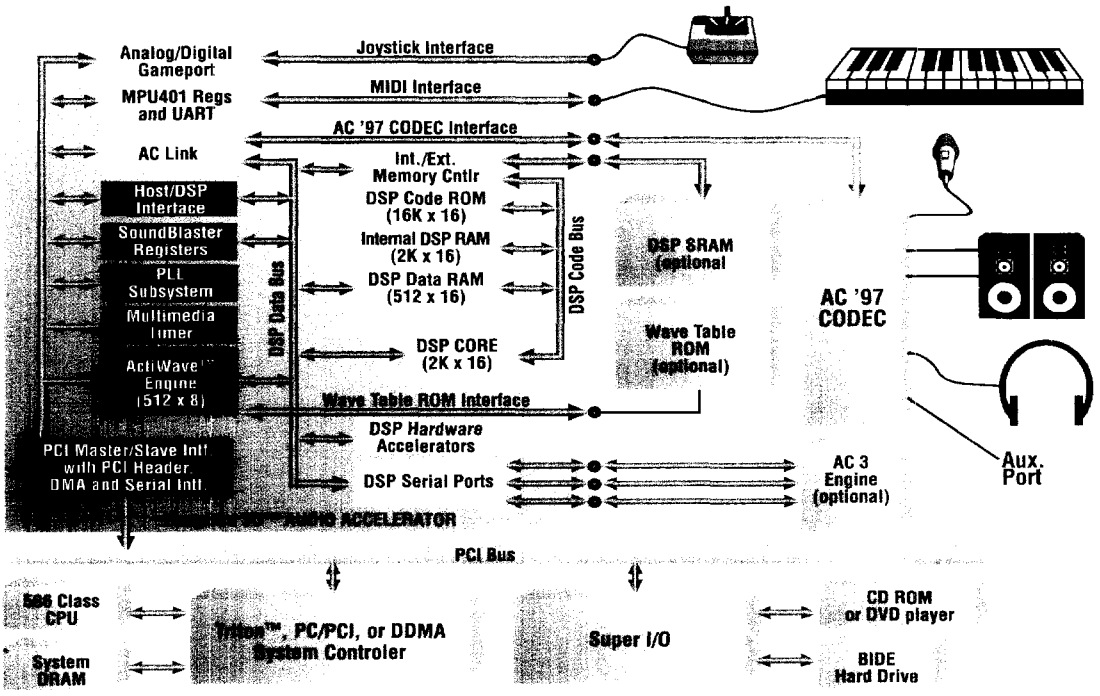
VLSI Technology, Inc.

VL82C829 SongBird 3D™ Audio Accelerator



Overview The VL82C829 Songbird 3D™ Audio accelerator, the second member in the ActiMedia™ family of multimedia products, is a state-of-the-art DirectSound accelerator for PCI architecture systems. SongBird provides True 3D™ sound localization and 32 voice wave table synthesis with VLSI's ActiWave™ technology. SongBird also provides Sound Blaster™ compatibility, OPL2 and OPL3 emulation through the use of the Pine™ Digital Signal Processor (DSP) engine, as well as full support of the AC'97 CODEC standard, MIDI interface, and an analog/digital game port.

Features

- AC'97 compliant with full duplex functionality
- ActiSound 3D™ localized audio using HRTF technology
- ActiWave™ engine for sample fetching from system memory or from ROM or Flash
- Legacy audio on PCI
- OPL2/OPL3 emulation and spatialization
- ActiF/X™ sound effects: reverb, echo, chorus, pitch shift, synth chorus, tremolo, vibrato
- Pine 16 bit DSP core with internal 4KB of RAM and 32 KB mask programmed ROM for firmware
- Field upgradable firmware
- Optional 32 or 64 KB external SRAM for data memory and reverb delay
- Hardware accelerators for sample rate conversion, reverb and wave table sample fetching and decompression
- Five serial ports providing DAC, Codec, MIDI MPU401 and co-processor support
- Integrated PLL for DSP and codec clock generation using a single crystal
- 20-bit 1µs resolution DirectX timer for video/audio synchronization
- An analog/digital game port
- PCI 2.1 compliant bus master/slave interface providing 10X performance increase over ISA
- Triton™, PC/PCI and Distributed DMA modes with streaming scatter/gather DMA
- VLSI's Autonomic Clock Synchronization (ACS™)
- Web phone support
- Operates on 3.3 or 5.0 VDC
- 0.6 micron technology
- Packaged in a choice of 208-pin MQFP or TQFP packages

