

PROGRAMMABLE DIGITAL AUDIO PROCESSOR

Solutions on a Chip

ZR38601 Product Brief

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Benefits Overview

The Zoran® (ZR38601) is a high-performance, programmable digital audio signal processor capable of real-time, single-chip decoding of Dolby Digital 5.1-channel and MPEG-2 digital surround algorithms. It is the fourth generation 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 requirements at the lowest possible system cost. At the low end, it can provide standard 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 without design complexity. Highly configurable standard functions with a simple command structure minimize software development, while a full set of development 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-channel 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.

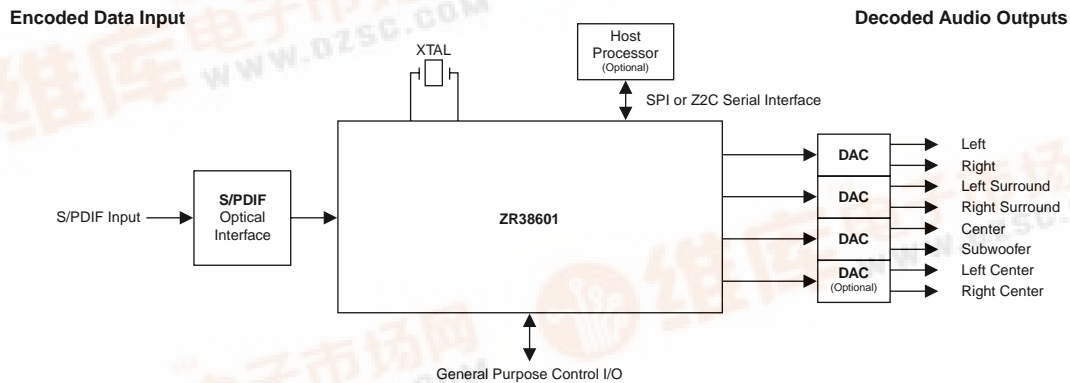


Figure 1. A typical Low-Parts-Count ZR38601 System

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 QSurrround, 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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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.

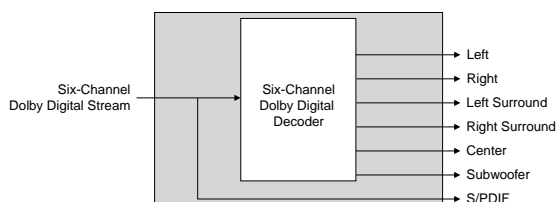
The ZR38601 is pin and instruction-set compatible with the earlier ZR38600, but with a higher 50-MIPS processing rate and larger internal program and data RAMs and ROM. These features provide new 96-kHz sample rate S/PDIF decoding, and increased processing cycles and memories for additional functions. New hardware features are a programmable timer, a Z2C serial host interface, and more support for the 24-bit I/O data formats.

Functions

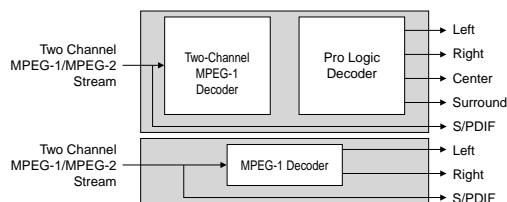
Dolby Digital and MPEG with variations are the primary decoding functions in use today. The ZR38601 has these and their associated test function with the required set-up, operation, and system functions to make them usable in an end-user product. In addition, an ever increasing number of SiliconSoftware functions can add special enhancing and differentiating features to products.

Primary Decoding and Test Functions

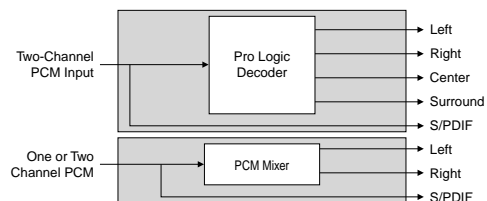
Dolby Digital The figure shows the simultaneous S/PDIF input and 5.1-channel Digital-to-Analog Converter (DAC) outputs of this primary digital audio function, the six-channel Dolby Digital decoder.



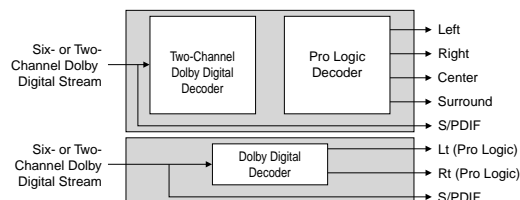
Or with four channels of Pro Logic output in either of two DAC forms: four channels directly or to an analog Pro Logic decoder



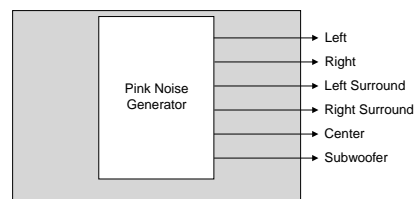
PCM + Pro Logic With two-channel PCM inputs, the choice of functions is four-channel Pro Logic decoding or two-channel stereo mixing, including upmixing from only one input channel to two.



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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