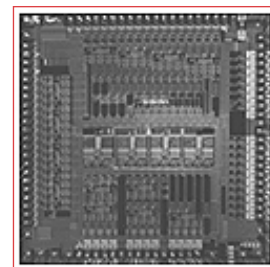# PRODUCT Brief

BCM3125 QAMLink® UNIVERSAL TRANSMISSION SOLUTION

BCM3125 FEATURES

- **Integrated QAMLink In-Band Receiver**
  - 10-bit A/D converter with input AGC amplifier
  - Variable symbol rate 256-QAM receiver
  - Digital demodulator, Nyquist filters, tracking loops, and 32-tap adaptive decision feedback equalizer
  - ITU-T J.83 Annex A/B/C compatible FEC decoder

- **Integrated QPSK Out-of-Band Receiver**
  - Baseband interface to dual 6-bit A/D converters or IF interface to signal A/D converter
  - Variable symbol rate QPSK receiver
  - Digital demodulator, Nyquist filters, tracking loops, and 4-tap adaptive decision feedback equalizer
  - DigiCipher II®/DVB/DAVIC FEC decoder
  - MPEG transport output interface/DAVIC MAC output interface

- **Integrated Upstream Transmitter**
  - Programmable Starvue II/DOCSIS/EuroDOCSIS/DVB/ DAVIC FEC encoder
  - Pre equalization filter
  - Up to 6 MBaud variable rate QPSK/16-QAM modulator
  - 10-bit D/A converter with output power control interfaces

- **Control Unit**
  - I^2C/SPI compatible interface for configuration and device control
  - RF tuner control

- **160-pin PQFP Package**

SUMMARY OF BENEFITS

- **Universal set-top and cable modem front-end supports the ITU-T J.83 Annex A/B/C standards, as well as OpenCable, DOCSIS/EuroDOCSIS, and DVB/DAVIC.**

- **Represents a complete solution for dual downstream channels (In-Band and Out-of-Band) and the upstream channel.**

- **Integrated analog front-end for the dual downstream and upstream blocks reduces board complexity and system costs.**

- **Serial control interface results in reduced overall pin count.**

- **Out-of-band QPSK receiver provides flexibility for IF or baseband inputs.**

- **Single, low-cost crystal solution eliminates costly VCXOs.**

- **Includes direct interface to the OpenCable Point of Deployment (POD) module.**

- **Single device supports both 6-MHz and 8-MHz channels.**

- **Allows direct connection to Broadcom ICs to support additional data and video channels for DOCSIS/EuroDOCSIS/DAVIC systems and PVR set-top boxes.**

