

CS4220/21

24-Bit Stereo Audio Codec with 3V Interface

The following information is based on the technical datasheet:

CS4220/1 DS284PP1 OCT '98

Please contact Cirrus Logic : Crystal Semiconductor Products Division for further information.

**CRYSTAL SEMICONDUCTOR
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PRODUCT INFORMATION**

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PI284PP1 OCT '98

24-Bit Stereo Audio Codec with 3V Interface

Features

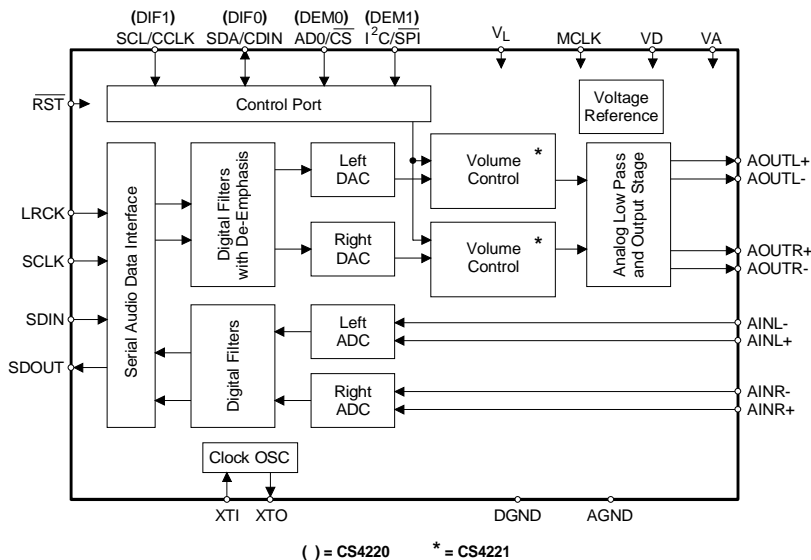
- 100 dB Dynamic Range A/D Converters
- 100 dB Dynamic Range D/A Converters
- 110 dB DAC Signal-to-Noise Ratio (EIAJ)
- Analog Volume Control (CS4221 only)
- Differential Inputs
- Differential Outputs
- On-chip Anti-aliasing and Output Smoothing Filters
- De-emphasis for 32, 44.1 and 48 kHz
- Supports Master and Slave Modes
- Single +5 V power supply
- On-Chip Crystal Oscillator
- 3 - 5 V Digital Interface

Description

The CS4220/1 is a highly integrated, high performance, 24-bit, audio codec providing stereo analog-to-digital and stereo digital-to-analog converters using delta-sigma conversion techniques. The device operates from a single +5 V power supply, and features low power consumption. Selectable de-emphasis filter for 32, 44.1, and 48 kHz sample rates is also included.

The CS4220/1 also includes an analog volume control capable of 113.5 dB attenuation in 0.5 dB steps. The analog volume control architecture preserves dynamic range during attenuation. Volume control changes are implemented using a “soft” ramping or zero crossing technique.

Applications include digital effects processors, DAT, and multitrack recorders.



Overview

The CS4220/1 has 2 channels of 24-bit analog-to-digital conversion and 2 channels of 24-bit digital-to-analog conversion. All ADCs and DACs are delta-sigma converters. The DAC outputs on the CS4221 have adjustable output attenuation implemented in 0.5 dB step resolution. The device also includes digital de-emphasis for 32, 44.1, and 48 kHz.

Digital audio data for the DACs and from the ADCs is communicated over separate serial ports. This allows concurrent writing to and reading from the device. The CS4220 is a stand-alone device controlled via pins. Control for the functions available on the CS4221 are communicated over a serial microcontroller interface.

The CS4221 supports additional functions through the control port interface as outlined in Table 1.

CS4221	CS4220
Volume control	-
Adjustable Mute ramp rate	-
Enable zero crossing detect	-
Enable/Disable mute on zero input	-
De-emphasis	De-emphasis
Mute DAC outputs	-
ADC Input Peak Level Detect	-
20, 24 bit Interface	20, 24 bit Interface
Codec power down	Codec power down
Cal on command	Cal on power-up
High pass enable/disable	High pass enabled

Table 1. CS4221 vs. CS4220

FAQs

- 1) Why does the CS4221 implement analog volume control instead of digital volume control?
A: Analog volume control allows one to preserve system dynamic range. As the audio signal is attenuated, the noise floor is also attenuated by the same amount. Thus, dynamic range is preserved during attenuation.

- 2) What does the term "soft volume control" mean?
A: When the user writes a new volume control setting, the CS4221 ramps from the old volume setting to the new volume setting in 0.5 dB steps. This approach is audibly superior to a single large volume control change which can result in an audible "click" or "pop". The rate at which this ramp occurs can be set to 4 different settings through a register in the control port. This same approach is used when muting the DAC outputs.

