ANALOG DEVICES

Data Sheet

AD8047/AD8048

250 MHz, General Purpose Voltage Feedback Op Amps

FEATURES

- Wide Bandwidth
  - AD8047, G = +1
    - Small Signal 250 MHz
    - Large Signal (2 V p-p) 130 MHz
  - AD8048, G = +2
    - Small Signal 260 MHz
    - Large Signal (2 V p-p) 160 MHz
- 5.8 mA Typical Supply Current
- Low Distortion, (SFDR) Low Noise
  - –66 dBc Typ @ 5 MHz
  - –54 dBc Typ @ 20 MHz
  - 5.2 nV/√Hz (AD8047), 3.8 nV/√Hz (AD8048) Noise
- Drives 50 pF Capacitive Load
- High Speed
  - Slew Rate 750 V/μs (AD8047), 1000 V/μs (AD8048)
  - Settling 30 ns to 0.01%, 2 V Step
- ±3 V to ±6 V Supply Operation

APPLICATIONS

- Low Power ADC Input Driver
- Differential Amplifiers
- IF/RF Amplifiers
- Pulse Amplifiers
- Professional Video
- DAC Current to Voltage Conversion
- Baseband and Video Communications
- Pin Diode Receivers
- Active Filters/Integrators

TYPICAL APPLICATION CIRCUIT

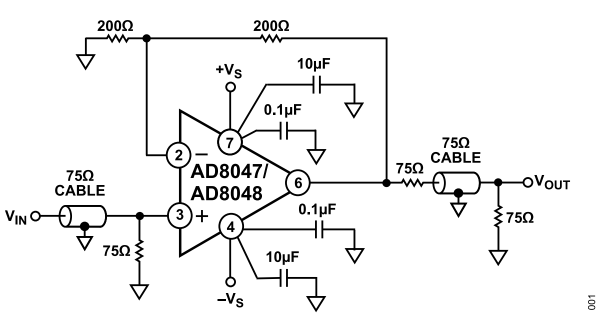

Figure 1. Video Line Driver

GENERAL DESCRIPTION

The AD8047 and AD8048 are very high speed and wide bandwidth amplifiers. The AD8047 is unity gain stable. The AD8048 is stable at gains of two or greater. The AD8047 and AD8048, which utilize a voltage feedback architecture, meet the requirements of many applications that previously depended on current feedback amplifiers.

A proprietary circuit has produced an amplifier that combines many of the best characteristics of both current feedback and voltage feedback amplifiers. For the power (6.6 mA max), the AD8047 and AD8048 exhibit fast and accurate pulse response (30 ns to 0.01%) as well as extremely wide small signal and large signal bandwidth and low distortion. The AD8047 achieves –54 dBc distortion at 20 MHz, 250 MHz small signal, and 130 MHz large signal bandwidths.

The AD8047 and AD8048's low distortion and cap load drive make the AD8047/AD8048 ideal for buffering high speed ADCs. They are suitable for 12-bit/10 MSPS or 8-bit/60 MSPS ADCs. Additionally, the balanced high impedance inputs of the voltage feedback architecture allow maximum flexibility when designing active filters.

The AD8047 and AD8048 are offered in industrial (–40°C to +85°C) temperature ranges and are available in 8-lead PDIP and SOIC packages.

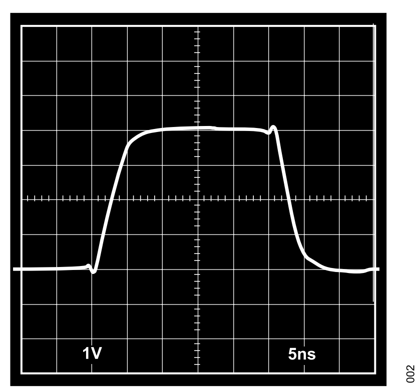

Figure 2. AD8047 Large Signal Transient Response, V_O = 4 V p-p, G = +1

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3/2026—Rev. A to Rev. B

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SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

$\pm V_S$ = ±5 V, R_{LOAD} = 100 Ω, A_V = 1 (AD8047), A_V = 2 (AD8048), unless otherwise noted.

Table 1.