Set-Top Box Block Diagram
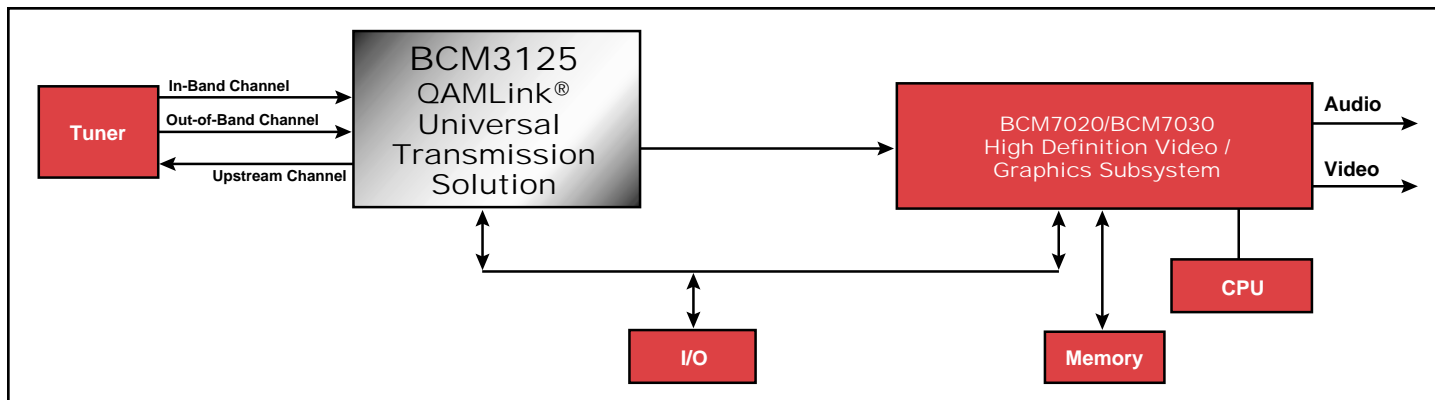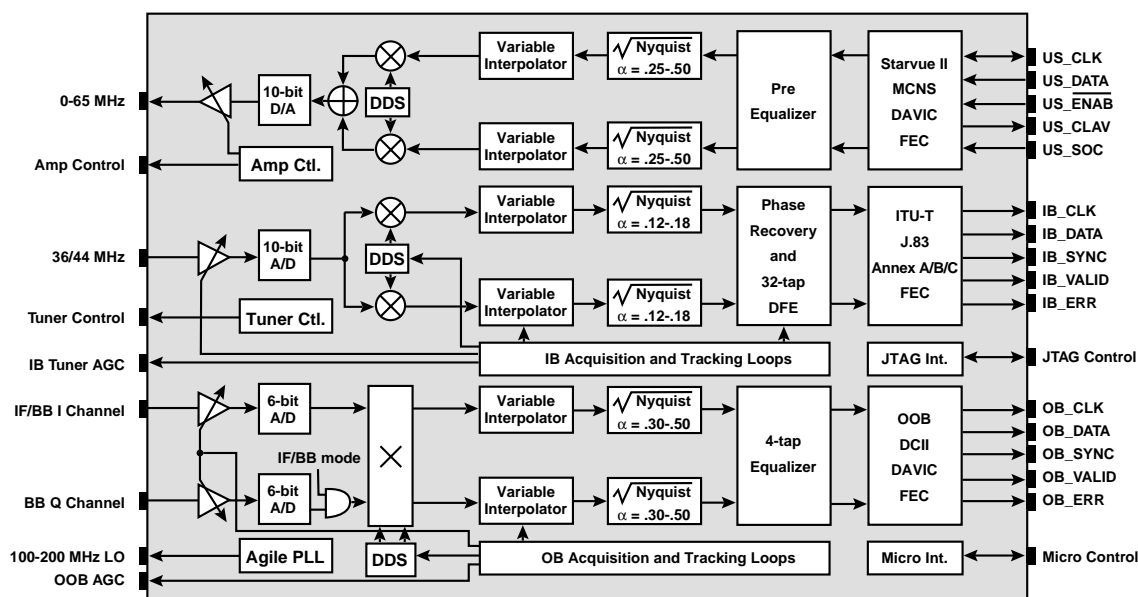
The Broadcom **BCM3125** combines an in-band 256-QAM receiver, an out-of-band QPSK receiver and a 4/16-QAM transmitter, providing an integrated set-top box or cable modem front-end solution.

The in-band receiver in the **BCM3125** directly samples a 36-44 MHz carrier frequency with a l0-bit A/D converter, which is preceded by a programmable gain amplifier (PGA). The in-band demodulator consists of a quadrature mixer and multi-rate filters that convert the oversampled IF data stream to a baseband complex data stream. The I and Q baseband signals are then filtered by dual square-root Nyquist filters that can accommodate roll-off factors of 12-18% for various ITU-T J.83 Annex A/B/C applications. A 32-tap decision feedback equalizer (DFE) with 8 feedforward taps and 24 feedback taps is implemented to remove the ISI generated by worst-case coaxial cable and wireless cable channels. The equalizer coefficients are updated every baud cycle for fast convergence. Two distinct forward error correction (FEC) methods are supported. The first standard, ITU-T J.83 Annex A/C, is also referred to as the DVB, DVB interactive or DAVIC standard. The second, ITU-T J.83 Annex B, is variously known as DigiCipher II®, DOCSIS/EuroDOCSIS and SCTE DVS-031.

For more information please contact us at:
Phone: 949-450-8700, FAX: 949-450-8710
Email: info@broadcom.com

The out-of-band receiver in the **BCM3125** contains a frequency agile oscillator that can down convert any channel in the 70-130 MHz frequency range to a SAW centered IF. The desired channel is then sub-sampled by a 6-bit A/D converter at a rate that is more than four times the symbol rate. An additional 6-bit A/D is provided to allow for direct input of baseband signals

The **BCM3125** provides complete Starvue II, DOCSIS/EuroDOCSIS and DVB/DAVIC compatible 4/16-QAM upstream burst FEC encoder and modulator functionality. A 1 KB burst FIFO buffer provides input data rate de-coupling. The FEC encoder consists of a programmable randomizer and Reed-Solomon encoder. There is also a programmable preamble prepend, symbol mapper, and transmitter pre-equalizer. The modulator consists of dual square-root raised cosine filters with programmable excess bandwidth, α=0.25 or α=0.50, interpolation filters, and a digital upconverter which translates the shaped pulse to a digitally tunable RF center frequency from 0-65 MHz. A 10-bit D/A then converts this signal to an analog waveform with programmable output power levels.

The **BCM3125** includes an I²C/SPI interface for setup and control by the host processor. In addition, an RF tuner controller is also provided.

BROADCOM CORPORATION
16215 Alton Parkway, P.O. Box 57013
Irvine, California 92619-7013