SongBird Architecture

The heart of the VL82C829 is the ActiMedia™ processor core. The DSP functions as both the OPL2/OPL3 and wave table synthesis engine with 3D localized sound effects. Additional functions include, digital mixing, sample rate conversion, Sound Blaster™ emulation and sound effects. Hardware accelerators for sample rate conversion, OPL2/OPL3 emulation, reverb effect, wave table sample fetching and decompression are included to enhance the core performance.

To implement the audio features ActiMedia™ firmware is carried

VLSI Technology, Inc.
1109 McKay Drive
San Jose, CA 95131
Tel: 408 434-3100
Fax: 408 434-7584

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32 KB ROM that is field upgradable through 4 KB of internal zero wait state SRAM and a jump table. The SongBird incorporates EuSynth-1+™, EuSynth-2/Pro™, and EuSpace™ music synthesis software developed by EuPhonics Inc.

ActiWave™ Technology

Since the VL82C829 chip is a PCI bus master, samples for the 32 voice wavetable synthesizer can be located in system DRAM. This is VLSI's ActiWave™ wave table technology. Although a 1,2, or 4 MB wave table ROM can be used, ActiWave provides a cost reducing system design option. In addition to the 8 KB of onboard data RAM the DSP utilizes an optional external memory interface that supports either 32 or 64 KB of 15 ns SRAM as data memory and reverb delay.

AC'97 Codec Interface

The SongBird is compliant to the Intel™ AC'97 audio codec specification supporting the 5 wire bi-directional "AC link" interface and 48 KHz sample rate.

Serial Ports

The SongBird has five serial ports to support optional functions. Three synchronous, high speed, bi-directional ports, designed to standard DSP and professional audio serial bus requirements, are provided as support for standard codecs, Zoom Video audio stream and Dolby™ AC3 MPEG processing.

A MIDI port using an MPU401 compatible bi-directional UART is provided to enable external MIDI devices to access the VL82C829 onboard synthesizers and codec path, or to enable MIDI file export to a synthesizer equipped external MIDI device.

A uni-directional serial port is provided as an interface to a high quality music DAC enabling lower cost audio systems.

Multimedia Timer and Game Port

The VL82C829 chip supplies a 20-bit, 1µs resolution timer for game synchronization and DirectX™ applications. The timer data can be used to synchronize the video to the audio stream.

The SongBird is also equipped with an analog/digital game port that can be used with any 558-based PC type joystick. This interface, designed to support Microsoft Direct Input™ requirements, can function in either legacy polled mode or configured to generate an interrupt upon any positional change of the joystick.

PCI Bus Interface

The SongBird's 33 MHz PCI (rev. 2.1) bus master interface uses "Open standard Distributed DMA" protocol (DDMA), PC/PCI, or Triton™ style DMA to enable legacy DMA based audio software to function on the PCI bus. The PCI bus interface enables the SongBird to provide 10 times the system performance of an ISA audio solution.

Power Management

VLSI Technology has long been the leader in power management. The VL82C829 carries VLSI's Autonomic Clock Synchronization (ACS™) power management technology of localized clock control and full event monitoring including interrupts, I/O, and software events, and PCI CLKRUN protocol. A programmable onboard PLL, driven from a single crystal or clock oscillator input, provides all DSP and codec clocks.

Software Support

The SongBird 3D comes with an impressive list of supporting software including a 3D extension to Direct Sound 3.0 to enable development of 3D sound applications prior to the release of the Microsoft's Direct Sound 3D API.

- Drivers
  - Windows 3.1, Win'95, WinNT and OS/2
  - DEV3D API for 3D sound
- Rack and Toolkit Utility
  - A non-TSR installation and diagnostic utility
  - On line help files
  - Stereo-rack utility with Record/Edit/Play, CD, Gain control, mixer control and mute
  - A wave table and effects edit/configuration utility with download-able samples
- Composer
  - A sound sequencer that enables composition, editing, layering, and playback of MIDI audio

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