Dual Ultralow Distortion, Ultralow Noise Op Amp

Preliminary Technical Data

AD8599

FEATURES

Low noise: 1 nV/√Hz at 1kHz
Low distortion: -120 dB THD @ 20 kHz
< 50 nV p-p input noise, 0.1 Hz to 10 Hz
Slew rate: 15 V/µs
Wide bandwidth: 10 MHz
Supply current: 5 mA typ
Low Offset Voltage: < 100 µV max
CMRR: 120 dB
Unity-Gain Stable
±5V to ±15V Operation

APPLICATIONS

Professional audio preamplifiers
ATE / Precision Testers
Imaging systems
Medical / Physiological measurements
Precision detectors / instruments
Precision Data Conversion

PIN CONFIGURATIONS

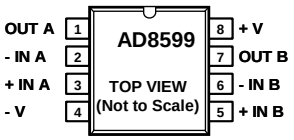


Figure 1. 8-Lead SOIC (R-8)

GENERAL DESCRIPTION

The AD8599 is a dual, very low noise, low distortion operational amplifier ideal for use as a preamplifier. The low noise of 1nV/√Hz and low harmonic distortion of -120 dB (or better) at audio bandwidths give the AD8599 the wide dynamic range necessary for preamps in audio, medical , and instrumentation applications. The AD8599's excellent slew rate of 15 V/ µs and 10 MHz gain bandwidth make it highly suitable for low frequency medical applications. The low distortion and settling time of the AD8599 make it ideas for buffering of high resolution data converters.

Rev. PrA

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700 **www.analog.com**
Fax: 781.461.3113

SPECIFICATIONS

V_{DD} = ±15 V and ±5 V, V_{CM}=0V, T_A = +25°C, unless otherwise noted

Table 1.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}				100	µV
		-40°C < T_A < +85°C			150	µV
		-40°C < T_A < +125°C			150	µV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	-40°C < T_A < +85°C			1	µV/°C
		-40°C < T_A < +125°C			1.5	µV/°C
Input Bias Current	I_B				100	nA
		-40°C < T_A < +85°C			300	nA
		-40°C < T_A < +125°C			300	nA
Input Offset Current	I_{OS}				tbd	
		-40°C < T_A < +85°C			tbd	
		-40°C < T_A < +125°C			tbd	
Input Voltage Range	V_{CM}	V_{DD} = ±15V	±11V			V
		V_{DD} = ±5V	±2.5			
Common-Mode Rejection Ratio	CMRR	-11V < V_{CM} < +11V	> 100	tbd		dB
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, V_O = -10V V to +10 V			tbd	V/mV
		-40°C < T_A < +85°C				
		-40°C < T_A < +125°C				
Input Capacitance	C_{DIFF}					pF
	C_{CM}					pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_{OUT} = 1 mA				V
		I_{OUT} = 10 mA				V
		-40°C < T_A < +85°C				V
		-40°C < T_A < +125°C				
Output Voltage Low	V_{OL}	I_{OUT} = 1 mA				mV
		I_{OUT} = 10 mA				mV
		-40°C < T_A < +85°C				mV
		-40°C < T_A < +125°C				
Output Current	I_{OUT}	Conditions				mA
Closed-Loop Output Impedance	Z_{OUT}	At 1MHz, A_V = +1				Ω
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_{DD} = ±15V to ±9V	120			dB
		-40°C < T_A < +85°C	120			
		-40°C < T_A < +125°C	120			
Supply Current per Amplifier	I_{SY}			5		mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 1 kΩ	10	15		V/µs
Settling Time	t_s	To 0.01%		tbd		µs
Gain Bandwidth Product	GBP			10		MHz

Phase Margin	ϕ_M		50	Degrees

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10 Hz		50		µV
Voltage Noise Density	e_n	f = 1 kHz		1		nV/√Hz
		f = 10 kHz		tbd		nV/√Hz
Current Noise		f = 1 kHz, 20 Ω		< 2pA		pA/√Hz
Total harmonic distortion + Noise	THD+N	G=1, R_L ≥1k Ω, f=250 kHz, V_{RMS} = 3 V, ±15V			-90	dB
		G=1, R_L ≥1k Ω, f=20 kHz, V_{RMS} = 3 V, ±15			-110	dB
Channel Separation	CS	f = 10 kHz?		-120		dB
		f = 100 kHz?		-120		dB

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage	6V
Input Voltage	GND to V_{DD}
Differential Input Voltage	±3V
Output Short-Circuit to GND	Indefinite
Storage Temperature Range	-65°C to +150°C
Operating Temperature Range	-40°C to +125°C
Lead Temperature Range (Soldering 60 sec)	300°C
Junction Temperature	150°C

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

THERMAL RESISTANCE

θ_{JA} is specified for the worst-case conditions, that is, a device soldered in a circuit board for surface-mount packages.

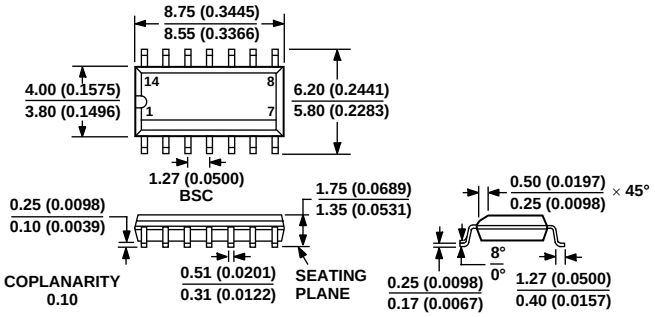
Table 3. Thermal Resistance

Package Type	θ_{JA}	θ_{JC}	Unit
14-Lead SOIC (R)	120	36	°C/W

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AB
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 2. 14-Lead Standard Small Outline Package [SOIC]
Narrow Body (R-14)
Dimensions shown in millimeters and (inches)

ORDERING GUIDE – DEVICE IN DEVELOPMENT

Model	Temperature Range	Package Description	Package Option

06274-0-6/06(PrA)