

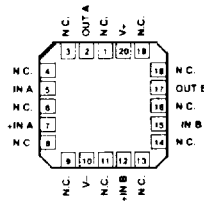
OP270

FEATURES

Very Low Noise: $5 \text{ nV}/\sqrt{\text{Hz}}$ @ 1 kHz max
Excellent Input Offset Voltage: $75 \mu\text{V}$ max
Low Offset Voltage Drift: $1 \mu\text{V}/^\circ\text{C}$ max
Very High Gain: 1500 V/mV min
Outstanding CMR: 106 dB min
Slew Rate: $2.4 \text{ V}/\mu\text{s}$ typ
Gain-Bandwidth Product: 5 MHz typ
Industry Standard 8-Pin Dual Pinout
Available In Die Form

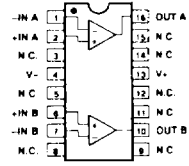
PIN CONFIGURATIONS

20-Pin LCC (RC Suffix)



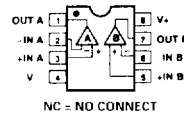
NC = NO CONNECT

16-Pin SOL (S Suffix)



NC = NO CONNECT

Epoxy Mini-DIP (P Suffix)
8-Pin Hermetic DIP (Z Suffix)



NC = NO CONNECT

GENERAL DESCRIPTION

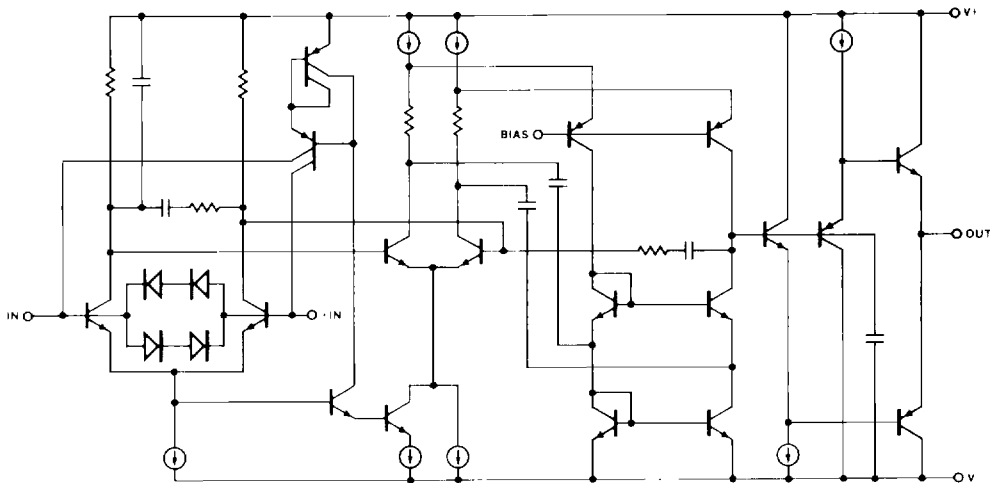
The OP270 is a high performance monolithic dual operational amplifier with exceptionally low voltage noise, $5 \text{ nV}/\sqrt{\text{Hz}}$ at 1 kHz max, offering comparable performance to PMI's industry standard OP27.

The OP270 features an input offset voltage below $75 \mu\text{V}$ and an offset drift under $1 \mu\text{V}/^\circ\text{C}$, guaranteed over the full military temperature range. Open-loop gain of the OP270 is over 1,500,000 into a $10 \text{ k}\Omega$ load ensuring excellent gain accuracy and linearity, even in high gain applications. Input bias current is under 20 nA which reduces errors due to signal source resistance. The OP270's CMR of over 106 dB and PSRR of less than $3.2 \mu\text{V}/\text{V}$ significantly reduce errors due to ground noise and power supply fluctuations. Power consumption of the dual OP270 is one-third less than two OP27s, a significant advantage for power conscious applications. The OP270 is unity-gain stable with a gain-bandwidth product of 5 MHz and a slew rate of $2.4 \text{ V}/\mu\text{s}$.

The OP270 offers excellent amplifier matching which is important for applications such as multiple gain blocks, low noise instrumentation amplifiers, dual buffers, and low noise active filters.

The OP270 conforms to the industry standard 8-pin DIP pin-out. It is pin compatible with the MC1458/1558, SE5532/A, RM4558 and HA5102 dual op amps and can be used to upgrade systems using these devices.

For higher speed applications the OP271, with a slew rate of $8 \text{ V}/\mu\text{s}$, is recommended. For a quad op amp, see the OP470.



Simplified Schematic (One of Two Amplifiers Is Shown)

To obtain the most recent version or complete data sheet, call our fax retrieval system at 1-800-446-6212 or visit our World Wide Web site at <http://www.analog.com>.

OP270—SPECIFICATIONS

ELECTRICAL CHARACTERISTICS (@ $V_S = \pm 15$ V, $T_A = +25^\circ\text{C}$, unless otherwise noted.)