		AD8047A			AD8048A			
Parameter	Conditions	Min	Typ	Max	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE								
–3 dB Bandwidth								
Small Signal	V_{OUT} ≤ 0.4 V p-p	170	250		180	260		MHz
Large Signal[1]	V_{OUT} = 2 V p-p	100	130		135	160		MHz
Bandwidth for 0.1 dB Flatness	V_{OUT} = 300 mV p-p							
	AD8047, R_F = 0 Ω;							
	AD8048, R_F = 200 Ω		35			50		MHz
Slew Rate, Average +/–	V_{OUT} = 4 V Step	475	750		740	1000		V/µs
Rise/Fall Time	V_{OUT} = 0.5 V Step		1.1			1.2		ns
	V_{OUT} = 4 V Step		4.3			3.2		ns
Settling Time								
To 0.1%	V_{OUT} = 2 V Step		13			13		ns
To 0.01%	V_{OUT} = 2 V Step		30			30		ns
NOISE/HARMONIC PERFORMANCE								
Second Harmonic Distortion	2 V p-p; 20 MHz		–54			–48		dBc
	R_L = 1 kΩ		–64			–60		dBc
Third Harmonic Distortion	2 V p-p; 20 MHz		–60			–56		dBc
	R_L = 1 kΩ		–61			–65		dBc
Input Voltage Noise	f = 100 kHz		5.2			3.8		nV/√Hz
Input Current Noise	f = 100 kHz		1.0			1.0		pA/√Hz
Average Equivalent Integrated								
Input Noise Voltage	0.1 MHz to 10 MHz		16			11		µV rms
Differential Gain Error (3.58 MHz)	R_L = 150 Ω, G = +2		0.02			0.01		%
Differential Phase Error (3.58 MHz)	R_L = 150 Ω, G = +2		0.03			0.02		Degree
DC PERFORMANCE[2]	R_L = 150 Ω							
Input Offset Voltage[3]			1	3		1	3	mV
	T_{MIN} to T_{MAX}			4			4	mV
Offset Voltage Drift			±5			±5		µV/°C
Input Bias Current			1	3.5		1	3.5	µA
	T_{MIN} to T_{MAX}			6.5			6.5	µA
Input Offset Current			0.5	2		0.5	2	µA
	T_{MIN} to T_{MAX}			3			3	µA
Common-Mode Rejection Ratio	V_{CM} = ±2.5 V	74	80		74	80		dB
Open-Loop Gain	V_{OUT} = ±2.5 V	58	62		65	68		dB
	T_{MIN} to T_{MAX}	54			56			dB
INPUT CHARACTERISTICS								
Input Resistance			500			500		kΩ
Input Capacitance			1.5			1.5		pF
Input Common-Mode Voltage Range			±3.4			±3.4		V
OUTPUT CHARACTERISTICS								
Output Voltage Range	R_L = 150 Ω	±2.8	±3.0		±2.8	±3.0		V
Output Current			50			50		mA
Output Resistance			0.2			0.2		Ω

SPECIFICATIONS

Table 1. (Continued)

Parameter	Conditions	AD8047A Min	AD8047A Typ	AD8047A Max	AD8048A Min	AD8048A Typ	AD8048A Max	Unit
Short-Circuit Current			130			130		mA
POWER SUPPLY								
Operating Range		±3.0	±5.0	±6.0	±3.0	±5.0	±6.0	V
Quiescent Current			5.8	6.6		5.9	6.6	mA
	T_{MIN} to T_{MAX}			7.5			7.5	mA
Power Supply Rejection Ratio		72	78		72	78		dB

[1] See Absolute Maximum Ratings and Theory of Operation sections.

[2] Measured at $A_V = 50$.

[3] Measured with respect to the inverting input.

