



## HDTV/CATV RECEIVER

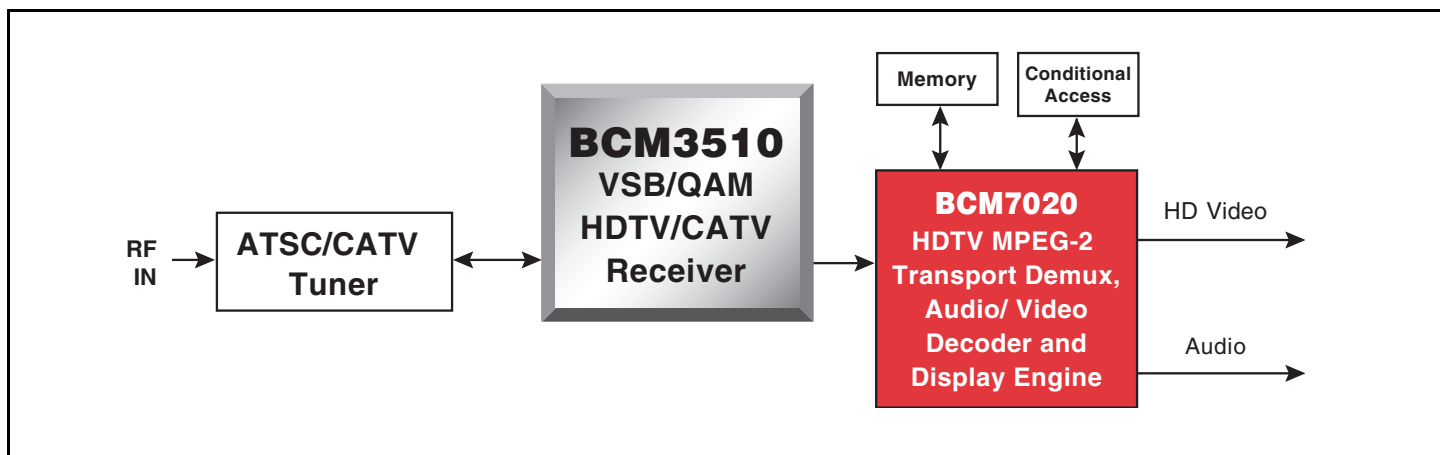
### FEATURES

- **Integrated 64/256-QAM and 8-VSB receiver**
  - 1–51 Mbps variable rate QAM/VSB receiver
  - Direct 36/44 MHz IF sampled architecture
  - 10-bit A/D converter with integral AGC amplifier
  - Digital demodulator and matched filters
  - Adjacent channel filters
  - NTSC co-channel rejection filter
  - 496-tap adaptive decision-feedback equalizer
  - All-digital clock and carrier recovery
  - Integrated PLLs to minimize external components
- **CATV/HDTV standards-compliant FEC decoder**
  - ITU-T J.83 annex A/B/C CATV modes
  - ATSC A/53 HDTV mode
  - Integrated deinterleaver RAM for all modes
- **Intelligent embedded microcontroller**
- **MPEG-2 transport output**
  - PCMCIA and Smart Card Format—EIA 679 A, B
  - PLL generated output clock
  - Glueless interface to BCM7020 video and graphics subsystem
- **Low-power standby mode**
- **I<sup>2</sup>C or SPI microcontroller interface**
- **128-pin PQFP package**
- **3.3V I/O and analog operation, 1.8V digital operation**

