

12-CHANNEL UNIVERSAL ADVANCED TDMA/SCDMA PHY-LAYER BURST RECEIVER

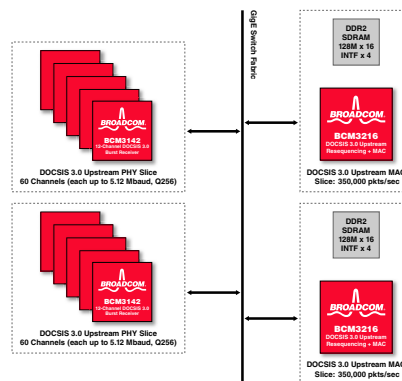
FEATURES

- The BCM3142 is a universal headend advanced TDMA and SCMA physical layer QPSK/QAM burst receiver.
- DOCSIS[®] 3.0-based, IEEE 802.14[™], DAVIC, and DVB compliant
- Programmable demodulation including BPSK, QPSK, 8, 16, 32, 64, 128, and 256 QAM formats
- Variable symbol rates from 160 KBaud to 5.12 MBaud, providing up to 40 Mbps operation
- Powerful Reed-Solomon FEC decoder with byte deinterleave options for impulse/burst noise mitigation
- Burst acquisition as fast as 16 preamble symbols
- Four onchip analog-to-digital converters and four external serial interface options
- Direct sampling for DOCSIS via digital input operating either at 164 MHz or 204 MHz to support up to 85 MHz reverse path
- Powerful equalization to provide ingress, ACI and inter-symbol interference (ISI) protection
- Integrated Fast Fourier Transform (FFT) processor with variable FFT sizes and programmable window options
- Dual gigabit Ethernet ports independently configurable to use either GMII or SerDes
- Broadcom serial control (BSC) or SPI-compatible microcontroller interface
- 65 nanometer process and JTAG test interface with AC-JTAG support for the GMII and external ADC SerDes
- Operates over commercial temperature range (0°C to +70°C)
- Supports up to four logical channels for each channel
- Flexible association of RF ports and digital receiver channels using a digital switch
- Impulse noise time stamping on empty channel/idle slots

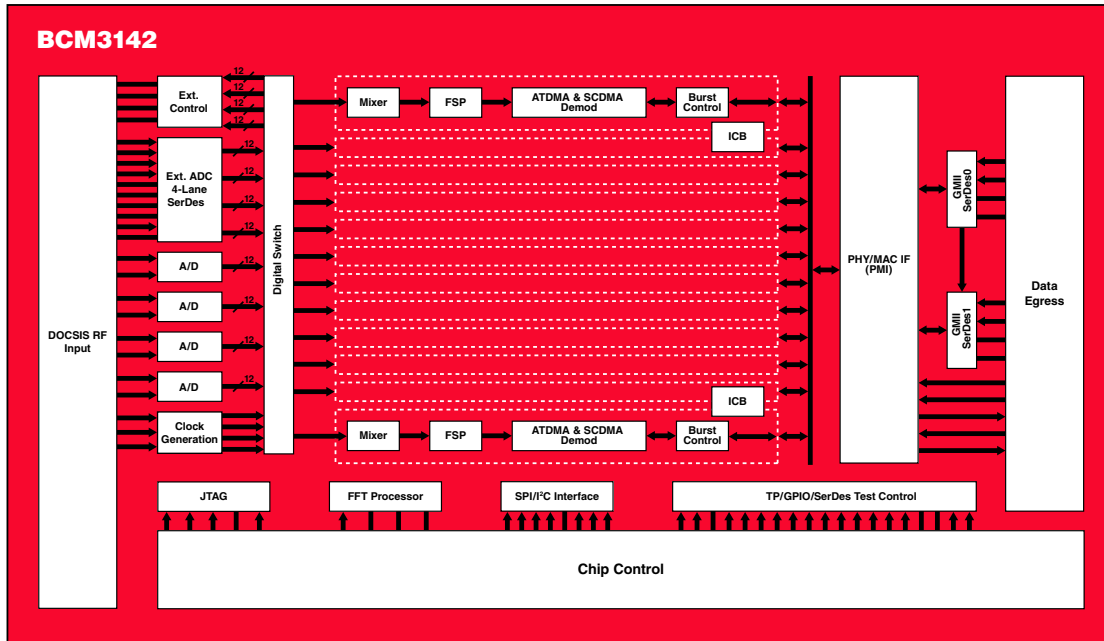
SUMMARY OF BENEFITS

- Presents a high-performance, integrated solution for upstream demodulation in cable-over-data, video, and telephony applications.
- 12 independent burst receivers per package enable high-density equipment designs, reducing equipment board space requirements.
- Based on DOCSIS 3.0 standards for use in cable modem termination systems (CMTS).
- Seamless integration with BCM3216 advanced CMTS DOCSIS 3.0 media access controller (MAC).
- Applies to digital CATV reverse-channel receiver.
- High bps/Hz modulation enables advanced digital services over narrow RF channels.
- Direct sampling using high-speed ADCs minimizes RF components.
- Use of onchip ADCs minimizes external components.
- Onchip equalizer enables operation of digital services under challenging plant conditions.
- Onchip FFT and impulse noise time-stamping enable spectrum analysis and management of the entire upstream channel.
- Small footprint enables high-density equipment.

DOCSIS 3.0 Cable Modem Termination System (CMTS) Block Diagram



OVERVIEW



BCM3142 I/O Interface Block Diagram

The BCM3142 QAMLink[®] Universal QPSK/QAM burst receiver is a highly integrated solution that significantly decreases the board space and cost of demodulators in digital cable modem headend applications. The BCM3142 provides 12 independent cable network receivers that accept QPSK and m-QAM burst data in TDMA or SCDMA schemes. Advanced features in the BCM3142 include an analog front end (AFE), a SCDMA despreader, a QAM demodulator, a generalized equalizer, and an enhanced Reed Solomon (RS) FEC decoder with dynamic deinterleaving.

The AFE performs analog-to-digital conversion (ADC) on RF input (either at 164 MHz or 204 MHz). The BCM3142 incorporates unique word detections of programmable length and pattern in the burst preamble for signal acquisition as fast as 16 symbols. An adaptive equalizer and ingress canceller characterizes the RF channel response, cancels ingress noise, and removes intersymbol interference (ISI) caused by microreflections in the channel. The FEC decoder consists of a

programmable derandomizer, a programmable RS decoder with T values programmable up to 16, and a byte deinterleaver with burst-by-burst reconfiguration capability.

The BCM3142 delivers the recovered data stream and accepts receiver control inputs through an IP-based link DOCSIS MAC chip, such as the BCM3216. The BCM3142 prepends ranging and data information to each received code word and packet for processing by the BCM3216.

The BCM3142 is a highly integrated, mixed-signal, and cost-effective device providing a worldwide solution for burst receiver applications. The 12-receiver design of the BCM3142 is packaged in a 31x31 FCBGA with 1mm pitch, enabling a significant increase in upstream channel density for headend-based CMTS equipment. The BCM3142, combined with the BCM3040 QAMLink Universal Modulator and the BCM3216 Advanced QAMLink CMTS DOCSIS 3.0 MAC, provides a complete solution for advanced cable headend equipment.

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