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Value
Supply Voltage, $(+V_S) – (–V_S)$	12.6 V
Voltage Swing × Bandwidth Product	
AD8047	180 V-MHz
AD8048	250 V-MHz
Internal Power Dissipation[1]	
Plastic Package (N)	1.3 W
Small Outline Package (R)	0.9 W
Input Voltage (Common Mode)	$±V_S$
Differential Input Voltage	±1.2 V
Output Short-Circuit Duration	Observe Power Derating Curves
Storage Temperature Range (N, R)	–65°C to +125°C
Operating Temperature Range (A Grade)	–40°C to +85°C
Lead Temperature Range (Soldering 10 sec)	300°C

[1] Specification is for device in free air: 8-Lead PDIP Package, $θ_{JA}$ = 90°C/W; 8-Lead SOIC Package, $θ_{JA}$ = 140°C/W.

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.

METALLIZATION PHOTOS

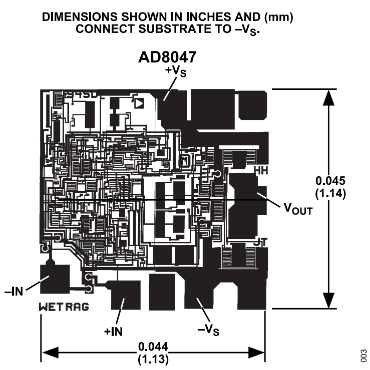


Figure 3. AD8047 Metallization

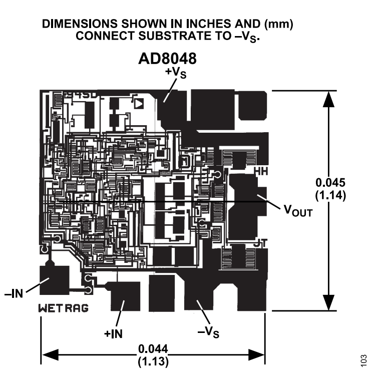


Figure 4. AD8048 Metallization

MAXIMUM POWER DISSIPATION

The maximum power that can be safely dissipated by these devices is limited by the associated rise in junction temperature. The maximum safe junction temperature for plastic encapsulated devices is determined by the glass transition temperature of the plastic, approximately 150°C. Exceeding this limit temporarily may cause a shift in parametric performance due to a change in the stresses exerted on the die by the package. Exceeding a junction temperature of 175°C for an extended period can result in device failure.

While the AD8047 and AD8048 are internally short circuit protected, this may not be sufficient to guarantee that the maximum junction temperature (150°C) is not exceeded under all conditions. To ensure proper operation, it is necessary to observe the maximum power derating curves.

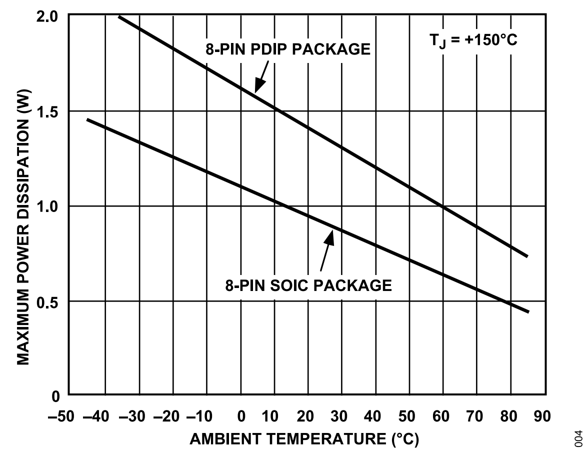
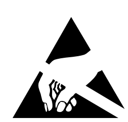


Figure 5. Plot of Maximum Power Dissipation vs. Temperature

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 DESCRIPTION

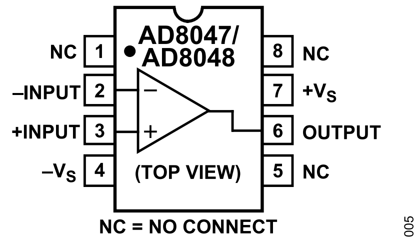


Figure 6. 8-Lead SOIC and and 8-Lead PDIP Pin Configurations

Table 3. Pin Function Descriptions, 8-Lead SOIC and and 8-Lead PDIP

Pin No.	Mnemonic	Package Description
1	NC	No Connect.
2	−INPUT	Inverting Input.
3	+INPUT	Non-inverting Input.
4	$-V_S$	Negative Supply Voltage.
5	NC	No Connect.
6	OUTPUT	Output.
7	$+V_S$	Positive Supply Voltage
8	NC	No Connect.

