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BCM3349 PRODUCT Brief



ADVANCED QAMLINK® DOCSIS® 2.0 HIGH-PERFORMANCE, SINGLE-CHIP CABLE MODEM

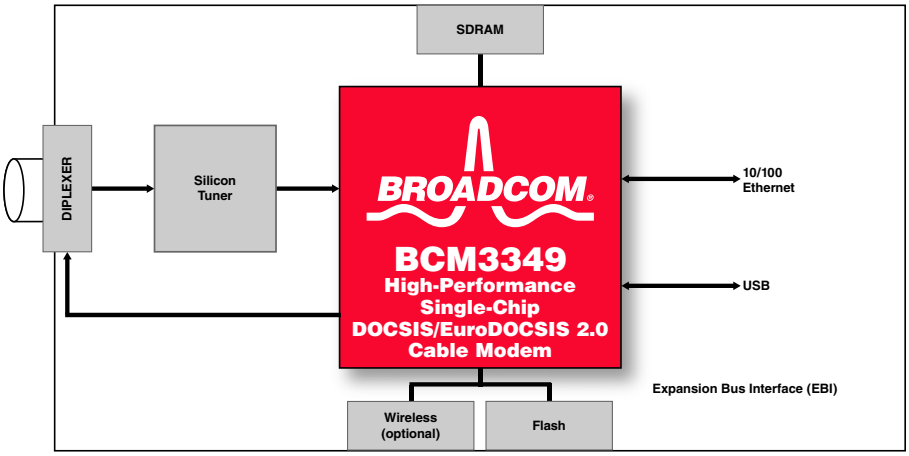
FEATURES

- **DOCSIS®/EuroDOCSIS™ 2.0 cable modem providing unprecedented levels of integration and performance**
- **The BCM3349 integrates:**
  - High performance 200 MHz MIPS32™ CPU
  - Advanced QAMLink® transceiver supporting Annex A/B/C operation
  - DOCSIS/EuroDOCSIS 2.0 MAC with 16 SIDS
  - Advanced QAMLink downstream demodulator supporting 4 QAM – 1024 QAM
  - Advanced QAMLink upstream modulator supporting 2 QAM – 256 QAM with S-CDMA
  - Upstream power amplifier
  - IEEE 802.3 10/100 Ethernet MAC and PHY
  - USB 1.1 slave port with integrated transceiver
  - 100-MHz SDRAM interface
  - Single 28-MHz reference crystal
  - Voltage regulators for single voltage system operation
  - Advanced RF and control interface to Broadcom BCM34XX silicon tuner
  - Expansion bus for peripherals such as 802.11 (PBGA package only)
- **Advanced 2.0+ features:**
  - SmartSpectrum™ noise immunity technology
  - Propane® packet accelerator
  - TurboQAM™ performance enhancement
- **Sixth-generation technology**
- **316-pin PBGA or 324-pin FBGA RoHS package options**

SUMMARY OF BENEFITS

- **Extreme integration level leads to highly cost-effective BOM.**
- **Package optimization enables low-cost 2-layer system PCB.**
- **Integrated upstream power amp and 10/100 Ethernet MAC/PHY lowers overall system cost.**
- **Support for DOCSIS/EuroDOCSIS 2.0 enables one device solution to be used worldwide.**
- **High speed MIPS® processor delivers 270 DMIPS, a 30–50% throughput improvement over previous generations**
- **Advanced QAMLink modulator/demodulator provides superior performance in noisy plant environments**
- **16 SIDs that provide for superior QoS performance and simultaneous support of high QoS and BE traffic.**
- **SmartSpectrum delivers multiple dB enhanced robustness in noisy plant conditions.**
- **Propane packet acceleration improves throughput and efficiency up to 3x.**
- **TurboQAM leads to over 30% increased upstream and downstream performance.**
- **Sixth-generation technology delivers an industry-leading, highly stable and reliable product.**

