

# BCM3137 UNIVERSAL BURST RECEIVER

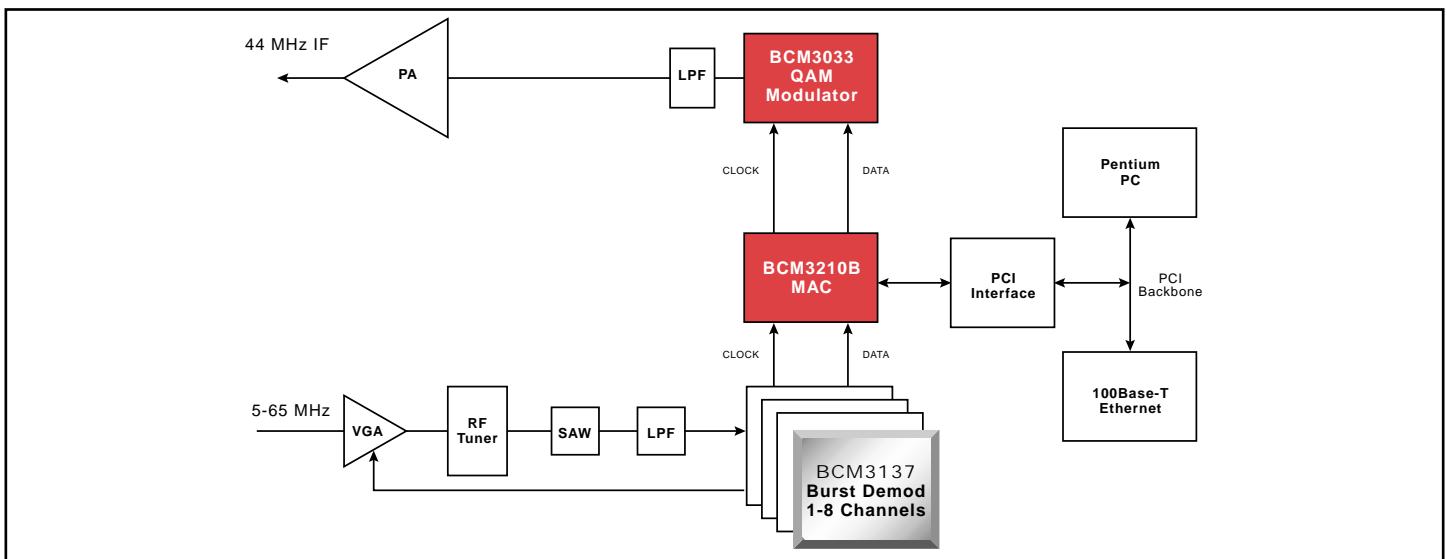
## BCM3137 FEATURES

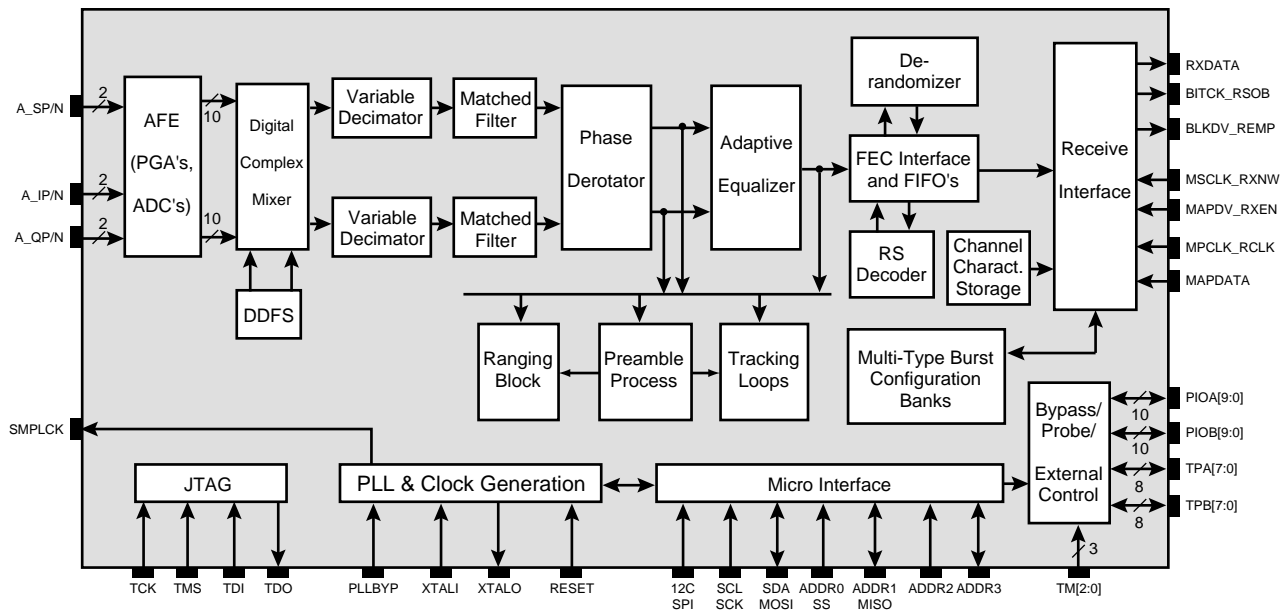
- The Broadcom BCM3137 is a headend QPSK/QAM burst receiver for CMTS applications
- DOCSIS/EuroDOCSIS, IEEE 802.14, DAVIC and DVB-compliant
- Programmable Demodulation: QPSK/16 QAM
- Variable symbol rates from 100 kBaud up to 5.12 MBaud
- Analog front-end featuring dual gain stages and dual 10-bit ADCs, plus a 6-bit ADC to estimate wideband channel
- Fast burst acquisition: preamble size as small as 4 bytes
- Programmable components include:
  - Flexible symbol demapping: Differential / Non-Differential
  - RS decoder block size (N), GF (256), T = 1 to 10
  - Last RS codeword size: fixed or shortened
  - 23-bit derandomizer: polynomial, seed, type
  - Derandomizer location: before/after RS decoder
- Internal burst FIFOs for receive rate de-coupling
- Choice of serial data receive interfaces
- JTAG Test Interface
- 100-pin PQFP Package