TYPICAL PERFORMANCE CHARACTERISTICS

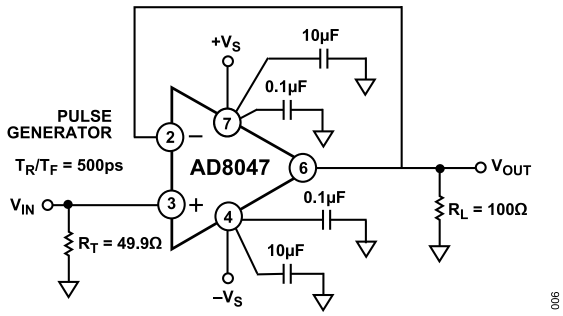


Figure 7. AD8047 Noninverting Configuration, G = +1

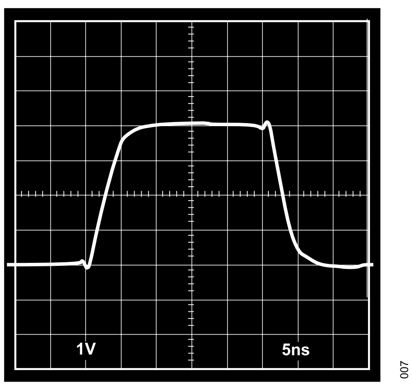


Figure 8. AD8047 Large Signal Transient Response; V_O = 4 V p-p, G = +1

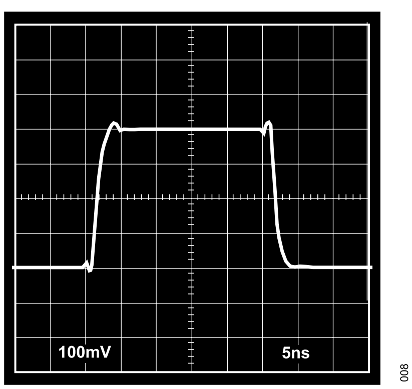


Figure 9. AD8047 Small Signal Transient Response; V_O = 400 mV p-p, G = +1

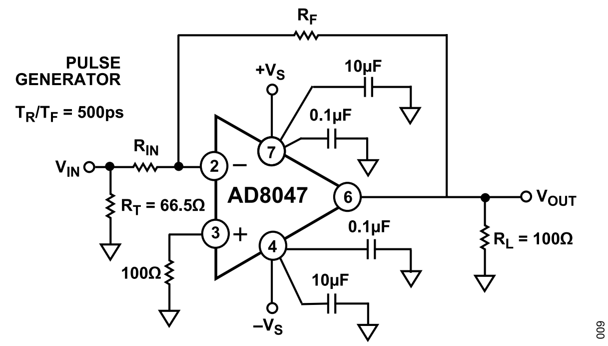


Figure 10. AD8047 Inverting Configuration, G = –1

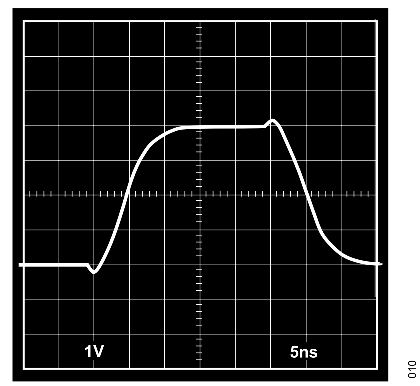


Figure 11. AD8047 Large Signal Transient Response; V_O = 4 V p-p, G = –1, R_F = R_{IN} = 200 Ω

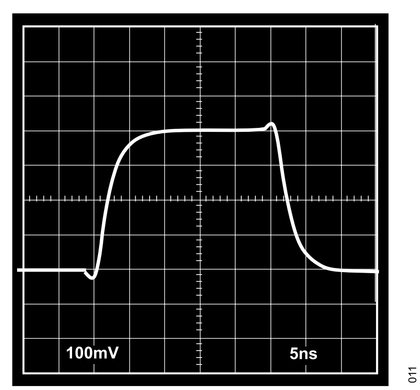


Figure 12. AD8047 Small Signal Transient Response; V_O = 400 mV p-p, G = –1, R_F = R_{IN} = 200 Ω

