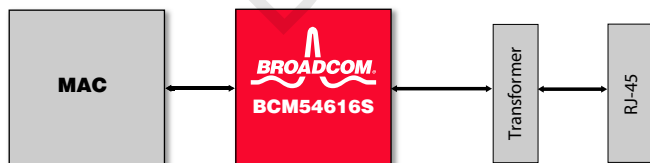**BROADCOM**

Connecting everything®

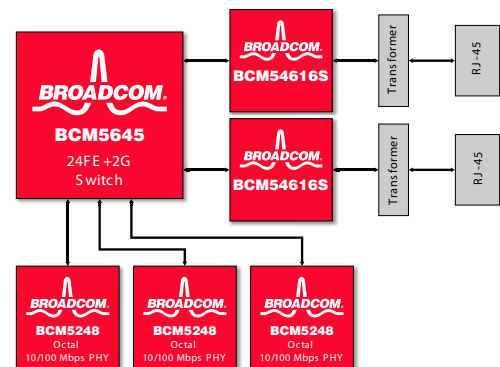# 10/100/1000BASE-T GIGABIT COPPER TRANSCEIVER

FEATURES

- **Single-chip integrated triple-speed Ethernet transceiver. Support for the following copper line interfaces:**
  - 1000BASE-T IEEE 802.3ab
  - 100BASE-TX IEEE 802.3u
  - 100BASE-FX
  - 10BASE-T IEEE 802.3™

- **RGMII and SGMII MAC interface options**

- **Integrated voltage regulator**

- **Low power**
  - Less than 600 mW per port
  - Advanced power management

- **Trace-matched output impedance**

- **Lineside loopback**

- **Low Electromagnetic Interference (EMI) emissions**

- **Cable plant diagnostics**
  - Cable plant analyzer function detects cable plant impairments
  - Link quality indication LED
  - Automatic detection and correction of wiring pair swaps, pair skew, and pair polarity
  - Automatic MDI/MDIX crossover at all speeds

- **Robust Cable Electrostatic Discharge (CESD) tolerance**

- **Support for jumbo packets up to 10 KB**

- **IEEE 1149.1 (JTAG) boundary scan**

- **100-pin FBGA package**

SUMMARY OF BENEFITS

- **Simplifies system and board design.**
  - Reduced I/O pin requirements with RGMII (over 50%).
  - On-chip RGMII timing delay

- **Provides interoperability with IEEE standard devices operating at 10 Mbps, 100 Mbps, and 1000 Mbps at half- and full-duplex.**

- **Lowers system Bill of Materials (BOM) cost and simplifies system design.**

- **Eases system level debug.**

- **Reduces system design constraints to meet EMI emissions standards.**

- **Cable diagnostic function characterizes cable plant condition and immediately indicates cabling issues.**
  - Prevents erroneous equipment return due to bad cable plants.
  - Prevents manufacturing fallout due to bad cable plants.

- **High CESD tolerance prevents equipment damage and return.**

- **Operates with larger packets for wider range of packet protocol support and improved efficiency.**

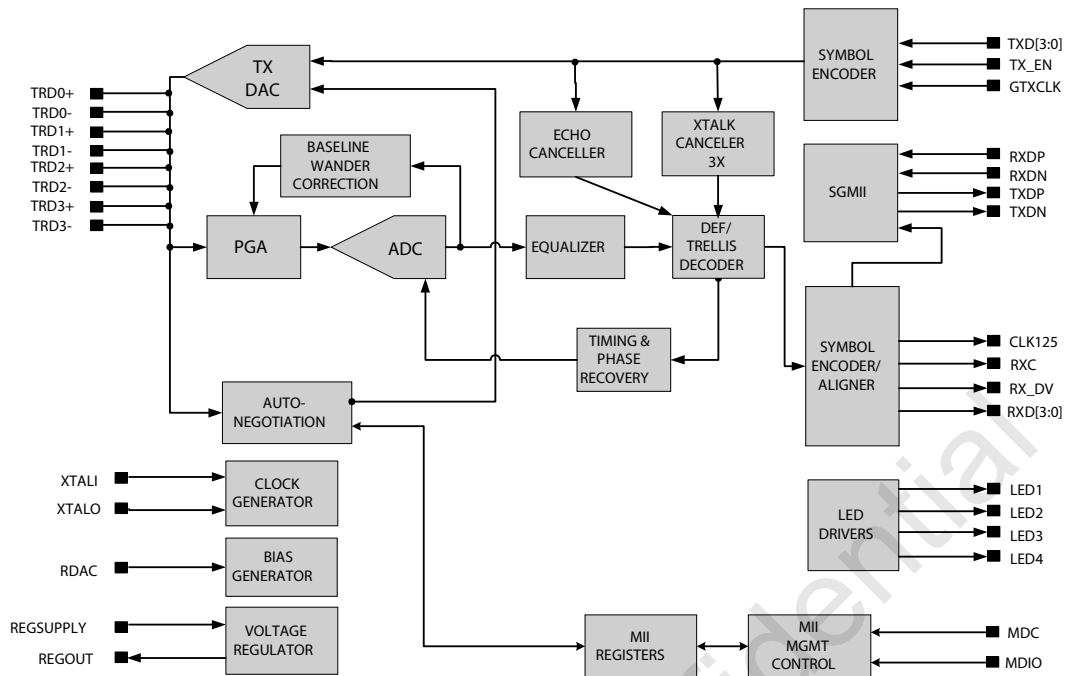- **Ease of manufacturing with JTAG support, simplified power supply, and multiple MAC interfaces.**

General Gigabit Ethernet Connectivity

1000BASE-T Gigabit Uplink

BROADCOM®

BCM54616S Reference Design

The BCM54616S is a triple-speed 10/100/1000BASE-T Gigabit Ethernet transceiver integrated into a single monolithic CMOS chip. The device performs all of the Physical Layer (PHY) functions for 1000BASE-T, 100BASE-TX, and 10BASE-T on standard Category 5 UTP cable. The 10BASE-T Ethernet can also run on standard categories 3, 4, and 5 UTP. The BCM54616S is designed to comply with the SGMII industry standard and to exceed IEEE specifications for noise cancellation and transmission jitter, providing consistent and reliable operation over the broadest range of existing cable plants.

The BCM54616S is based on the proven digital-signal processor technology of Broadcom, combining digital adaptive equalizers, ADCs,

phase-locked loops, line drivers, encoders, decoders, echo cancelers, crosstalk cancelers, and all other required support circuitry. The BCM54616S is designed to be fully compliant with RGMII, SGMII, and MII interface specifications, allowing compatibility with industry-standard Ethernet MACs and switch controllers.

Designed for reliable operation over worst-case Category 5 cable plants, the BCM54616S automatically negotiates with its link partner to determine the highest possible operating speed. The device detects and corrects most common wiring problems. The BCM54616S features CableChecker™ diagnostics, which detects common cable problems, including shorts, opens, and cable length.

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