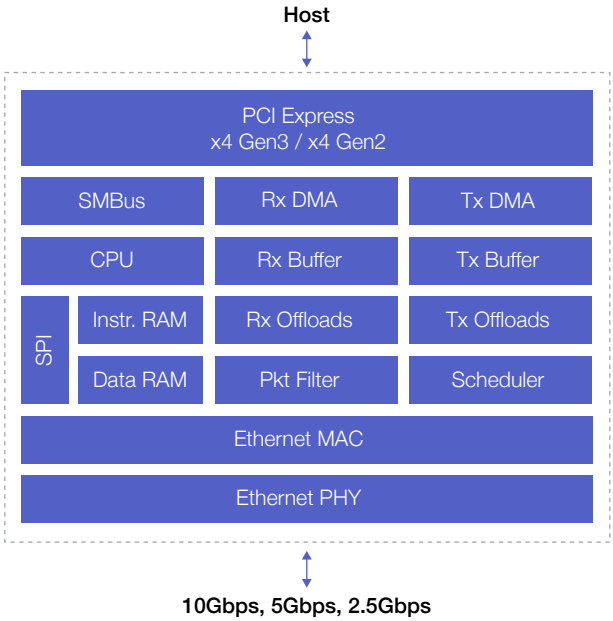
The AQVC100 performs all the physical functions required to implement PCIe to Ethernet bridging.

Features	Benefits
PCI Express Gen3 or Gen2	Supports line rates of 8.0 GT/s and 5.0 GT/s per lane
Bus width	Supports Gen3 x4 or Gen2 x4
MSI, MSI-X, and legacy INTx PCIe interrupts	Improved CPU utilization and network performance
Two SMBus (Master/Slave + Slave)	Communication and management function
MAC	
LSO, RSS, DCA, and header checksum	Increased network performance and lower host CPU utilization
WoL power management	Support for lower power modes
On-chip CPU DASH	Desktop management
Quality of Service (QOS) support	Up to eight traffic classes and Data Center Bridging (DCB)
Jumbo Frames (up to 16 Kbytes)	Improved network performance while reducing CPU utilization
IPv4/6, IPv6/TCP and IPv6/UDP checksum offload	Offloading calculations and improved CPU usage
Production test and ROM programming tools, Windows installer	Easy test, setup, and installation
Boot Options	UEFI and PXE
Packaging 7x11mm FCBGA	Small packaging with minimal board space requirements

The AQVC100 Block Diagram



The AQVC107/108/109 Block Diagram



The Aquantia AQVC107/108/109 Automotive Ethernet Controllers

The Aquantia AQVC107, AQVC108, and AQVC109 are based on the award winning AQtion controller architecture to deliver up to 10Gbps Multi-Gig Ethernet transfer rates over Automotive cables. It works with PCI Express Gen 2/3 over x1, x2, or x4 connections, offering optimal line rate performance with a 4-lane configuration connected directly to the host processor.

The AQVC107, AQVC108 and AQVC109 support all the features of the AQVC100. Additional features:

Key Features	Benefits
Support for the following functions: • 10GBASE-4C/4-channel (AQV107, 10 Gbps only) • 5GBASE-2C/2-channel (AQV108, 5 Gpbs only) • 2.5GBASE-1C/1-channel (AQV109, 2.5 Gbps only) Note: Each supported channel can be one differential pair or one single-ended line.	• Meets requirements for delivering 10 Gbps/5 Gbps/2.5 Gbps over 15 meters of automotive-rated cabling with up to four in-line connectors • Meets requirements for both immunity and emissions on automotive-rated cabling
Energy-Efficient Ethernet (EEE)	EEE lowers overall power consumption
MACsec (IEEE 802.1ae, MAC security standard) • Full support for Advanced Encryption Standard (AES-256) and stand-alone operation	MACsec provides for secure, encrypted data communications across networks
PTP/1588v2	PTP/1588v2 provides for timing accuracy across the network
Synchronous Ethernet (Sync-E), ITU-T standard in cooperation with IEEE	Provides accurate clock recovery for time aware applications
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
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
Packaging 12x14mm FCBGA	Small packaging for minimal board space requirements

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