TYPICAL PERFORMANCE CHARACTERISTICS

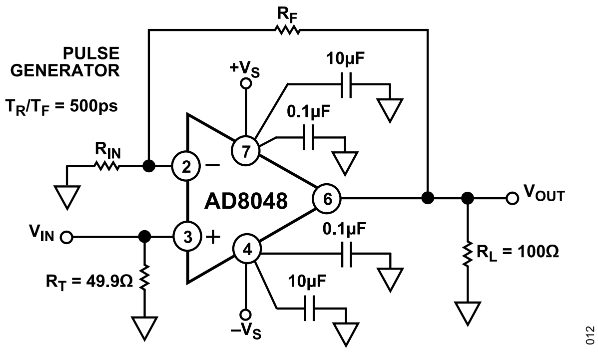


Figure 13. AD8048 Noninverting Configuration, G = +2

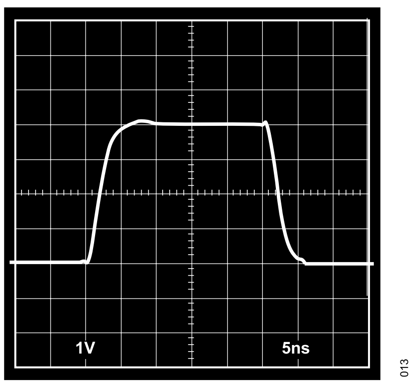


Figure 14. AD8048 Large Signal Transient Response; V_O = 4 V p-p, G = +2, R_F = R_{IN} = 200 Ω

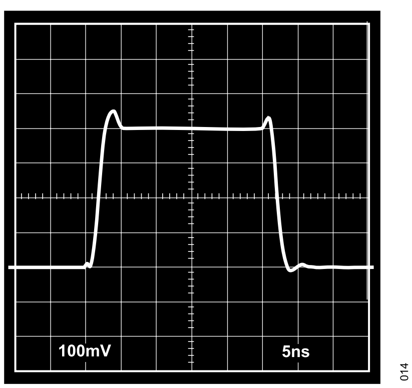


Figure 15. AD8048 Small Signal Transient Response; V_O = 400 mV p-p, G = +2, R_F = R_{IN} = 200 Ω

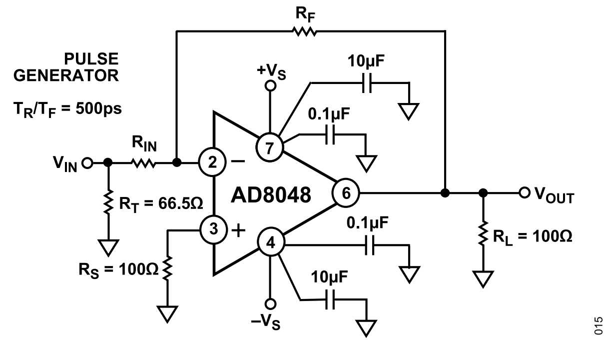


Figure 16. AD8048 Inverting Configuration, G= –1

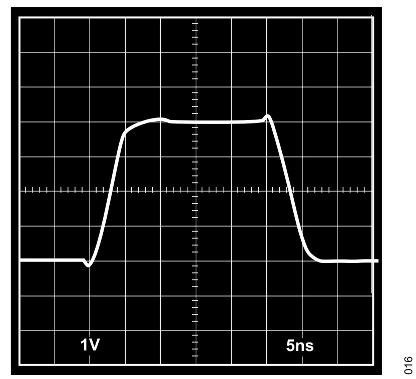


Figure 17. AD8048 Large Signal Transient Response; V_O = 4 V p-p, G = –1, R_F = R_{IN} = 200 Ω

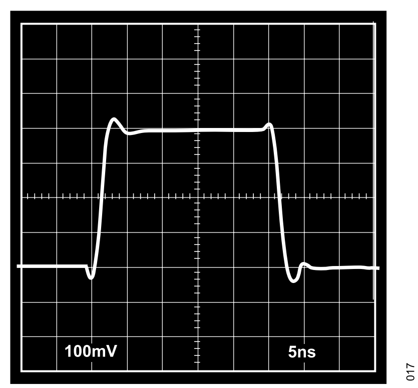


Figure 18. AD8048 Small Signal Transient Response; V_O = 400 mV p-p, G = –1, R_F = R_{IN} = 200 Ω

