PROGRAMMABLE DIGITAL AUDIO PROCESSOR

Solutions on a Chip

ZR38601
Product Brief

Benefits Overview

The Zoran® (ZR38601) is a high-performance, programmable digital audio sig-nal processor capable of real-time, single-chip decoding of Dolby Digital 5.1- channel and MPEG-2 digital surround algorithms. It is the fourth genera-tion decoder made by Zoran, based on the proven ZR38600 architectures. The hardware block floating-point makes it optimum for Dolby Digital and complex digital audio signal processing applications.

Due to its programmable high-performance and high level of integration, the ZR38601 is unusually flexible in meeting a wide range of system require-ments at the lowest possible system cost. At the low end, it can provide stan-dard fixed decoding functions with only a DAC and an optical interface for the S/PDIF input, in addition to the oscillator crystal. At the high end, it can pro-

vide eight channels of output, analog input, long-delay memories, custom operating features, and the ability to be upgraded with downloaded SiliconSoftware® product enhancements. Yet all of this flexibility comes with-out design complexity. Highly configurable standard functions with a simple command structure minimize software development, while a full set of devel-opment tools are available for the highly-custom product developer.

The ZR38601 is suitable primarily for audio applications such as Audio/Visual home theater receivers, Digital Audio Broadcast (DAB), 3-D audio, six-chan-nel speaker systems, and Karaoke processors; video applications like SDTV and HDTV stereo television receivers and digital cable, and satellite TV set-top boxes; and multimedia PC applications such as DVD players.
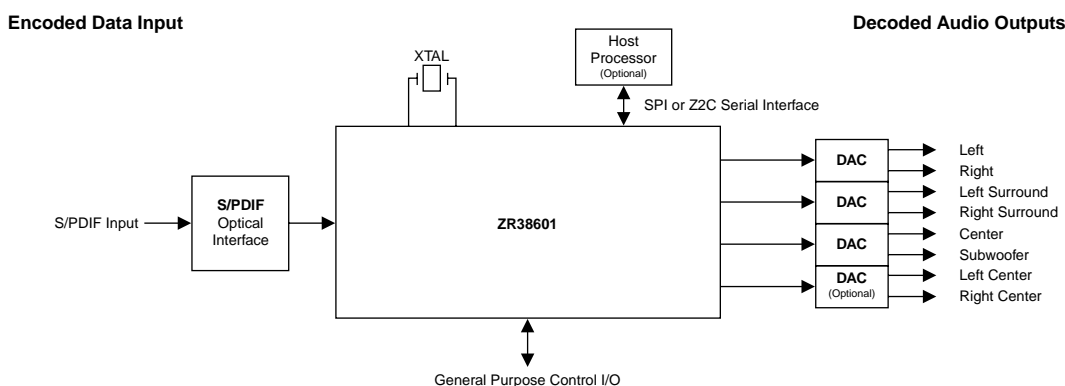
Encoded Data Input   **Decoded Audio Outputs**

Figure 1. A typical Low-Parts-Count ZR38601 System

Key Features

Standard High Performance Functions in ROM
- Dolby Digital, 5.1-channel and 2-channel decoding
  up to 640 Kbits per second
- Dolby Pro Logic encoding and decoding
- MPEG-1 and MPEG-2 two channel decoding with MPEG-2
- PES stream parsing, PTS decoding and SCR handling

Downloadable SiliconSoftware Functions
- Aureal A3D, Dolby Virtual Surround, Harman VMAx
- QSound QSurround, Spatializer N-2-2, Home THX
- SRS TruSurround, music modes
- Bass Management and multi-channel downmix

Flexible Input/Output
- Serial and/or parallel data stream I/O
- Serial SPI, serial Z2C or 8-bit parallel host interface
- 3 serial input data ports and 4 serial data output ports
- Formatted S/PDIF receiver with up to 96 kHz sample rate
- Sample rates: 32 kHz, 44.1 kHz, 48 kHz or 96 kHz
- Formatted S/PDIF Dolby Digital and MPEG transmitter output

Low System Cost
- Host less operation without glue chips
- Separate internal PLLs for DSP core and audio I/O
- No external RAM required for 5.1 Dolby Digital/MPEG-2
- Wait-state generation for low-cost external memory
- 100-pin Plastic Quad Flat Pack (PQFP) packaging
- 3.3 V supply with 5 V compatible I/O for low power

