

Leading the Multi-Gig Revolution in Automotive

AQcelerate Automotive Ethernet Controllers

Product Overview

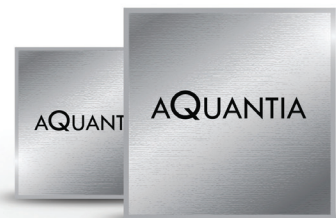
Aquantia AQcelerate Automotive Ethernet controllers implement the necessary electronic circuitry to communicate among the GPUs/CPU, switches, sensors and ECUs that are part of the In-Vehicle Network (IVN) for autonomous vehicles. Moving to Level 4/5 autonomous driving requires an IVN that can support:

- **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 support all the required features of autonomous driving.

Both the AQVC100 and the AQVC107 are based on Aquantia's industry leading Ethernet controller technology. The AQVC107 integrates both 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.

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

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



Applications

Target applications supported by the AQVC100 and AQVC107 - together with the Aquantia AQV107 include:

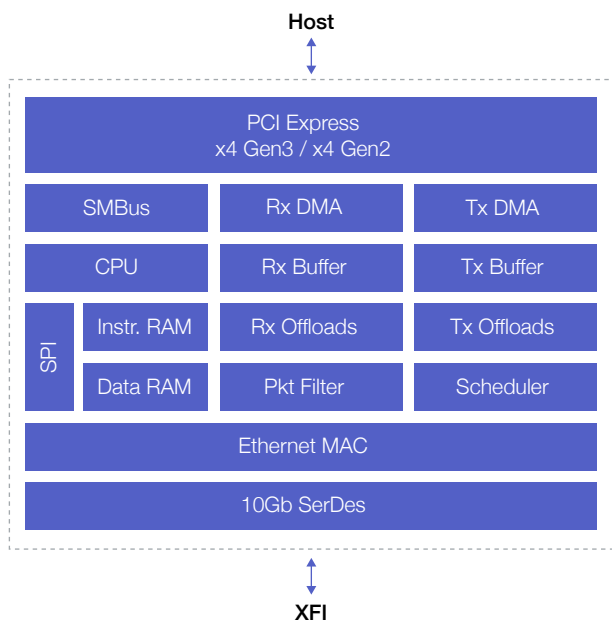
- Advanced Driver Assistance System (ADAS)
- High-resolution front & rear-view cameras
- Surround view & parking assist systems
- Radar, Lidar & Sonar
- Advanced telematics
- Audio video bridging
- Infotainment

The AQVC100 PCI Express Ethernet MAC

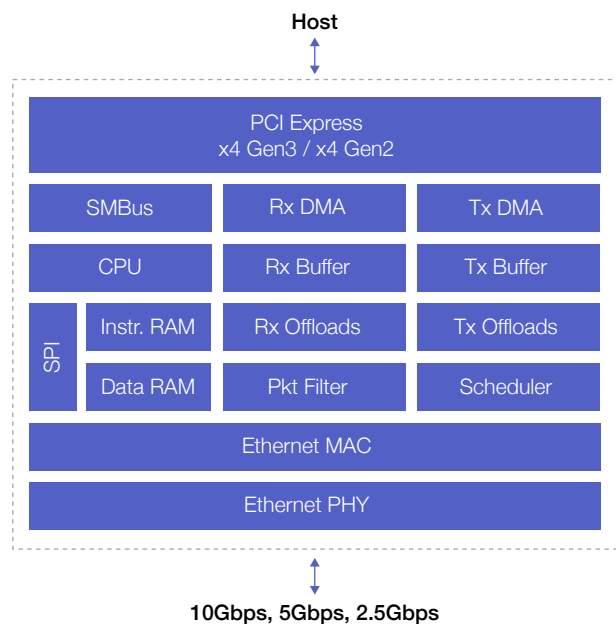
The AQVC100 performs all the physical functions required to implement PCIe to Ethernet bridging.

| 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 Block Diagram



The Aquantia AQVC107

The Aquantia AQVC107 is 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 supports all the features of the AQVC100. Additional features:

| Key Features | Benefits |
|--|---|
| 10Gbps / 5Gbps / 2.5Gbps over 15m automotive cables with 4 inline connectors | Meets automotive requirements for immunity and emissions on automotive cabling |
| Energy-Efficient Ethernet (EEE) | EEE lowers overall power consumption |
| MACsec (IEEE 802.1ae, MAC security standard) <ul style="list-style-type: none">• 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 <ul style="list-style-type: none">• On-chip thermal sensor with alarm and warning thresholds | Enables deployment in thermally constrained environments |
| Advanced Cable Diagnostics <ul style="list-style-type: none">• On-chip high-resolution cable analyzer | Enables the deployment of meaningful cable analysis tools for debugging installation problems |
| Advance Loopback and Diagnostic Capability <ul style="list-style-type: none">• 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 |