

### FEATURES

- ±600 V dc common-mode voltage range
- Rail-to-rail output
- Fixed gain of 1
- Wide power supply operating voltage range of ±2.5 V to ±18 V
- 550 μA typical power supply current
- Excellent ac specifications
  - 80 dB minimum CMRR
  - 130 kHz small signal –3 dB bandwidth
- High accuracy dc performance
  - 10 ppm maximum gain nonlinearity
  - 15 μV/°C maximum offset voltage drift
  - 5 ppm/°C maximum gain drift

### ENHANCED PRODUCT FEATURES

- Supports defense and aerospace applications (AQEC standard)
- Military temperature range (–55°C to +125°C)
- Controlled manufacturing baseline
- One assembly/test site
- One fabrication site
- Product change notification
- Qualification data available on request

### APPLICATIONS

- Avionics
- Unmanned systems
- High voltage current sensing
- Motor controls
- Isolation

### GENERAL DESCRIPTION

The AD8479-EP is a difference amplifier with a very high input common-mode voltage ( $V_{CM}$ ) range. The AD8479-EP is a precision device that allows the user to accurately measure differential signals in the presence of high  $V_{CM}$  up to ±600 V dc.

The AD8479-EP can replace costly isolation amplifiers in applications that do not require galvanic isolation. The device operates over a ±600 V dc  $V_{CM}$  range and has inputs that are protected from common-mode or differential mode transients up to ±600 V.

The AD8479-EP has low offset voltage, low offset voltage drift, low gain drift, low common-mode rejection drift, and excellent common-mode rejection ratio (CMRR) over a wide frequency range.

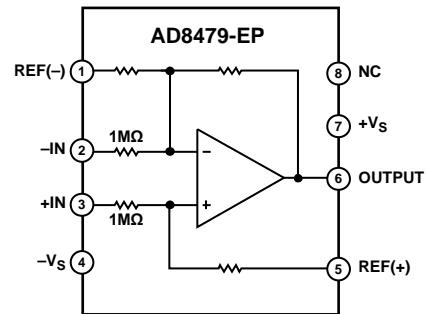
The AD8479-EP is available in a space-saving 8-lead SOIC package and is operational over the –55°C to +125°C temperature range.

Rev. 0

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### FUNCTIONAL BLOCK DIAGRAM



NOTES  
1. NC = NO CONNECT. DO NOT CONNECT TO THIS PIN.

Figure 1.

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Additional application and technical information can be found in the [AD8479](#) data sheet.

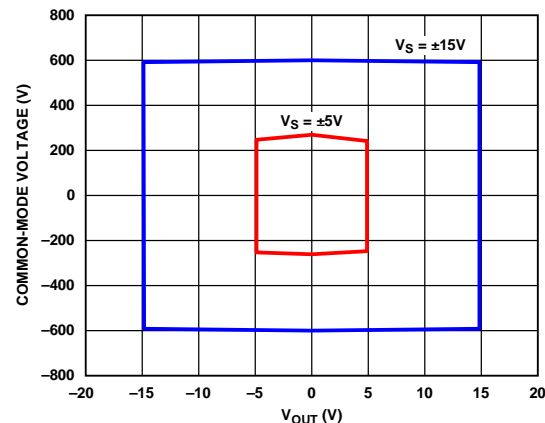


Figure 2. Input Common-Mode Voltage vs. Output Voltage ( $V_{out}$ )

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**REVISION HISTORY**

6/2019—Revision 0: Initial Version

## SPECIFICATIONS

Supply voltage ( $V_S$ ) =  $\pm 15$  V, REF(-) = REF(+) = 0 V, load resistor ( $R_L$ ) = 2 k $\Omega$ , and  $T_A$  = 25°C, unless otherwise noted.

Table 1.

