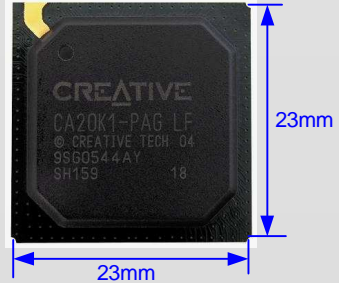


CA20K1 Audio Processor

Overview

The CA20K1 digital audio processor is a slave processor designed to accelerator digital audio processing and is available in 0.13µm BGA package size 23mm by 23mm. The CA20K1 contain several special purposes processing units including: a sample rate converter engine, a digital filter engine, a digital delay line accelerator know as the "tank engine", a digital filter engine, a powerful mixer, a micro-programmable audio DSP, various digital I/O capabilities and bus mastering external memory interfaces. Unlike the host interface control port the bus mastering "audio transport" supports burst mode accesses to the PCI and SDRAM interfaces. Host processor is required to control the CA20K1 through a 32-bit PCI bus or a generic microprocessor interface using a series of reads and writes to control registers.

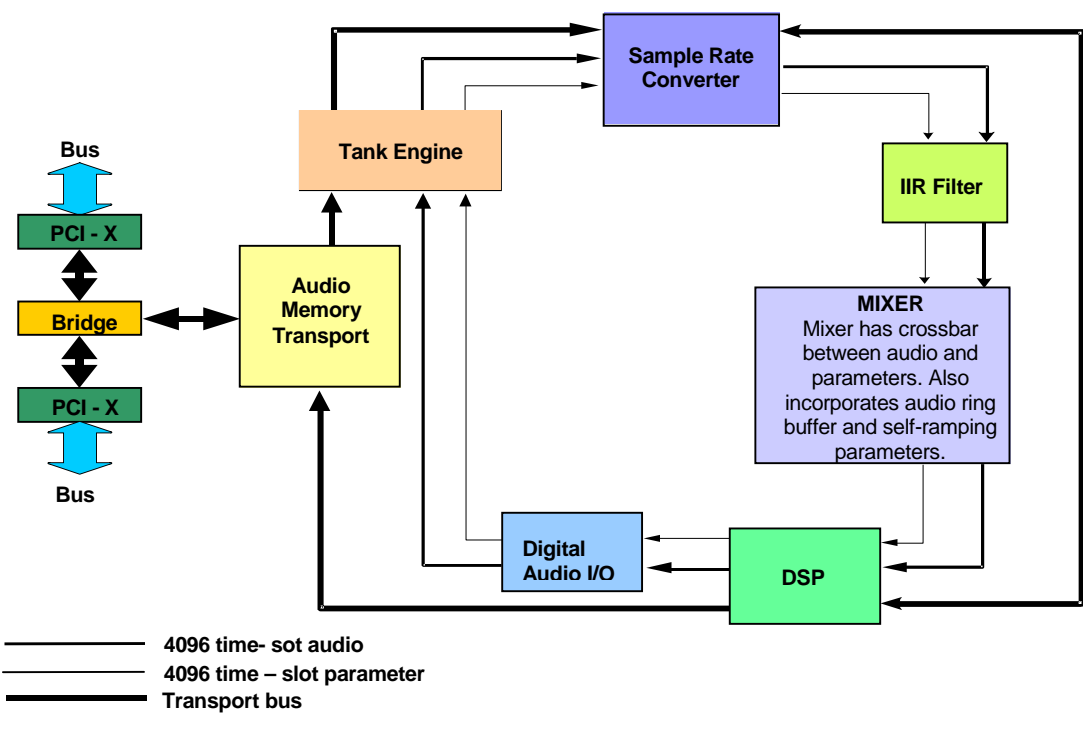
The X-Fi audio enhancement algorithm is integrated into the CA20K1 audio processor to extend the X-Fi enjoyment to the customers. As the next generation high-resolution audio processor, CA20K1 provides dramatic improvements to enhance listening experiences for movies and improves the capabilities, performance and quality of audio. The enhanced sound quality makes movies more realistic. Users can truly immerse themselves in scenes like underwater, volcano eruption, war zone etc. while enjoying the enhanced sound effect at home. The X-Fi module gives you an experience beyond studio quality. Users can enjoy the live concert experience in their own comfortable surroundings.



Applications

- Gaming Soundcard
- Entertainment PC
- Desktop PC Motherboards
- Audio Creation
- General Purpose multi-channel I/O

Architecture of CA20K1 Audio Core



Key Features

- X-Fi CMSS-3D
- X-Fi Crystalizer™
- EAX® Advanced HD 5.0 for games
- 10 Band Multi-channel Equalizer
- THX Certification
- Smart Volume Management
- OpenAL Support
- Creative ALchemy



Key Features

- 400/200 MHz internal clock rate
- 4 stereo S/PDIF inputs and 4 stereo S/PDIF outputs
- 4 stereo I2S digital inputs and 4 stereo I2S digital outputs
- Sample rate slave capability to I2S and S/PDIF
- 16 independently configurable GPIOs pins
- I2C controller
- EEPROM interface for overriding reset defaults and storing software values
- 5-volt tolerant 3.3V I/O
- Power management with an energy efficient 1.2V core
- 2 UARTs with programmable baud rates
- 4-Thread, Interleaved Quartet DSP with 1,200 MFLOPS max throughput
- Fully flexible routing – connect anything to anything – using “audio ring” bus.
- Tank accelerator that supports fractional and modulated digital delay lines
- Very high quality Sample Rate Converter (SRC)
- Dual-mode microprocessor/PCI interface with shared pins
- 100 MHz SDRAM Interface for high bandwidth audio requirements
- Paged Virtual Memory support
- Native 96kHz 24-bit, 192 KHz, 44.1 KHz, and 32 KHz support
- Wall clock and interval timer tied to the sample rate
- Programmable PLL that supports multiple sample rates with a single crystal
- Host interrupt subsystem

Audio Enhancement

- **X-Fi audio enhancement algorithm**
 - **X-Fi CMSS-3D Surround**
 - Stereo Xpand for stereo to multi-channel upmix with ambient extraction and voice centering.
 - Stereo Surround for duplicating of stereo over multi-channel.
 - **X-Fi CMSS-3D Headphone Expander** for externalization of stereo content and very accurate HRTF for 3D positioning.
 - **X-Fi CMSS-3D Virtual** for audio virtualization and enhancements over 2 loudspeakers. Stereo Surround mode.
 - **X-Fi Crystalizer™**
 - Enhances musical dynamics by emphasizing sharp percussive sounds and transients.
 - Creating a “puncher” and more dynamic listening experience.
- **THX Setup Console and THX Certification**
- **Highest Quality Audio**
 - 24-bit/96kHz recording
 - 24-bit/96kHz 7.1 playback, 24-bit/192kHz Stereo playback
- **10-Band, Multi-Channel Graphics Equalizer support presets and custom preset**
- **SVM – Smart Volume Management**
- **EAX® ADVANCED HD™ 5.0**
 - **128 Voices**
 - **EAX® Voice**
 - **EAX® PurePath™**
 - **Environment FlexiFX**
 - **EAX® MacroFX™**
 - **Environment Occlusion™**
- **OpenAL Support**
- **Creative ALchemy**
Provides multi-channel audio for legacy game titles running on Windows Vista™

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