TYPICAL PERFORMANCE CHARACTERISTICS

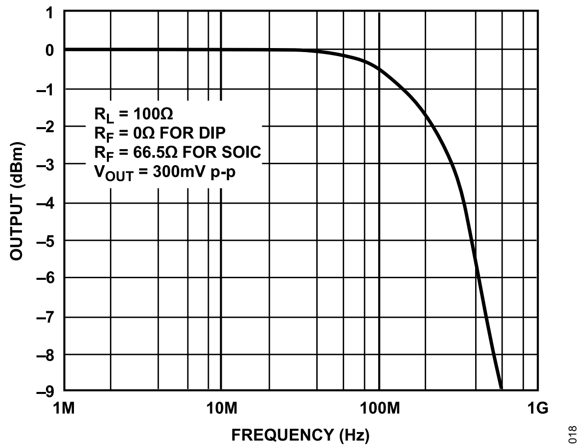


Figure 19. AD8047 Small Signal Frequency Response, G = +1

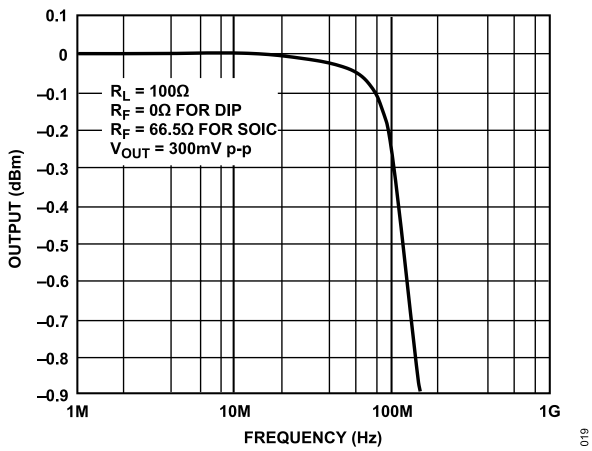


Figure 20. AD8047 0.1 dB Flatness, G = +1

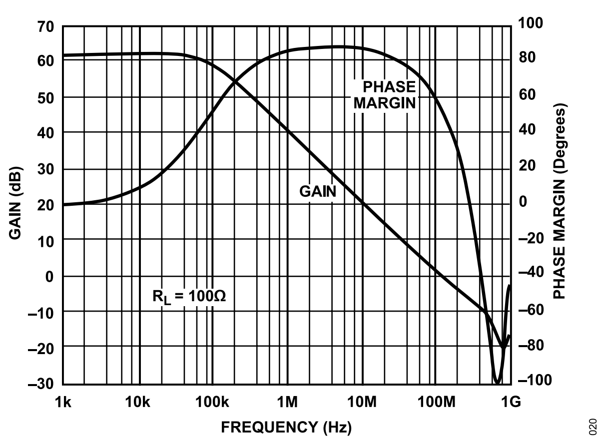


Figure 21. AD8047 Open-Loop Gain and Phase Margin vs. Frequency

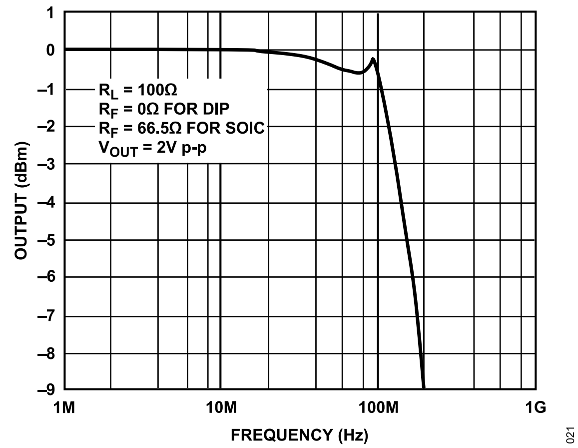


Figure 22. AD8047 Large Signal Frequency Response G = +1