- 3) Are these parts backward compatible with the CS4222?
A: The best choice for backward compatibility is the CS4221. Pin 13 changes from being DEM0 to being VL, the pin to set the logic interface voltage level. Pin 2 ceases to be $\overline{\text{SMUTE}}$ and becomes XTO, the drive pin for the on chip crystal oscillator.

Ordering Information

CS4220-KS	-10 to 70 °C	28-pin SSOP
CS4221-KS	-10 to 70 °C	28-pin SSOP
CDB4220/1	Evaluation Board	

For further information on Crystal products, please visit our website “www.crystal.com” or call our literature department (800) 888-5016 ext. 3594 or (512) 912-3594 for data sheets and application notes.

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Sales Office and Applications Support

UNITED STATES

Western Area

Cirrus Logic, Inc.
3100 West Warren Ave.
Fremont, CA 94538
Ph: 510-623-8300
FAX: 510-252-6020

Southern California, Sales
Westlake Village
The Townsgate Executive Bldg.
2659 Townsgate Road,
Suite 238
Westlake Village, CA 91361
Ph: 805-371-5860
FAX 805-371-5861

Cirrus Logic, Inc.
6650 S.W. Redwood Lane,
Ste. 105, First Floor Bldg. 16
Portland, Oregon 97224
Ph: 503-620-5547
FAX: 503-620-5665

Cirrus Logic, Inc.
827 Wellesley Ave.
Los Angeles, CA 90049
Ph: 310-820-6489
FAX: 310-820-6180

Central Area

Cirrus Logic, Inc.
14205 Burnet Rd., Ste. 400
Austin, TX 78728
Ph: 512-255-8893
FAX: 512-255-0733

Cirrus Logic, Inc.
2500 W. Higgins Road, Ste. 1125
Hoffman, Estates, IL 60195
Ph: 847-884-6750
FAX: 847-884-6795

Sotheastern Area

Cirrus Logic, Inc..
5511 Capital Center Dr., Ste. 103
Raleigh, NC 27606
Ph: 919-859-5210
FAX: 919-859-5334

Cirrus Logic International
3998 NW 8th Ave., Ste. 300
Boca Raton, FL 33431
Ph: 561-395-1613
FAX: 561-395-1373

Northeastern Area

Cirrus Logic, Inc.
10 New England Business
Center, Ste. 100
Andover, MA 01810
Ph: 978-794-9992
FAX: 978-794-9998

Cirrus Logic, Inc.
10440 Little Patuxent Pkwy.,
Ste. 300
Columbia, MD 21044-3559
Ph: 410-740-5654
FAX: 410-740-6961

EUROPE

Cirrus Logic International SARL
Immeuble Andre Malraux
1 rue de Rome
F-93561 Rosny-sous-Bois
CEDEX, France
Ph: +33148122812
FAX: +33148122810

Cirrus Logic UK.
Anglers Court
4-5 Spittal St.
Marlow
Bucks, England SL7 1DB
Ph: +44(0)1628 472 211
FAX: +44(0)1628 486 114

Cirrus Logic GmbH
Muehlfelder-Strasse 2
D-82211 Herrsching, Germany
Ph: +49815292460
FAX: +498152924699

FAR EAST

China

Cirrus Logic International Ltd.
A-1403 Seg Paowah Bldg. No.
1016
Huaqiang N. Rd.
Shenzhen, China 518031
Ph: 86-755-3779537
FAX: 86-755-3779734

Hong Kong

Cirrus Logic International Ltd.
1203 Park Tower
15 Austin Rd., Tsimshatsui
Kowloon, Hong Kong
Ph: (852)2376-0801
FAX: (852)2375-1202

Korea

Cirrus Logic, Korea Co., Ltd.
Rm 1302 SangKyung
Bldg., 824-21 YeokSam-Dong,
Kang Nam-Ku,
Seoul, Korea
Ph: +82(2)565-8561
FAX: +82(2)565-8565

Singapore

Cirrus Logic International Ltd.
6 Kaki Bukit Ave. 1, Ste. 03-03
Singapore 417940
Ph: +65-743-4111
FAX: +65-742-4111

Taiwan

Cirrus Logic International Ltd.
Taiwan Branch
10F, No.214 Tun Hwa North Rd.
Taipei, Taiwan R.O.C.
Ph: +886(22)718-4533
FAX: +886(22)718-4526

JAPAN

Cirrus Logic K.K.
Shinjuku Green Tower,
Bldg. 26F
6-14-1 Nishi-Shinjuku,
Shinjuku-ku,
Tokyo, Japan 160
Ph: +81(03)3340-9111
FAX: +81(03)3340-9120



**CRYSTAL SEMICONDUCTOR
PRODUCTS DIVISION**

**PO BOX 17847
4210 S. INDUSTRIAL DRIVE
AUSTIN, TEXAS 78744
512.445.7222 / 800.888.5016
FAX: 512.445.7581**

**WORLDWIDE WEB:
<http://www.crystal.com>**