

CS3011 CS3012

Precision Low Voltage Amplifier; DC to 1 kHz

Features

- Low Offset: 10 μV Max
- Low Drift: 0.05 μ 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

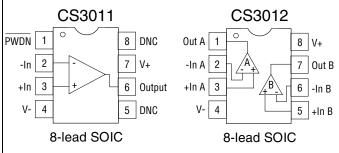
Applications

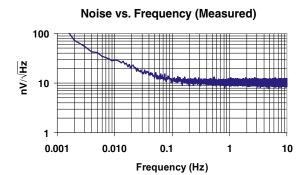
- Thermocouple/Thermopile Amplifiers
- Load Cell and Bridge Transducer Amplifiers
- Precision Instrumentation
- Battery-Powered Systems

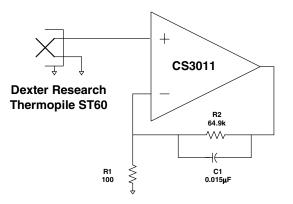
Description

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 _A = 25º C	٠	-	±50	±100 ±1000	рА
Input Offset Current		T _A = 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 _{p-p}
Input Noise Current Densit	y f ₀ = 1 Hz			-	2		pA√Hz
Input Noise Current	0.1 to 10 Hz			-	40		pA _{p-p}
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 _L = 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 μ 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 Ω 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>

IMPORTANT NOTICE

"Preliminary" product information describes products that are in production, but for which full characterization data is not yet available. "Advance" product information describes products that are in development and subject to development changes. Cirrus Logic, Inc. and its subsidiaries ("Cirrus") believe that the information contained in this document is accurate and reliable. However, the information is subject to change without notice and is provided "AS IS" without warranty of any kind (express or implied). Customers are advised to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability. No responsibility is assumed by Cirrus for the use of this information, including use of this information as the basis for manufacture or sale of any items, or for infringement of patents or other rights of third parties. This document is the property of Cirrus and by furnishing this information, Cirrus grants no license, express or implied under any patents, mask work rights, copyrights, trademarks, trade secrets or other intellectual property rights. Cirrus ones the copyrights of the information contained herein and gives consent for copies to be made of the information only for use within your organization with respect to Cirrus integrated circuits or other parts of Cirrus. This consent does not extend to other copying such as copying for general distribution, advertising or promotional purposes, or for creating any work for resale.

An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan. An export license and/or quota needs to be obtained from the competent authorities of the Chinese Government if any of the products or technologies described in this material is subject to the PRC Foreign Trade Law and is to be exported or taken out of the PRC.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). CIRRUS PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANT-ED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF CIRRUS PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

Cirrus Logic, Cirrus, and the Cirrus Logic logo designs are trademarks of Cirrus Logic, Inc. All other brand and product names in this document may be trademarks or service marks of their respective owners.