

Verilog® Encoder Code for Integrated Circuits

FEATURES

- Complete BTSC encoder
 - Stereo
 - SAP (Optional)
 - Optional 4.5 MHz aural carrier FM modulator
 - All digital
 - Synthesizes into FPGA or ASIC
- Well-documented Verilog HDL
 - Efficient design
 - Optimized for consumer applications
- Evaluation board based on Xilinx gate-array technology

APPLICATIONS

- Consumer multimedia products
 - Cable/satellite set tops
 - DVD recorders
 - DVRs
 - Converter boxes

Description

North American homes contain an overwhelming number of legacy analog TV sets. Most of these receive TV signals via a tuner and RF connector. Even in homes which receive some signals via cable, almost half also receive some signals via an antenna connection. After US analog over-the-air broadcasts stop (now set for February 2009), these sets will be blacked out. The only way to prevent these valued sets from being made obsolete in the rush to digital is to generate a local BTSC signal. While some devices already provide local encoding (e.g., satellite and cable set-tops), the blackout of analog broadcasts creates a huge potential for BTSC-enabled TV converter boxes.

THAT Corporation's consumer encoder solution, which has been in commercial deployment for many years now, was designed specifically for the local generation of BTSC. This solution can be configured to generate a 4.5MHz aural carrier and/or baseband BTSC signal from L/R inputs. The extensive set of BTSC Encoder functions performed, include:

- L+R and L-R matrix 75 μ sec pre-emphasis
- BTSC compression
- Pilot generation
- 4.5 MHz aural carrier modulation
- L-R 2fH amplitude modulation

The encoder has been carefully optimized for ASIC integration, requiring less than 80k gates for generating baseband signals.

The encoder comes with an extensive set of deliverables including well commented source code, an FPGA-based evaluation board, and complete engineering support including customization and evaluation services.

The system is offered for a license issue fee plus per-instance royalties. Code meeting the specifications shown in this data sheet is available immediately. Our engineers are implementing additional features and performance improvements, so please check our web site for the latest updates.

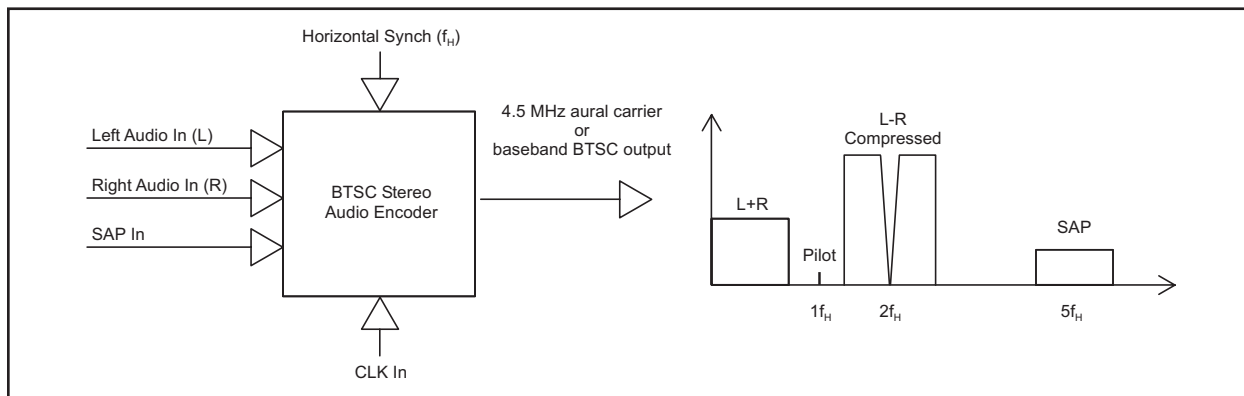


Figure 1. BTSC Stereo encoder block diagram

SPECIFICATIONS¹

<u>Inputs</u>	<u>I/O</u>	<u>Outputs</u>
<ul style="list-style-type: none"> • Four signal serial interface to Stereo A/D (similar to I²S interface) • Horizontal synch input • System clock input • Mode configuration <ul style="list-style-type: none"> – Stereo / mono – Test modes • Reset input 		<ul style="list-style-type: none"> • D/A interface to support clock and data output for 4.5 MHz carrier • D/A interface to support clock and data output for baseband

Performance Specifications³

Parameter	Conditions	Typical
Stereo Separation	50Hz - 500Hz @ 10% EIM ²	49 dB
	500Hz - 5kHz @ 10% EIM ²	44 dB
	5kHz - 14kHz @ 10% EIM ²	32 dB
Stereo THD+N	1 kHz, 100%, NR on, 15 kHz BW	0.03 %
Stereo S/N	No tone, NR on, 22 Hz - 15 kHz BW	-73 dB
Stereo Frequency Response	50 - 13 kHz	± 0.25 dB

Applications Assistance

The BTSC encoder solution comes with the following comprehensive set of deliverables:

- An evaluation board, based on Xilinx gate-array technologies, for performing an engineering assessment of THAT's BTSC encoder functional block.
- Well documented/commented Verilog source code.
- All files associated with simulation, synthesis, placement, and routing.
- Functional test wrapper.

THAT provides a range of system integration support for customers. The standard support package includes the following:

- General applications assistance
- A/D & D/A converter selection assistance
- Encoder interface customization
- Final design evaluation

¹ This product is covered by one or more of the following U.S. patents and corresponding filings worldwide: 5,796,842 6,037,993 6,118,879 6,192,086 6,259,482 6,588,867. Other patents pending.

² 75 μ s equivalent input modulation (EIM): The audio signal level prior to encoding that results in a stated percentage modulation when the encoding process is replaced by 75 μ s pre-emphasis.

³ Based on 4.5 MHz aural carrier output