

# CS3011 CS3012

# Precision Low Voltage Amplifier; DC to 1 kHz

#### Features

- Low Offset: 10 μV Max
- Low Drift: 0.05  $\mu$ V/°C Max
- Low Noise
  - 12 nV/√Hz @ 1.0 Hz
  - 0.1 to 10 Hz = 250 nVp-p
  - 1/f corner @ 0.08 Hz
- Open-Loop Voltage Gain
  - 1000 Trillion Typ
  - 10 Billion Min
- Rail-to-Rail Output Swing
- 750 μA Supply Current
- Slew rate: 2 V/μs

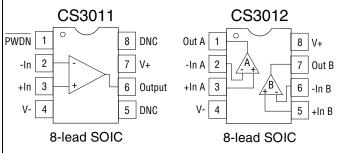
### Applications

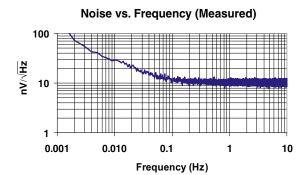
- Thermocouple/Thermopile Amplifiers
- Load Cell and Bridge Transducer Amplifiers
- Precision Instrumentation
- Battery-Powered Systems

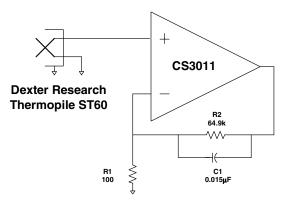
#### Description

The CS3011 single amplifier and the CS3012 dual amplifier are designed for precision amplification of low level signals and are ideally suited to applications that require very high closed loop gains. These amplifiers achieve excellent offset stability, super high open loop gain, and low noise over time and temperature. The devices also exhibit excellent CMRR and PSRR. The common mode input range includes the negative supply rail. The amplifiers operate with any total supply voltage from 2.7 V to 6.7 V ( $\pm$ 1.35 V to  $\pm$ 3.35 V).

# **Pin Configurations**







#### Thermopile Amplifier with a Gain of 650 V/V

Advanced Product Information

This document contains advanced information for a new product. Cirrus Logic reserves the right to modify this product without notice.



### 1. CHARACTERISTICS AND SPECIFICATIONS

### **1.1 ELECTRICAL CHARACTERISTICS**

V+ = +5 V, V- = 0V, VCM = 2.5 V (Note 1)

				CS3011/CS3012			
I	Parameter			Min	Тур	Max	Unit
Input Offset Voltage		(Note 2)	٠	-	-	±10	μV
Average Input Offset Drift		(Note 2)	٠	-	±0.01	±0.05	µV/ºC
Long Term Input Offset Voltage Stability				(Note 3	)		
Input Bias Current		T <sub>A</sub> = 25º C	٠	-	±50	±100 ±1000	рА
Input Offset Current		T <sub>A</sub> = 25º C	٠	-	±100	±200 ±2000	рА
Input Noise Voltage Density $R_S = 100 \Omega$ , $f_0 = 1 Hz$			-	12		nV/√Hz	
	$R_S = 100 \Omega$ , $f_0 = 1 \text{ kHz}$			-	12		nV/√Hz
Input Noise Voltage	0.1 to 10 Hz			-	250		nV <sub>p-p</sub>
Input Noise Current Densit	y f <sub>0</sub> = 1 Hz			-	2		pA√Hz
Input Noise Current	0.1 to 10 Hz			-	40		pA <sub>p-p</sub>
Input Common Mode Voltage Range		٠	-0.1	-	(V+)-1.25	V	
Common Mode Rejection	Ratio (dc)	(Note 4)	٠	115	120	-	dB
Power Supply Rejection Ratio		٠	120	136	-	dB	
Large Signal Voltage Gain	$R_L = 2 k\Omega$ to V+/2	(Note 5)	٠	200	300	-	dB
Output Voltage Swing	$R_L = 2 k\Omega$ to V+/2 $R_L = 100 k\Omega$ to V+/2	2	•	+4.7	- +4.99	-	V V
Slew Rate	R <sub>L</sub> = 2 k, 100 pF				2	-	V/µs
Overload Recovery Time			-	600	-	μs	
Supply Current per Amplifi PWDI	<u>e</u> r N active (CS3011 Only)	(Note 6)	•	-	0.75	1.0 15	mΑ μΑ
PWDN Threshold		(Note 6)	٠	(V+) -1.0			
Start-up Time		(Note 7)	•	-	9	12	ms

Notes: 1. Symbol "•" denotes specification applies over -40 to +85 ° C.

- 2. This parameter is guaranteed by design and laboratory characterization. Thermocouple effects prohibit accurate measurement of these parameters in automatic test systems.
- 3. 1000-hour life test data @ 125 °C indicates randomly distributed variation approximately equal to measurement repeatability of 1  $\mu$ V.
- 4. Measured within the specified common mode range limits.
- 5. Guaranteed within the output limits of (V+ -0.3 V) to (V- +0.3 V). Tested with proprietary production test method.
- 6.  $\overline{PWDN}$  input has an internal pullup resistor to V+ of approximately 800 k $\Omega$  and is the major source of current consumption when PWDN is pulled low.
- 7. The device has a controlled start-up behavior due to its complex open loop gain characteristics. Startup time applies to when supply voltage is applied or when PDWN is released.



#### 1.2 ABSOLUTE MAXIMUM RATINGS

Parameter	Min	Тур	Max	Unit
Supply Voltage [(V+) - (V-)]			6.8	V
Input Voltage	V0.3		V+ +0.3	V
Storage Temperature Range	-65		+150	°C

## 2. ORDERING INFORMATION

Part #	Temperature Range	Package Description
CS3011-IS	-40 °C to +85 °C	8-lead SOIC
CS3012-IS	-40 °C to +85 °C	8-lead SOIC

Note: Add the letter R to the Part # to order reels, 2000 pieces per reel.

#### 3. AVAILABILITY

#### Samples: November 1, 2002

## Production: December 1, 2002



#### **Contacting Cirrus Logic Support**

For all product questions and inquiries contact a Cirrus Logic Sales Representative. To find one nearest you go to <<u>http://www.cirrus.com/corporate/contacts/sales.cfm></u>

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