High-Performance, Single-Chip DOCSIS®/EuroDOCSIS™ 2.0 Cable Modem



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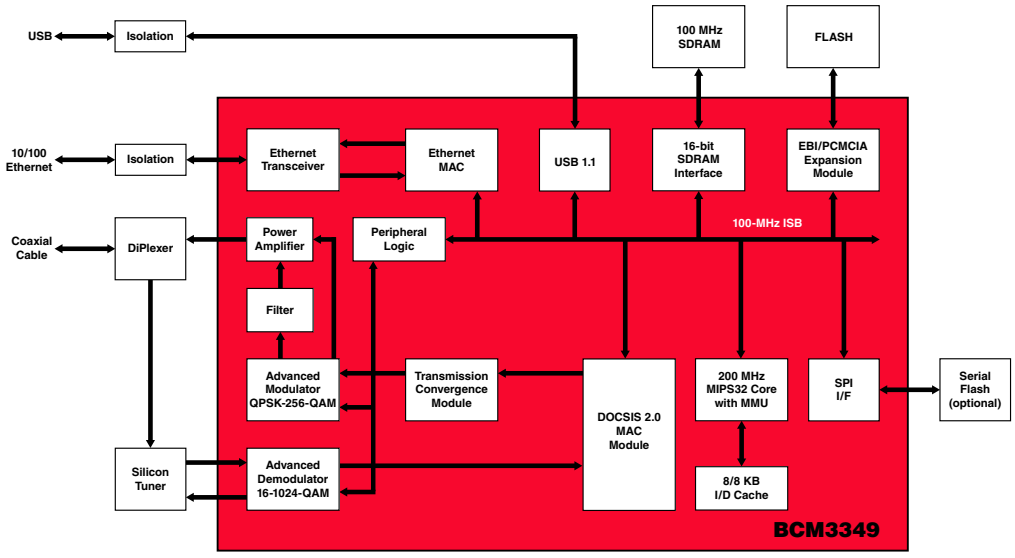
OVERVIEW



BCM3349 Block Diagram

The BCM3349 combines an RF receiver with an advanced QAM and S-CDMA demodulator, an advanced QAM transmitter, a complete DOCSIS 2.0 Media Access Controller (MAC), a 200-MHz MIPS32 communication processor, a 16-bit, 100-MHz SDRAM interface, 10/100 Ethernet MAC with integrated transceiver and MII Interface, and a USB MAC with integrated transceiver.

The QAM receiver directly samples a tuner output with a 11-bit A/D converter and input ACG amplifier. The receiver digitally resamples and demodulates the signal with recovered clock and carrier timing, filters and equalizes the data and passes soft decisions to an ITU-T J.83 Annex A/B/C compatible decoder. The receiver supports variable symbol rate 4/16/32/64/128/256/512/1024-QAM FEC decoding. The final received data stream is delivered in a serial MPEG-2 transport format. All gain, clock, and carrier, acquisition and tracking loops are integrated in the QAM receiver.

The upstream transmitter takes burst or continuous data, provides FEC encoding and pre-equalization for DOCSIS applications, filters and applies 2/4/8/16/64/128/256-QAM or S-CDMA modulation to the data stream, amplifies the signal through the integrated upstream power amplifier, and provides a direct 0 MHz – 65 MHz analog output.

The BCM3349 MAC includes all features required for full DOCSIS/EuroDOCSIS 1.0, 1.1 and 2.0 compliance, including full support for baseline privacy (BPI+) encryption and decryption. Single-user support includes six SIDs in downstream, four DA perfect-match filters, a 256-entry CAM for multicast/unicast hash filter, and 16 independent upstream queues for simultaneous support of QoS and BE traffic. To enhance operational support, the BCM3349 MAC provides extended network management MIB/diagnostic features, as well as immediate UCC (on-the-fly) using independent resets for downstream and upstream and both individual queues reset/flush for upstream queues.

Enhanced end-to-end 2.0+ features increase overall performance and robustness. First, SmartSpectrum is a suite of technology that delivers increased noise immunity and improved performance in noisy conditions. SmartSpectrum includes Hi-PER SCDMA (High Power SCDMA) mode for highly attenuated connections, BPSK modulation that delivers a 3 dB gain in poor plant connectivity, Impulse Noise Mitigation to reduce packet error rate caused by impulse noise, and Trellis Coding (TCM-TDMA) that provides up to a 2 dB RF signal gain.

Second, certified Propane packet accelerator technology delivers enhanced efficiency with DPHS (Dynamic Payload Header Suppression), which increases upstream payload capacity by up to 3 times, and Sync-TDMA (Synchronous TDMA), which increases capacity with a smaller preamble.

Lastly, Broadcom's TurboQAM technology significantly increases overall performance of the system. 1024 QAM downstream and 256 QAM ATDMA upstream deliver an over 30% performance increase.

The BCM3349 pinout has been optimized to allow an ultra low-cost 2-layer PCB. With the incorporation of an upstream power amplifier and Ethernet PHY, the BCM3349 allows a complete cable modem to be assembled with a minimal set of external components. When used with the BCM34XX silicon tuner, the BCM3349 offers the most cost-effective solution for a high- performance, single-user DOCSIS 2.0 cable modem.

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