

### FEATURES

**With no external resistors:**

- Difference Amplifier: Gains: 0.5, 1, 2**
- Inverting Amplifier: Gains: 0.5, 1, 2**
- Noninverting Amplifier: Gains: 1.5, 2, 3**
- Set reference voltage at 0, +Vs/2, or +Vs**

**Excellent AC Specifications**

- 10 MHz bandwidth**
- 30V/ $\mu$ s slew rate**

**Low Distortion**

- 90 dBc @ 100 kHz, 20Vpp, 600  $\Omega$  load**

**High Accuracy DC Performance**

- 0.05% gain accuracy**
- 10 ppm gain drift**
- 400  $\mu$ V offset voltage**
- 80 dB CMRR**

**Two channels in small 4 mm  $\times$  4 mm LFCSP**

**Supply current: 2.5 mA per channel**

**Supply range:  $\pm$ 2.5 V to  $\pm$ 18 V**

### APPLICATIONS

- Instrumentation Amplifier Building Block**
- Level Translator**
- Automatic Test Equipment**
- High Performance Audio**
- Sin/Cos Encoders**

### GENERAL DESCRIPTION

The AD8270 is a low distortion, dual-channel amplifier with internal gain setting resistors. With no external components, it can be configured as a high performance difference amplifier ( $G=0.5, 1, \text{ or } 2$ ), inverting amplifier ( $G=0.5, 1, \text{ or } 2$ ) or non-inverting amplifier ( $G=1.5, 2, \text{ or } 3$ ).

### FUNCTIONAL BLOCK DIAGRAM

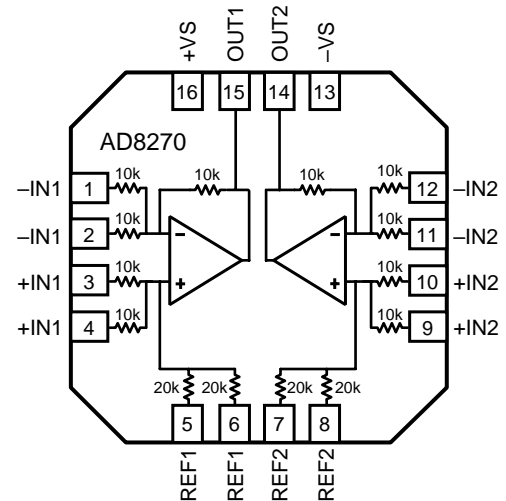


Figure 1. AD8270 Dual Difference Amplifier

Table 1. Difference Amplifiers by Category

Low Distortion	High Voltage	Single Supply Uni-directional	Single Supply Bi-directional
AD8270	AD628	AD8202	AD8205
AD8273	AD629	AD8203	AD8206
AMP03	AD8212		AD8210

The AD8270 is the first dual difference amplifier in the small 4 mm  $\times$  4mm LFCSP. It requires the same board area as a typical single difference amplifier. The smaller package allows a 2X increase in channel density and a lower cost per channel, all with no compromise in performance.

The AD8270 operates on both single and dual supplies and only requires 2.5 mA maximum supply current for both amplifiers. It is specified over the industrial temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  and is fully RoHS compliant.

Rev. PrA

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## SPECIFICATIONS

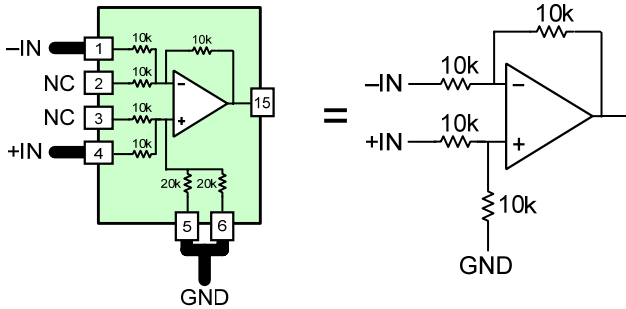
$V_S = \pm 15\text{ V}$ ,  $V_{REF} = 0\text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $G = 1$ ,  $R_L = 2\text{ k}\Omega$ , unless otherwise noted.