Software and Hardware PC Development Environment
- Assembler/Linker/Simulator
- On-chip ICE support with direct PC connection
- ZR38600DB Demonstration Board with 6 analog outputs,
  microphone and line inputs, and optional PC connection

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ZORAN

General Description

The Zoran ZR38601 is the latest digital audio processing member of the ZR38000 high-performance, programmable digital signal processor product line. It is especially configured with peripherals, I/O capability, and software for digital audio. Today, quality digital audio starts with a primary decoding function, adds appropriate data stream protocols, and interfaces with I/O configurations to match the application. The ZR38601 has these primary decode and protocol software functions yet has processing cycles left for additional product-distinguishing features. The ZR38601 also has the necessary flexibility in system I/O and hardware configuration.

The ZR38601 is pin and instruction-set compatible with the earlier ZR38600, but with a higher 50-MIPS processing rate and larger internal program and data RAMs and ROM. These features provide new 96-kHz sample rate S/PDIF decoding, and increased processing cycles and memories for additional functions. New hardware features are a programmable timer, a Z2C serial host interface, and more support for the 24-bit I/O data formats.
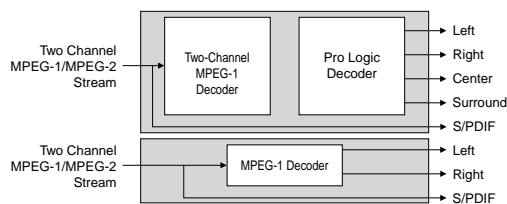
Functions
Dolby Digital and MPEG with variations are the primary decoding functions in use today. The ZR38601 has these and their associated test function with the required set-up, operation, and system functions to make them usable in an end-user product. In addition, an ever increasing number of SiliconSoftware functions can add special enhancing and differentiating features to products.

### Primary Decoding and Test Functions
Dolby Digital Dolby DigitalThe figure shows the simultaneous S/PDIF input and 5.1-channel Digital-to-Analog Converter (DAC) outputs of this primary digital audio function, the six-channel Dolby Digital decoder.
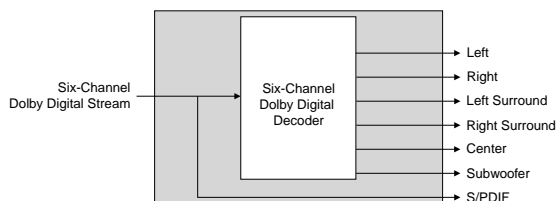

Or with four channels of Pro Logic output in either of two DAC forms: four channels directly or to an analog Pro Logic decoder


PCM + Pro Logic With two-channel PCM inputs, the choice of functions is four-channel Pro Logic decoding or two-channel stereo mixing, including upmixing from only one input channel to two.
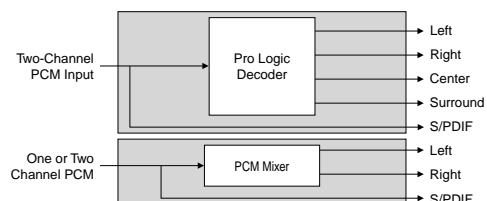
MPEG The MPEG-1 decoder accepts either MPEG-1 or MPEG-2 input streams and produces either Pro Logic DAC outputs or two-channel stereo in DAC form.
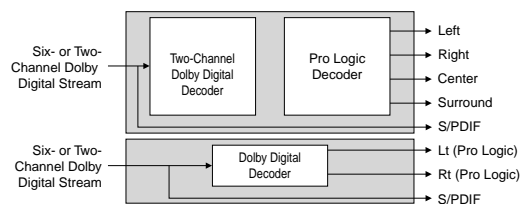
Pink Noise A six-channel pink pseudo-random noise generator function is included for user testing of speaker balance in their listening space. Individual speakers can be enabled in any combination.
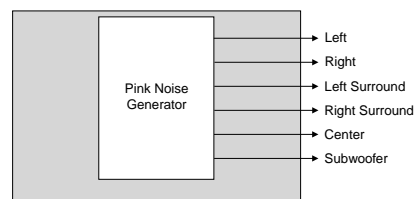
SiliconSoftware Functions
SiliconSoftware is a group of additional functions for the ZR38601 provided by Zoran or third-party suppliers that can add special features now or provide new functions in the future.

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For more information, contact Zoran's Santa Clara office or the office nearest you: