CIRRUS LOGIC®

Leading the Digital Entertainment Revolution™

CS9268X

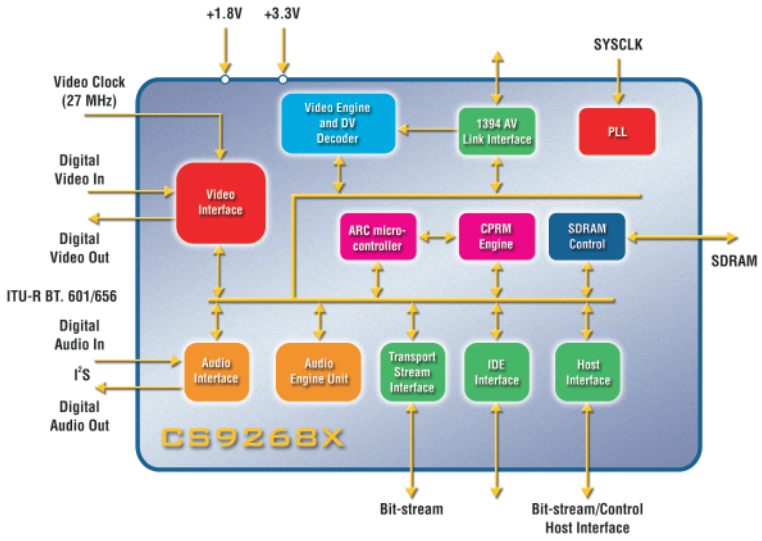
PRODUCT BULLETIN

New MPEG-2 Processors Deliver Superior Audio & Video

DVD Encoders with DV Decoding are Ideal for Digital Video Recording Applications

CS9268X Features

- Single-chip, real-time, MPEG-2 audio/video encoder, with DV decoder and 1394 link-layer interface
- ITU-R BT.601 or ITU-R BT.656 video interfaces
- I²S audio input and output interfaces
- IEEE 1394 link-layer A/V interface
- Transport stream interface; 8-bit parallel or serial
- IDE interface
- 8-bit and 16-bit host interfaces
- Serial Bus Interface (SBI)
- Supports real-time MPEG-1 or MPEG-2 audio/video encoding and decoding
- Supports DV25 decoding and DV25 to MPEG transcoding in real-time
- Supports Transport, Program, and Elementary streams
- Supports real-time encoding and decoding of two-channel audio using either the Dolby® Digital Consumer Encoder (DDCE) or MPEG audio, including MP3
- Programmable system mux/demux supports VCD, SVCD, and DVD formats
- Supports both PAL and NTSC
- Supports multiple resolutions and scan rates
- Supports one-pass constant and variable bit rate
- Field, 16x8, and frame-mode prediction for superior video quality
- Integrated programmable video pre- and post-processors, including noise-reduction and deblocking filters
- Integrated temporal filter and telecine functions
- Programmable VBI extraction
- Hardware-based cipher engine for content protection of recording media (CPRM)
- 1.8V and 3.3V power supplies, 5V I/O tolerant
- 240-pin MQFP or 272-pin BGA packages



The new CS9268X is a family of single-chip, real time MPEG-2 audio and video encoders with an integrated DV decoder, DV to MPEG transcoder, system multiplexor, programmable VBI extraction, and a rich set of interfaces, such as IDE and IEEE 1394 link-layer A/V interface. The CS9268X family is designed for digital video recording systems, such as DVD recorders, personal video recorders, and advanced set-top boxes, as well as home media centers.

These devices integrate all the features of the CS92288 MPEG-2 audio/video encoder plus:

- IEEE 1394 link-layer A/V interface
- DV to MPEG transcoding
- Hardware-based cipher engine for content protection (CPRM)
- Dedicated, bi-directional, serial or 8-bit parallel transport stream interface (BGA packages only)
- Programmable VBI extraction
- Serial Bus Interface (BGA packages only)
- IDE Interface (BGA packages only)

By integrating advanced MPEG-2 features, such as support for both frame and field prediction, and proprietary rate control algorithms, these processors provide high video quality at both low and high bit rates.

Technical Overview

The CS9268X family combines a programmable ARC core, a programmable DSP core, and dedicated processing units organized as a process pipeline. The ARC core supports programmable VBI data extraction and system mux requirements for a variety of system applications, including VCD, SVCD, and DVD recorders.

For video coding and DV decoding, the device fully complies with the ISO/IEC 13818 Main Profile at Main level (MPEG-2 MP@ML), ISO/IEC 11172 (MPEG-1) formats, and IEC 61843.

For audio coding, the audio DSP supports dual-channel Dolby Digital Consumer encoding (DDCE) and MPEG (including MP3) audio encoding and decoding.

These processors support multiple types of host interfaces including 8-bit, 16-bit (Intel or Motorola-like), IDE, SBI, and IEEE 1394 link-layer A/V. A dedicated transport stream interface can be configured to operate in either 8-bit parallel or serial mode.

Audio A/Ds and D/As can be connected using dedicated I^2S buses. NTSC/PAL video encoders and decoders can be connected using either ITU-R BT.601 or ITU-R BT.656 interfaces.

To support chip-level debugging facilities, these processors include a JTAG interface.

Applications

These processors are targeted for digital video recording applications such as:

- DVD recorders
- Personal video recorders
- Advanced set-top boxes with recording functionality
- Home media centers
- USB-based video recorders for desktop video editing

Superior Video Quality

The CS9268X family includes one of the few consumer-grade MPEG CODECs that support motion estimation using frame, 16x8, and field prediction. Most other encoders support only frame prediction. Support for advanced modes in motion estimation, combined with our proprietary rate-control algorithms, lends to a high level of video quality at both low and high bit rates.

The processor family provides application program control over a large number of encoding parameters such as I, P, B-picture cadence, GOP structure, and rate control.

Internal rate control provides a high degree of flexibility in relation to the output bit rate, including the ability to generate variable bit rate compressed video stream in one pass. This makes it suitable for storage sensitive applications such as DVD recorders and PVRs. Pre-processing support includes spatial noise pre-filtering, temporal pre-filtering, telecine (3:2 pulldown), and chroma conversions. Digital video loop-back is also provided.

Superior Audio Features

A programmable DSP supports Dolby Digital Consumer Encoding and all MPEG audio formats, including MP3.

Systems

These processors can output MPEG-compliant transport and program streams or audio and video elementary streams.

CS9268X Family Comparison

Feature	CS92686	CS92687	CS92688	CS92689
DVD recording	√	√	√	√
DV decoding and transcoding	√	√	√	√
1394 AV link interface	√	√	√	√
Programmable VBI extraction	√	√	√	√
Hardware-based CPRM support	√	√		
Transport stream interface		√		√
IDE interface		√		√
SBI interface		√		√
Separate input and output A/V ports		√		√
Package	240-pin MQFP	272-pin BGA	240-pin MQFP	272-pin BGA

Video Preprocessor

- Accepts ITU-R BT.601 or ITU-R BT.656
- 4:2:2 to 4:2:0 conversion
- Spatial noise pre-filters
- Temporal noise filtering
- Automatic inverse telecine
- Scene-change detection
- VBI extraction
- Digital loop back enables preview capability

Video Encoder

- Real-time encoding in MPEG-1 or MPEG-2 MP@ML
- NTSC: (720-D1, 704-D1, 640-VGA, 544, 480-2/3D1, 352-1/2D1) x 480, or 352 x 240 (CIF), or 176 x 112 (QCIF) at 30 or 29.97 Hz
- PAL: (720-D1, 704-D1, 640-VGA, 544, 480-2/3D1, 352-1/2D1) x 576, or 352 x 288 (CIS/SIF), or 176 x 144 (QCIF) at 25 Hz
- ITU-R 656 or ITU-R 601
- Proprietary high-performance motion estimation
- Field, 16x8, and frame-mode prediction
- Field- or Frame-based DCT
- Programmable encoding parameters
  - IBBBP, IBBP, IBP, IP, I GOP structures
  - User-defined quantization matrices
  - Average bit rate
  - Active picture area selection
  - VBR or CBR

