Marvell® Brightlane™ 88Q2233M MACsec integrated Dual Automotive 1000Base-T1 PHY

Dual 1000Base-T1 PHY, Integrated MACsec, Open Alliance TC10 and IEEE 802.3bp compliant Automotive Ethernet PHY

Overview

The Marvell Brightlane™ 88Q2233M device has two single-pair Ethernet physical layer transceivers (PHY) that support operation over unshielded twisted pair (UTP). The transceivers implement the Ethernet physical layer portion of 1000BASE-T1 as defined by the IEEE 802.3bp standard.
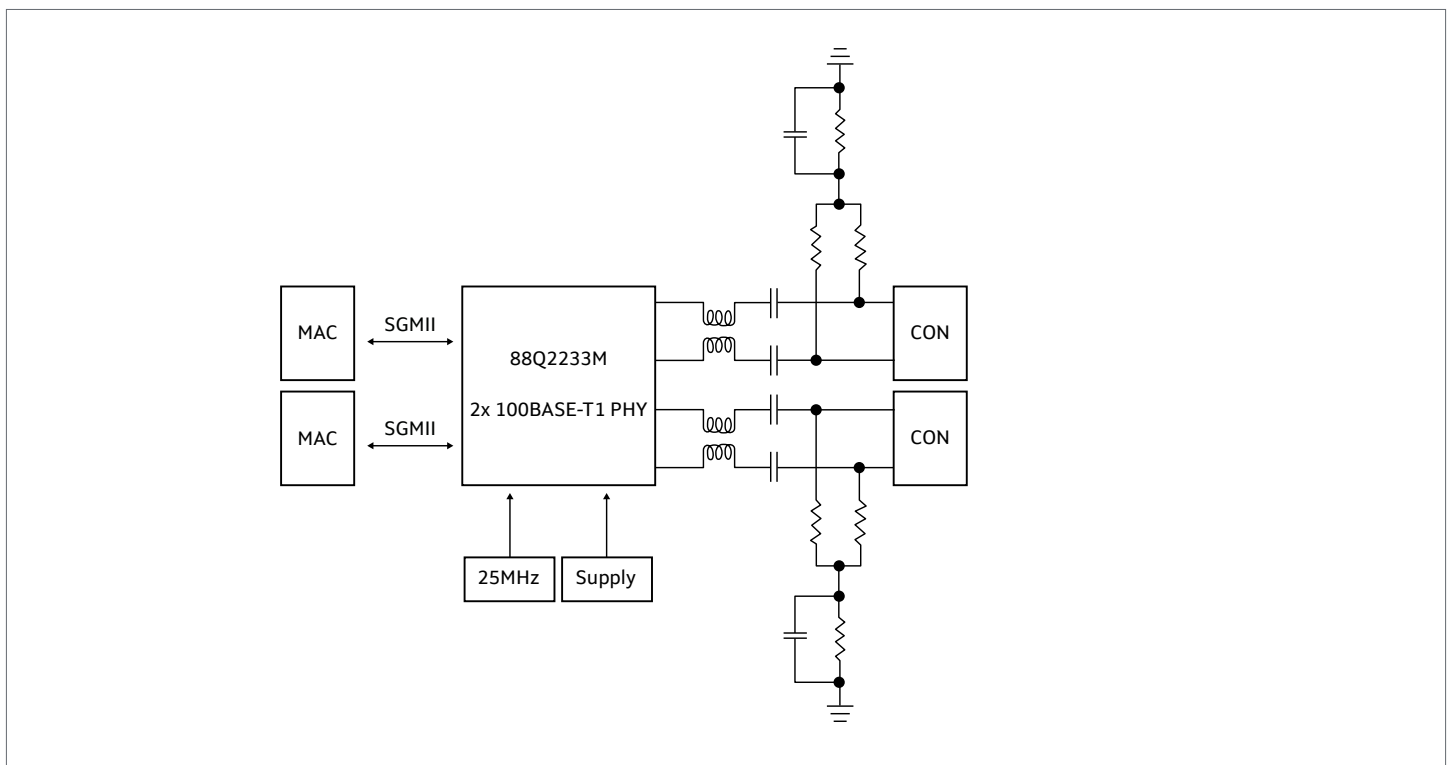
The 88Q2233M has integrated MACsec that secures against the Layer 2 In-Vehicle Networking security threats. MACsec secures data exchange on a hop-by-hop basis and prevents attacks such as intrusion, man-in-the-middle, and replay attacks.

The 88Q2233M is manufactured using a standard digital CMOS process and contains all the active circuitry required to implement the physical layer functions to transmit and receive data on a single balanced twisted pair. The device family supports SGMII for direct connection to a MAC/switch port.

The device integrates media dependent interface (MDI) termination resistors into the PHY. This resistor integration simplifies board layout and reduces board cost by reducing the number of external components. The device has a voltage regulator to generate all required voltages. The device can run off a single 3.3V supply. The device supports 1.8V, 2.5V, and 3.3V LVCMOS I/O standards.

The device uses advanced mixed-signal processing to perform equalization, echo and crosstalk cancellation, data recovery, and error correction at a data rate of 1 Gbps. The device achieves robust performance and exceeds electromagnetic interference (EMI) requirements in noisy environments with very low power dissipation.

Block Diagram

Marvell Brightlane™ 88Q2233M Block Diagram

Key Features

Features	Benefits
1000BASE-T1, IEEE 802.3bp-compliant	· Dual Automotive Ethernet PHY supports operation over unshielded twisted pair (UTP)
Supports IEEE 802.1AE MACsec	· MACsec provides Layer 2 security
OPEN Alliance TC10 Sleep Mode	· As an IEEE and OPEN Alliance TC10 compliant 1000BASET1 Ethernet PHY, the device supports wake-up and sleep signaling over dedicated I/O pins, as well as through Wake-up Pulse (WUP), Wake-up Request (WUR) and Low Power Sleep (LPS) commands
Automotive Qualified	· AEC-Q100 · Automotive Grade 2 (-40 °C to +105 °C)
Wake on LAN (WoL)	· Saves system power through magic packet or link change detection
Integrated Voltage Regulators	· 3.3V only operation
Integrated passive filter network	· Reduced BOM/board space
Integrated Virtual Cable Tester	· VCT tool used for cable diagnostics
Signal quality indicator (SQI)	· Signal quality indicator (SQI) tool provides signal-to-noise ratio (SNR) data
802.1AS and 1-step PTP	· Support for Precision time protocol (PTP)

Target Applications

88Q2233M is a secure dual 1000BASE-T1 PHY that has an integrated MACsec and is OPEN Alliance TC10 and 802.3bp compliant, which is ideal for space constrained applications and can be deployed in various domains in the car, including:

· Automotive infotainment systems
· Advanced driver assist systems
· Telematic control units
· Instrumentation clusters