Single, Ultralow Distortion, Ultralow Noise Op Amp

Preliminary Technical Data

AD8597

FEATURES

Low noise: 1 nV/√Hz at 1 kHz
Low distortion: −105 dB THD @ 20 kHz
<80 nV p-p input noise, 0.1 Hz to 10 Hz
Slew rate: 16 V/µs
Wide bandwidth: 10 MHz
Supply current: 4.7 mA typical
Low offset voltage: 10 µV typical
CMRR: 120 dB
Unity-gain stable
±15 V operation

APPLICATIONS

Professional audio preamplifiers
ATE/precision testers
Imaging systems
Medical/physiological measurements
Precision detectors/instruments
Precision data conversion

PIN CONFIGURATION

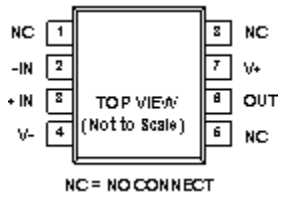

Figure 1. 8-Lead SOIC (R-8)

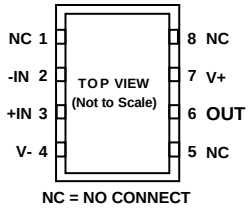

Figure 2. 8-LFCSP (3x3)(CP-8)

GENERAL DESCRIPTION

The AD8597 is a single, very low noise, low distortion operational amplifier ideal for use as a preamplifier. The low noise of 1 nV/√Hz and low harmonic distortion of −105 dB (or better) at audio bandwidths give the AD8597 the wide dynamic range necessary for preamps in audio, medical, and instrumentation applications. The AD8597's excellent slew rate of 16 V/µs and 10 MHz gain bandwidth make it highly suitable for medical applications. The low distortion and settling time of the AD8597 make it ideal for buffering of high resolution data converters.

The AD8597 is available in an 8-Lead SOIC and 8-Lead LFCSP (3x3) packages and is specified over a −40°C to +125°C temperature range.

Rev. PrA

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SPECIFICATIONS

V_S = ±15 V, V_{CM} = 0 V, V_O = 0 V, T_A = +25°C, unless otherwise specified.

Table 1.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			10	120	µV
		−40°C ≤ T_A ≤ +125°C			180	µV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	−40°C ≤ T_A ≤ +125°C		0.8	2.2	µV/°C
Input Bias Current	I_B			25	180	nA
		−40°C ≤ T_A ≤ +125°C			300	nA
Input Offset Current	I_{OS}			25	180	nA
		−40°C ≤ T_A ≤ +125°C			220	nA
Input Voltage Range	IVR	V_{DD} = ±15 V	−12.5		+12.5	V
Common-Mode Rejection Ratio	CMRR	−12.5 V ≤ V_{CM} ≤ +12.5 V	120	140		dB
		−40°C ≤ T_A ≤ +125°C	115			dB
Large Signal Voltage Gain	A_{VO}	R_L ≥ 600 Ω, V_O = −11 V to +11 V	110	116		dB
		−40°C ≤ T_A ≤ +125°C	106			dB
Input Capacitance	C_{DIFF}			4.8		pf
	C_{CM}			4.5		pf
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	R_L = 600 Ω	13.1	13.4		V
		−40°C ≤ T_A ≤ +125°C	12.8			V
		R_L = 2 kΩ	13.5	13.7		V
		−40°C ≤ T_A ≤ +125°C	13.2			V
Output Voltage Low	V_{OL}	R_L = 600 Ω		−13.2	−12.9	V
		−40°C ≤ T_A ≤ +125°C			−12.8	V
		R_L = 2 kΩ		−13.5	−13.4	V
		−40°C ≤ T_A ≤ +125°C			−13.3	V
Output Short Circuit Current	I_{SC}			±52		mA
Closed-Loop Output Impedance	Z_{OUT}	At 1 MHz, A_V = 1		5		Ω
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_{DD} = ±18 V to ±4.5 V	120	140		dB
		−40°C ≤ T_A ≤ +125°C	118			dB
Supply Current per Amplifier	I_{SY}			4.7	5.7	mA
		−40°C ≤ T_A ≤ +125°C			6.75	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	A_V = −1, R_L = 2 kΩ		16.8		V/µs
		A_V = 1, R_L = 2 kΩ		15		V/µs
Settling Time	t_s	To 0.01%, step = 10 V		2		µs
Gain Bandwidth Product	GBP			10		MHz
Phase Margin	ϕ_M			68		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10 Hz		76		nV
Voltage Noise Density	e_n	f = 1 kHz		1.07	1.15	nV/√Hz
		f = 10 Hz			1.5	nV/√Hz
Current Noise		f = 1 kHz		1.5		pA/√Hz
Total Harmonic Distortion + Noise	THD + N	G = 1, R_L ≥ 1 kΩ, f = 1 kHz, V_{RMS} = 3 V		−108		dB
		G = 1, R_L ≥ 1 kΩ, f = 20 kHz, V_{RMS} = 3 V		−105		dB

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage	±18 V
Input Voltage	GND to V_{DD}
Differential Input Voltage	±1 V
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
8-Lead LFCSP (CP-8)	TBD	TBD	°C/W
8-Lead SOIC (R-8)	120	36	°C/W

POWER SEQUENCING

The op amp supplies must be established simultaneously with, or before, any input signals are applied.

If this is not possible, the input current must be limited to 10 mA.

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.