Table 2.

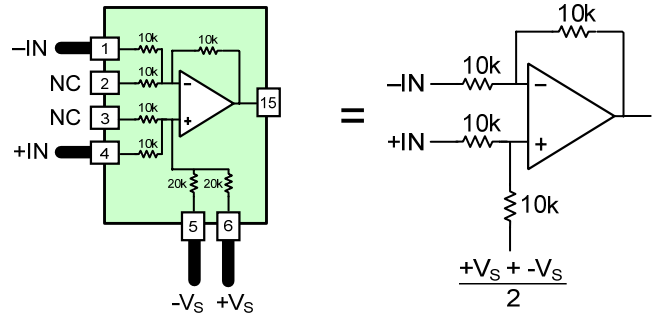
Parameter	Conditions	G = 1/2			G = 1			G = 2			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
DYNAMIC PERFORMANCE											
Bandwidth			15		10		5			MHz	
Slew Rate			30		30		30			V/ $\mu\text{s}$	
Settling Time to 0.01%	10V Step on output		700		800		850			ns	
Settling Time to 0.001%	10V Step on output		800		900		950			ns	
NOISE/DISTORTION											
Harmonic Distortion	f = 1 kHz, $V_{OUT} = 20\text{ Vpp}$		100		100		100			dBc	
	f = 10 kHz, $V_{OUT} = 20\text{ Vpp}$		100		100		100			dBc	
	f = 100 kHz, $V_{OUT} = 20\text{ Vpp}$		90		90		90			dBc	
Output Voltage Noise (referred to input)	f = 0.1 Hz to 10 Hz									$\mu\text{V p-p}$	
	f = 1 kHz		45		30		16			nV/ $\sqrt{\text{Hz}}$	
GAIN											
Gain Error				0.05		0.05			0.05	%	
Gain Drift		1	10		1	10		1	10	ppm/ $^\circ\text{C}$	
Gain Nonlinearity		10	40		10	40		10	40	ppm	
INPUT CHARACTERISTICS											
Offset			100	400		100	400		100	400	$\mu\text{V}$
Overtemperature Drift			2	8		2	8		2	8	$\mu\text{V}/^\circ\text{C}$
Common Mode Rejection Ratio	DC to 10 kHz	74	94		80	100		86	106		dB
Power Supply Rejection Ratio	DC to 10 kHz										dB
Input Voltage Range		-15.4		15.4	-15.4		15.4	-15.4		15.4	V
Impedance											
Differential			20		20		10		10		k $\Omega$
Common Mode			7.5		10		7.5		7.5		k $\Omega$
OUTPUT CHARACTERISTICS											
Output Swing	$-40^\circ\text{C} < T_A < 85^\circ\text{C}$	-13.5			-13.5			-13.5			V
		-13			-13			-13			V
Short circuit current limit			60		60		60		60		mA
POWER SUPPLY											
Supply Current (per Amplifier)		2.5	3		2.5	3		2.5	3		mA
	$-40^\circ\text{C} < T_A < 85^\circ\text{C}$	3	4		3	4		3	4		mA