Parameter	Symbol	Conditions	Min			Typ			Max			Units
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V_{OS}		10	75		20	150		50	250	μV	
Input Offset Current	I_{OS}	$V_{CM} = 0$ V	1	10		3	15		5	20	nA	
Input Bias Current	I_B	$V_{CM} = 0$ V	5	20		10	40		15	60	nA	
Input Noise Voltage	e_n p-p	0.1 Hz to 10 Hz ¹	80	200		80	200		80		nV p-p	
Input Noise Voltage Density	e_n	$f_0 = 10$ Hz ²	3.6	6.5		3.6	6.5		3.6		nV/ $\sqrt{\text{Hz}}$	
		$f_0 = 100$ Hz ²	3.2	5.5		3.2	5.5		3.2		nV/ $\sqrt{\text{Hz}}$	
		$f_0 = 1$ kHz ²	3.2	5.0		3.2	5.0		3.2		nV/ $\sqrt{\text{Hz}}$	
Input Noise Current Density	i_n	$f_0 = 10$ Hz	1.1			1.1			1.1		pA/ $\sqrt{\text{Hz}}$	
		$f_0 = 100$ Hz	0.7			0.7			0.7		pA/ $\sqrt{\text{Hz}}$	
		$f_0 = 1$ kHz	0.6			0.6			0.6		pA/ $\sqrt{\text{Hz}}$	
Large-Signal Voltage Gain	A_{VO}	$V_O = \pm 10$ V									V/mV	
		$R_L = 10$ k Ω	1500	2300		1000	1700		750	1500		V/mV
		$R_L = 2$ k Ω	750	1200		500	900		350	700		V/mV
Input Voltage Range	IVR	(Note 3)	± 12	± 12.5		± 12	± 12.5		± 12	± 12.5	V	
Output Voltage Swing	V_O	$R_L \geq 2$ k Ω	± 12	± 13.5		± 12	± 13.5		± 12	± 13.5	V	
Common-Mode Rejection	CMR	$V_{CM} = \pm 11$ V	106	125		100	120		90	110	dB	
Power Supply Rejection Ratio	PSRR	$V_S = \pm 4.5$ V to ± 18 V		0.56	3.2		1.0	5.6		1.5	6	$\mu\text{V/V}$
Slew Rate	SR		1.7	2.4		1.7	2.4		1.7	2.4	V/ μs	

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS¹

Supply Voltage	± 18 V
Differential Input Voltage ²	± 1.0 V
Differential Input Current ²	± 25 mA
Input Voltage	Supply Voltage
Output Short-Circuit Duration	Continuous
Storage Temperature Range	
P, RC, S, Z Package	65°C to $+150^\circ\text{C}$
Lead Temperature Range (Soldering, 60 sec)	$+300^\circ\text{C}$
Junction Temperature (T_J)	65°C to $+150^\circ\text{C}$
Operating Temperature Range	
OP270A	-55°C to $+125^\circ\text{C}$
OP270E, OP270F, OP270G	-40°C to $+85^\circ\text{C}$

Package Type	θ_{JA} ³	θ_{JC}	Units
8-Pin Hermetic DIP (Z)	134	12	$^\circ\text{C/W}$
8-Pin Plastic DIP (P)	96	37	$^\circ\text{C/W}$
20-Contact LCC (RC)	88	33	$^\circ\text{C/W}$
16-Pin SOL (S)	92	27	$^\circ\text{C/W}$

NOTES

¹Absolute maximum ratings apply to both DICE and packaged parts, unless otherwise noted.

²The OP270's inputs are protected by back-to-back diodes. Current limiting resistors are not used in order to achieve low noise performance. If differential voltage exceeds ± 10 V, the input current should be limited to ± 25 mA.

³ θ_{JA} is specified for worst case mounting conditions, i.e., θ_{JA} is specified for device in socket for cerdip, plastic DIP, and LCC packages; θ_{JA} is specified for device soldered to printed circuit board for SOL package.

ORDERING GUIDE

Model	V_{OS} max ($T_A = +25^\circ\text{C}$)	Temperature Range	Package Option ¹
OP270AZ ²	75 μV	-55°C to $+125^\circ\text{C}$	Q-8
OP270EZ	75 μV	-40°C to $+85^\circ\text{C}$	Q-8
OP270FZ	150 μV	-40°C to $+85^\circ\text{C}$	Q-8
OP270GP	250 μV	-40°C to $+85^\circ\text{C}$	N-16
OP270GS	250 μV	-40°C to $+85^\circ\text{C}$	R-16
OP207GS-REEL	250 μV	-40°C to $+85^\circ\text{C}$	R-16
OP270ARC/883C	75 μV	55°C to $+125^\circ\text{C}$	E-20A

NOTES

¹For outline information see Package Information section.

²For devices processed in total compliance to MIL-STD-883, add '883 after part number. Consult factory for 883 data sheet.