Audio Processor

- Programmable, 24-bit, digital signal processor
- Input/Output sampling rates: 32, 44.1, 48 kHz
- Two-channel audio encoding in either MPEG (all layers, including MP3) or Dolby Digital

System Processor

- Based on powerful ARC core
- System multiplexor
- Programmable, supports DVD, VCD, SVCD, or proprietary formats
- Supports Transport, Program, and Elementary streams
- VBI insertion
- Hardware support for CPRM

System Interfaces

- 16-bit Intel or Motorola interface
- 8-bit microcontroller interface
- 64-bit SDRAM interface (8 MB required)
- Flash and EPROM serial interface
- 8051 protocol interface
- I^2S
- General Purpose I/O
- Transport stream interface; serial or 8-bit parallel
- ITU-R BT.601 and BT.656 interfaces
- SBI
- IDE interface
  - Provides a second IDE bus
  - PIO mode 1 to mode 4 for taskfile register transfers
  - Streaming PIO mode 1 to mode 4 for DMA data transfers
  - Multiword DMA mode 2 for DMA data transfers
- IEEE 1394 link-layer A/V interface
- JTAG Interface

Technology

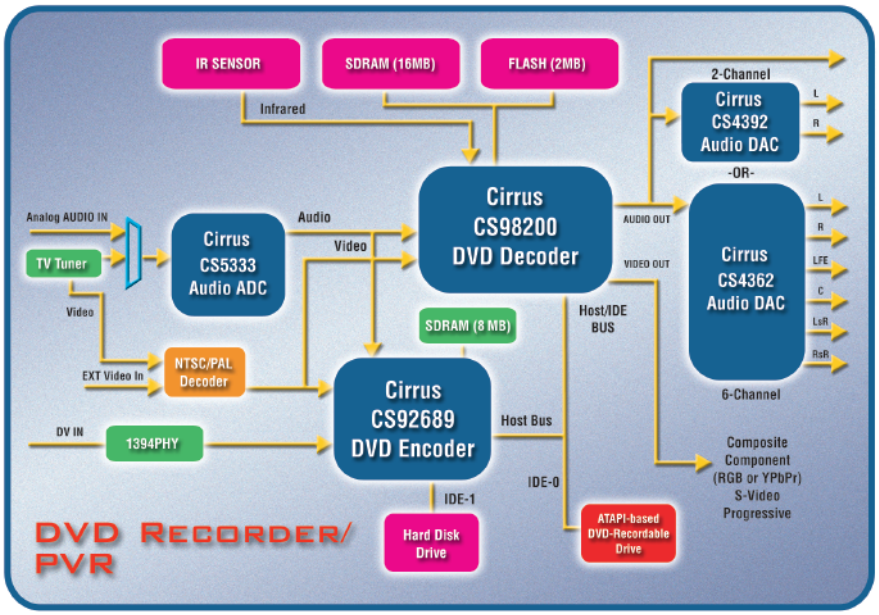
- 0.18 µm CMOS technology
- 240-pin MQFP or 272-pin BGA packages
- 3.3 and 1.8 Volts power supplies
- 5V I/O tolerance
- Internal pull-ups for SDRAM data buses

System Design Example

DVD Recorder/PVR

This processor family is an ideal solution for a variety of MPEG-2-based applications, such as DVD recorders, personal video recorders, or set-top boxes with recording capability. As an example, our reference designs for DVD recorders or PVRs combine the CS98200 DVD processor with the CS92689 or CS92688.

This architecture enables a new class of consumer devices, such as DVD players with time-shift capabilities, home media servers, or DVD-recordable VHS replacement systems. The MP3 coding capability of this processor can further enhance these devices by adding additional audio functionality, such as an audio jukebox or an audio server.



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