## SUMMARY OF BENEFITS

- A high-performance, integrated solution for upstream demodulation in cable data, video and telephony applications
- Provides full DOCSIS/EuroDOCSIS compliance for use in Cable Modem Termination Systems (CMTS)
- Seamless integration with BCM3210B CMTS Media Access Controller (MAC)
- Applicable to digital CATV reverse-channel receiver
- Unprecedented integration of three on-board ADCs
  - Reduces overall system cost
  - Increases channel density per card
  - Simplifies RF frontend design
  - Enables power estimation of the entire upstream band
- Improved ability to control external VGAs/PLLs through integrated serial/parallel interface
- Extraordinary handling of burst-to-burst variations in excess of 20 dB
- Supports random burst arrival
- Improved ability to remove channel impairments through integration of an adaptive equalizer
- Maximum baud rate flexibility with full programmability from 100 kBaud to 5.12 MBaud

DOCSIS/EuroDOCSIS-compliant Cable Modem Termination System Block Diagram





The Broadcom **BCM3137** QAMLink® Universal QPSK/16 QAM Burst Receiver is a complete single-chip cable network receiver, that accepts QPSK and 16 QAM upstream burst data in a frequency-agile, time-division multiple access (TDMA) scheme. An analog front-end (AFE), a QAM demodulator and an FEC decoder are integrated on this single chip. The AFE performs coarse gain setting and A-to-D conversion on either an IF input or baseband I/Q inputs. A digital down-mixer translates the input spectral center to true DC. The I and Q samples pass through dual decimators and square-root raised cosine filters with an excess bandwidth  $\alpha = 0.25$ . Fast burst detection and acquisition are performed on the preamble with programmable length and pattern. The chip incorporates unique word (UW) detection in the preamble process to delineate the packet and resolve phase ambiguity. Carrier phase offset is removed by a derotator. An adaptive equalizer characterizes the RF channel response and removes inter-symbol interference (ISI) caused by micro-reflections. The FEC decoder consists of a programmable derandomizer and a programmable RS decoder. FIFO buffers provide input/output data rate de-coupling for the FEC decoder.

The **BCM3137** delivers the recovered data stream and accepts receiver control inputs through a receive interface linked to an MCNS MAC chip. The BCM3137 prepends ranging and data information to each received code word and packet for processing by the BCM3210B. An ATM UTOPIA-like receive interface is also supported in a bit-serial style. The BCM3137 can be configured through either an SPI or I<sup>2</sup>C-compatible serial interface.

The **BCM3137** represents a highly-integrated, mixed-signal solution that significantly increases the channel density per line card for CMTS implementations. When combined with the BCM3033 QAMLink Universal Modulator and the BCM3210B QAMLink CMTS Media Access Controller, these chips are an ideal solution for cable headends. A complete CMTS reference design (BCM93210B), which integrates these three chips, is available from Broadcom, providing a complete development platform for a multi-channel, DOCSIS/EuroDOCSIS-compliant Cable Modem Termination System.

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