# Preliminary Technical Data

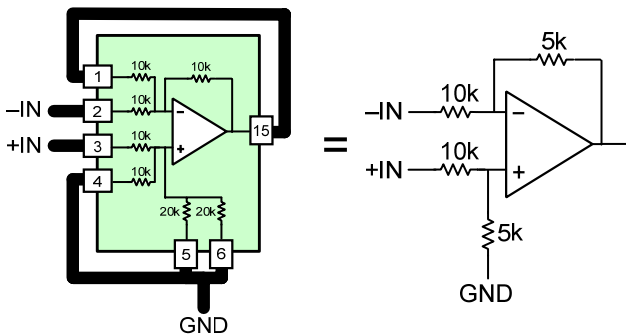
**GAIN = 1**  
referenced to ground



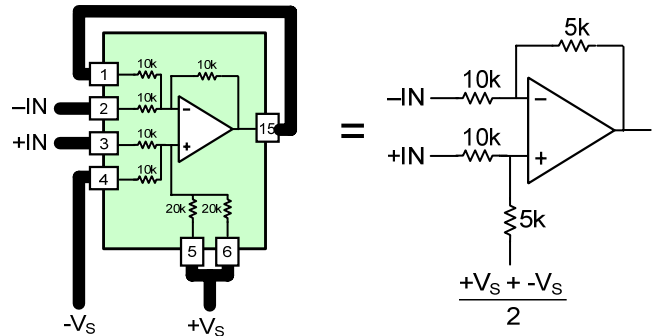
**GAIN = 1**  
referenced to mid-supply



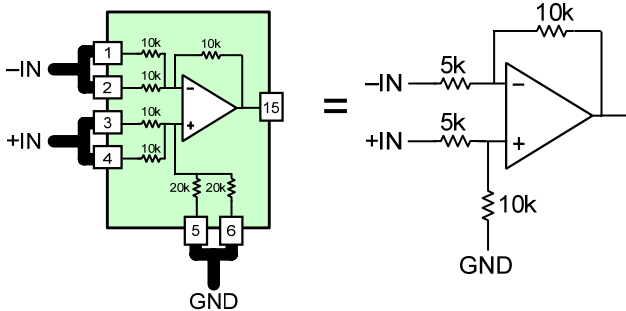
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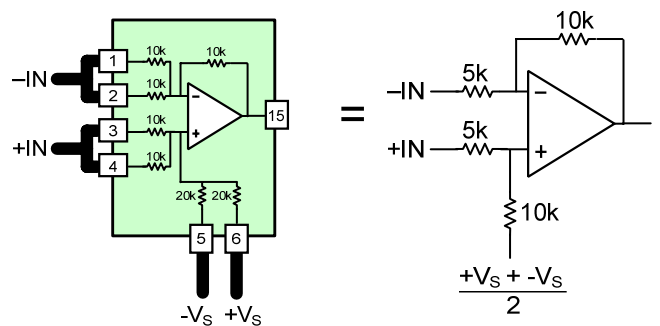
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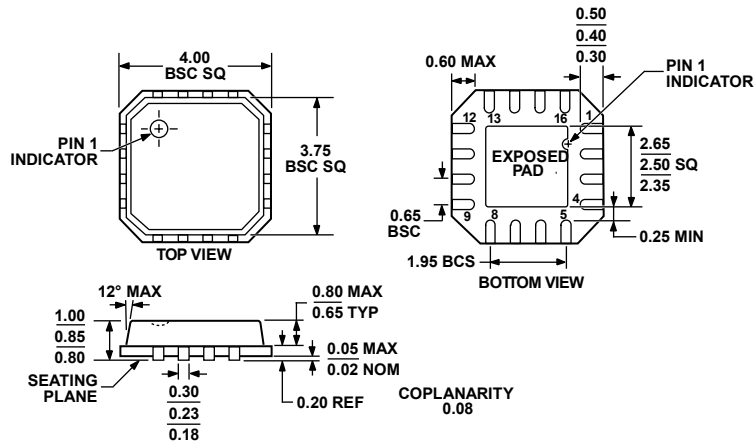
**GAIN = 2**  
referenced to ground



**GAIN = 2**  
referenced to mid-supply



OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MO-220-VGGC.

Figure 2. 16-Lead Lead Frame Chip Scale Package [LFCSP\_VQ]  
 4 mm × 4 mm Body, Very Thin Quad  
 (CP-16-13)

Dimensions are shown in millimeters

031006-A