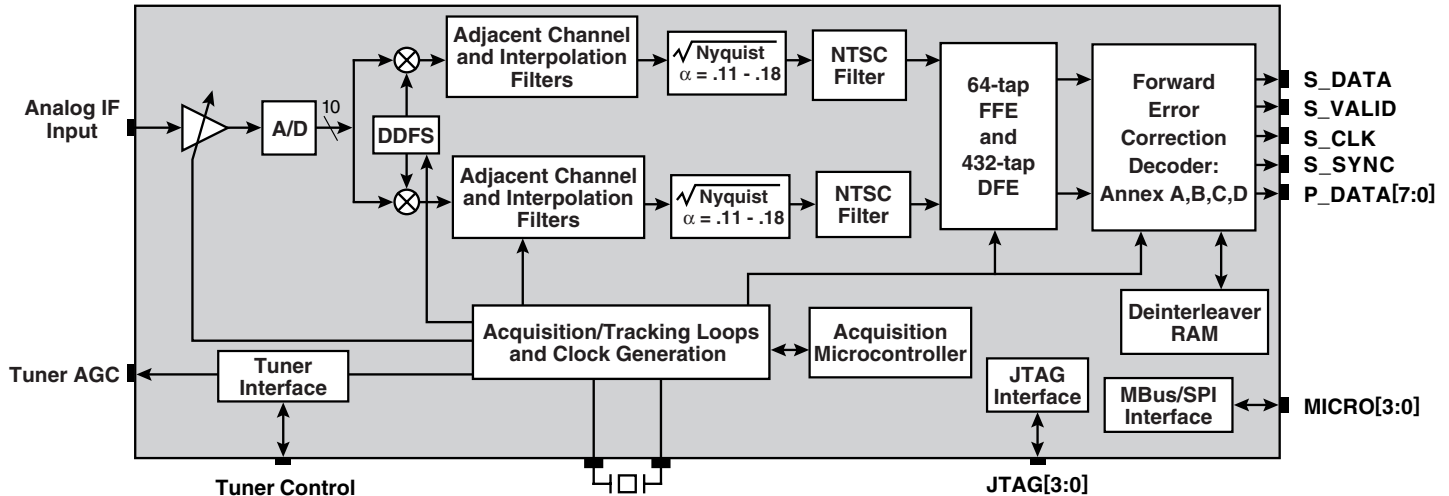
### SUMMARY OF BENEFITS

- Full equalizer architecture spans -6 to +40 ms delays
- Automatic NTSC co-channel rejection filter provides performance superior to traditional designs
- Full 496-tap equalizer implementation eliminates multipath effects over a wide dynamic range
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- Digital adjacent channel filters provide additional rejection for challenging environmental conditions
- On-chip digital PLL simplifies circuit design
- Integrated microcontroller with on-chip ROM for simplified software development, intelligent monitoring, and fast-channel acquisition
- Operates at 15 dB SNR threshold of visibility.
- Multiple AGC loops handle wide dynamic range input and rapid signal fading
- Integrated AGC and 10-bit A/D converter for direct interface to standard DTV tuners
- MPEG-2 transport interface requires no glue logic to interface to the BCM7020 video and graphics subsystem, smart cards, and PCMCIA conditional access devices
- Support for both QAM and VSB for cable TV-ready systems at no additional cost

### QAM/VSB CATV/HDTV Receiver



## OVERVIEW



The Broadcom BCM3510 is a VSB/QAM digital receiver, compatible with both North American digital cable television and digital terrestrial broadcast television standards. The BCM3510 is capable of receiving all Standard-Definition and High-Definition digital television formats (SDTV/HDTV).

This second-generation Broadcom VSB receiver implements significant performance and feature improvements. Performance is enhanced in several key areas, including equalizer, gain control, and adjacent and co-channel rejection. These improvements were developed using more than one year of field trial and deployment of the BCM3500. Feature improvements include an upgraded embedded microcontroller to handle acquisition, reacquisition, and monitoring tasks, while offering users a simplified, high-level application programmer interface.

The BCM3510 accepts an analog signal centered at the standard television IF frequencies. The BCM3510 then amplifies and digitizes this signal with an integrated programmable gain amplifier and 10-bit A/D converter, and demodulates and filters the signal with a combined 64/256-QAM and 8-VSB demodulator. The integrated interpolation filters enable variable symbol rates with fixed A/D sample rate. A second stage of filters is provided for increased adjacent channel rejection performance. The 496-tap equalizer and adaptive NTSC co-channel rejection filter remove propagation effects and interference. The data is error-corrected by the integrated trellis and Reed-Solomon decoders supporting both the ATSC A/53 and ITU J.83 coding formats. The final

received data stream is delivered in either parallel or serial MPEG-2 transport format with a clock generated by an on-chip PLL. The output interface is designed to operate with Broadcom's HDTV video and graphics subsystem device, the BCM7020. All clock, carrier, and gain acquisition and tracking loops are integrated on-chip, as are the necessary phase-locked loops, referenced to a single external crystal.

The BCM3510 also contains an integrated microcontroller to greatly simplify the system software development task and increase overall performance through extensive monitoring and control functions. The chip contains both on-chip RAM and ROM for design flexibility and low cost implementations.

The BCM3510 implements all of the receiver functionality for both VSB and QAM signals at no extra cost, creating a single system solution for digital terrestrial and cable applications. This highly integrated device includes an A/D converter and on-chip digital PLL to maximize system performance while eliminating the need for expensive external components. An innovative Broadcom NTSC co-channel rejection system is designed to minimize signal loss experienced by traditional comb filter designs, ensuring superior performance under the harshest channel conditions. The BCM3510 contains a large equalizer to compensate for the longest terrestrial multipath of up to 40 ms. All of these advanced features are combined to meet or exceed all the Advanced Television Testing Center Grand Alliance System test results.

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