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
<b>GAIN</b>					
Nominal Gain	$V_{OUT} = \pm 10$ V, $R_L = 2$ k $\Omega$		1		V/V
Gain Error			0.01	0.02	%
Gain Nonlinearity			4	10	ppm
Gain Drift	$T_A = T_{MIN}$ to $T_{MAX}$		3	5	ppm/°C
<b>OFFSET VOLTAGE</b>					
Offset Voltage	$V_S = \pm 15$ V		0.5	3	mV
	$V_S = \pm 5$ V		0.5	3	mV
Offset Voltage Drift	$T_A = T_{MIN}$ to $T_{MAX}$		3	15	$\mu$ V/°C
Power Supply Rejection Ratio (PSRR)	$V_S = \pm 2.5$ V to $\pm 15$ V	84	100		dB
<b>INPUT</b>					
Common-Mode Rejection Ratio (CMRR)	$V_{CM} = \pm 600$ V dc				
	$T_A = 25^\circ\text{C}$	80	90		dB
	$T_A = T_{MIN}$ to $T_{MAX}$	80			dB
	$V_{CM} = 1200$ V p-p, dc to 12 kHz	80			dB
Operating Voltage Range	Common-mode			$\pm 600$	V
	Differential			$\pm 14.7$	V
Input Operating Impedance	Common-mode		500		k $\Omega$
	Differential		2		M $\Omega$
<b>OUTPUT</b>					
Output Voltage Swing	$R_L = 2$ k $\Omega$	$-V_S + 0.3$		$+V_S - 0.3$	V
Output Short-Circuit Current			$\pm 55$		mA
Capacitive Load	Stable operation		500		pF
<b>DYNAMIC RESPONSE</b>					
Small Signal -3 dB Bandwidth			130		kHz
Slew Rate			9	9.3	V/ $\mu$ s
Full Power Bandwidth	$V_{OUT} = 20$ V p-p		100		kHz
Settling Time	0.01%, $V_{OUT} = 10$ V step		11		$\mu$ s
	0.001%, $V_{CM} = 10$ V step		15.4		$\mu$ s
<b>OUTPUT VOLTAGE NOISE</b>					
0.01 Hz to 10 Hz			30	35	$\mu$ V p-p
Noise Spectral Density	Frequency $\geq 100$ Hz		1.6		$\mu$ V/ $\sqrt{\text{Hz}}$
<b>POWER SUPPLY</b>					
Operating Voltage Range		$\pm 2.5$		$\pm 18$	V
Supply Current	$V_{OUT} = 0$ V		550	650	$\mu$ A
	$T_A = T_{MIN}$ to $T_{MAX}$		850		$\mu$ A
<b>TEMPERATURE</b>					
Operating Range ( $T_{MIN}$ to $T_{MAX}$ )		-55		+125	°C

## ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
$V_S$	$\pm 18\text{ V}$
Input Voltage Range	
Continuous	$\pm 600\text{ V}$
Common-Mode and Differential, 10 sec	$\pm 900\text{ V}$
Output Short-Circuit Duration	Indefinite
REF(-) and REF(+)	$-V_S - 0.3\text{ V}$ to $+V_S + 0.3\text{ V}$
Maximum Junction Temperature	$150^\circ\text{C}$
Operating Temperature Range	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Storage Temperature Range	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Lead Temperature (Soldering, 60 sec)	$300^\circ\text{C}$

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

## THERMAL RESISTANCE

Thermal performance is directly linked to printed circuit board (PCB) design and operating environment. Careful attention to PCB thermal design is required.

$\theta_{JA}$  is the natural convection, junction to ambient thermal resistance measured in a one cubic foot sealed enclosure.

$\theta_{JC}$  is the junction to case thermal resistance.

Table 3. Thermal Resistance

Package Type	$\theta_{JA}^1$	$\theta_{JC}^2$	Unit
R-8	122	87	$^\circ\text{C}/\text{W}$

<sup>1</sup> Thermal impedance simulated values are based on JEDEC 2S2P thermal test board. See JEDEC JESD-51.

<sup>2</sup> Thermal impedance simulated values are based on JEDEC 1S0P thermal test board. See JEDEC JESD51.

## 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.

## PIN CONFIGURATION AND FUNCTION DESCRIPTIONS



### NOTES

1. NC = NO CONNECT. DO NOT CONNECT TO THIS PIN.

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Figure 3. Pin Configuration

Table 4. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	REF(-)	Negative Reference Voltage Input.
2	-IN	Inverting Input.
3	+IN	Noninverting Input.
4	-Vs	Negative Supply Voltage.
5	REF(+)	Positive Reference Voltage Input.
6	OUTPUT	Output.
7	+Vs	Positive Supply Voltage.
8	NC	No Connect. Do not connect to this pin.

# TYPICAL PERFORMANCE CHARACTERISTICS

$V_S = \pm 15\text{ V}$ , unless otherwise noted.

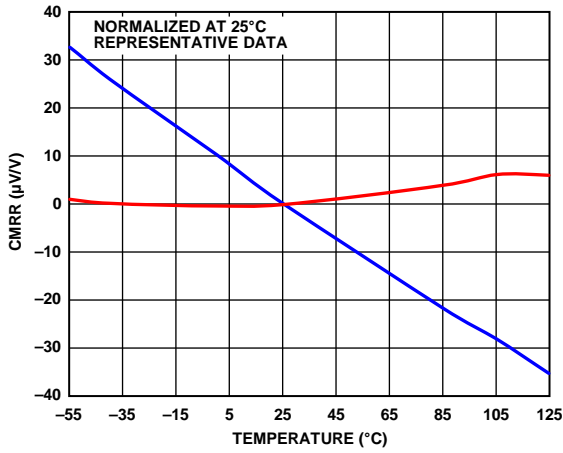


Figure 4. CMRR vs. Temperature,  $V_{CM} = \pm 20\text{ V}$

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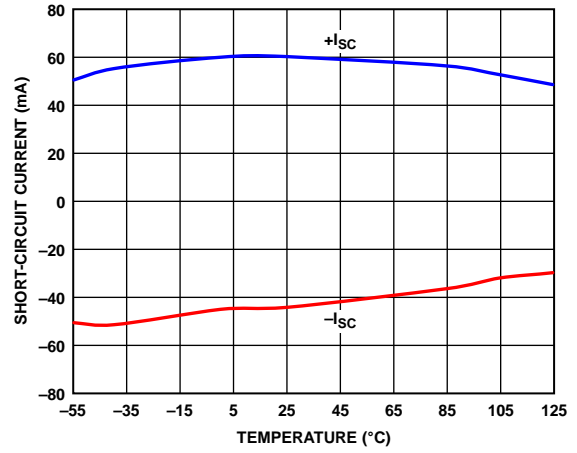


Figure 7. Short-Circuit Current ( $\pm I_{sc}$ ) vs. Temperature

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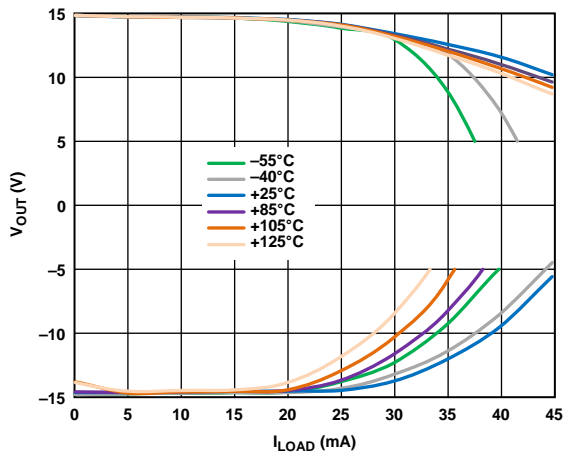


Figure 5.  $V_{OUT}$  vs. Output Current ( $I_{LOAD}$ ) at Various Temperatures

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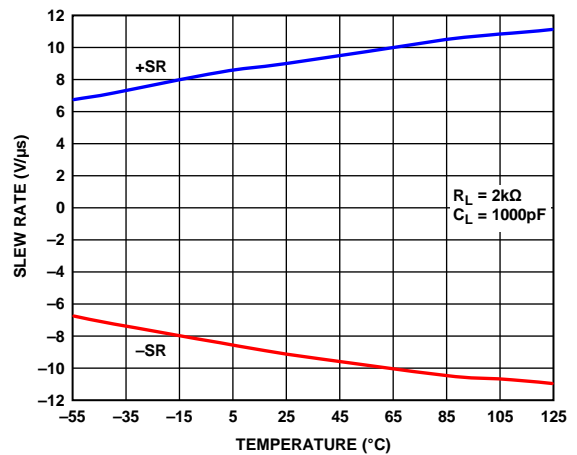


Figure 8. Slew Rate ( $\pm SR$ ) vs. Temperature

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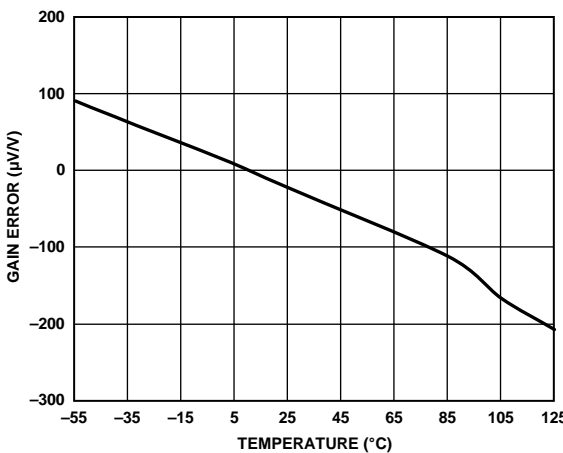


Figure 6. Gain Error vs. Temperature

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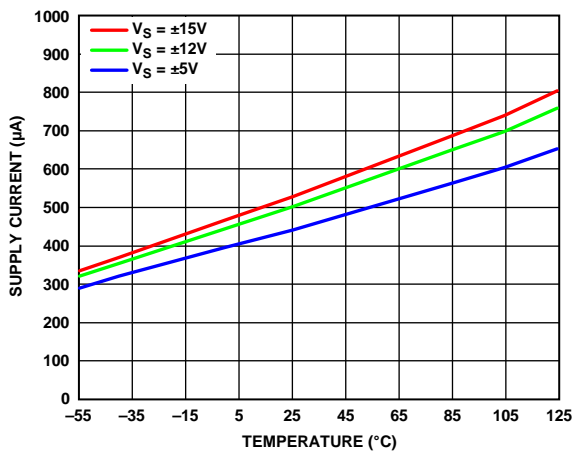


Figure 9. Supply Current vs. Temperature

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