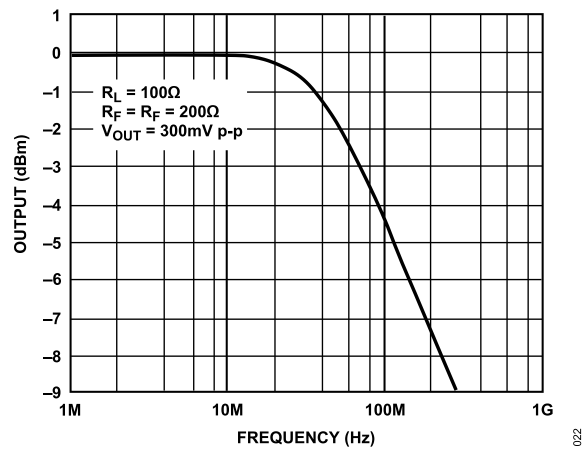


Figure 23. AD8047 Small Signal Frequency Response, G = –1

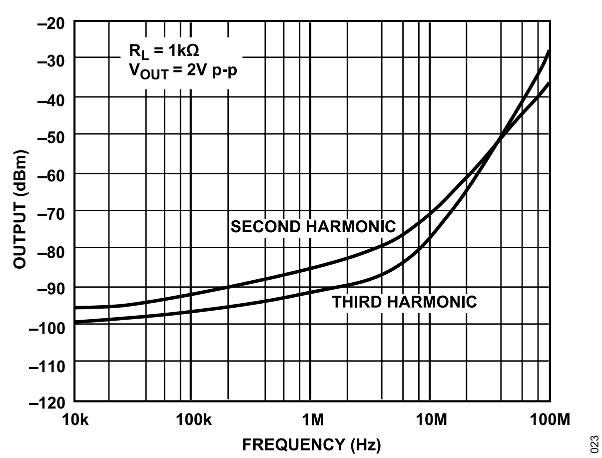


Figure 24. AD8047 Harmonic Distortion vs. Frequency, G = +1

TYPICAL PERFORMANCE CHARACTERISTICS

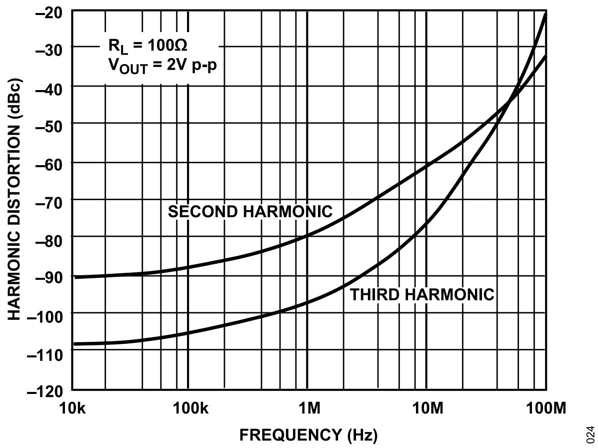


Figure 25. AD8047 Harmonic Distortion vs. Frequency, G = +1

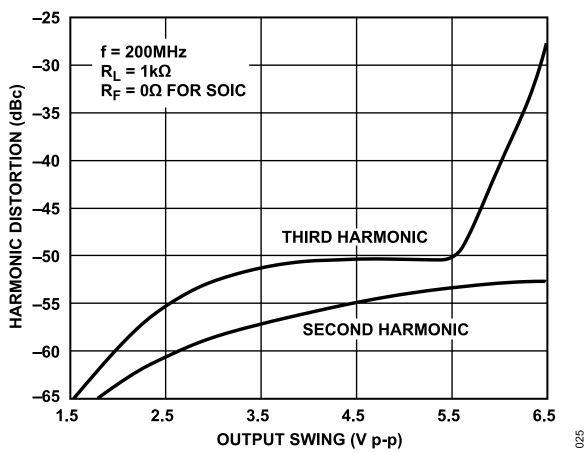


Figure 26. AD8047 Harmonic Distortion vs. Output Swing, G = +1

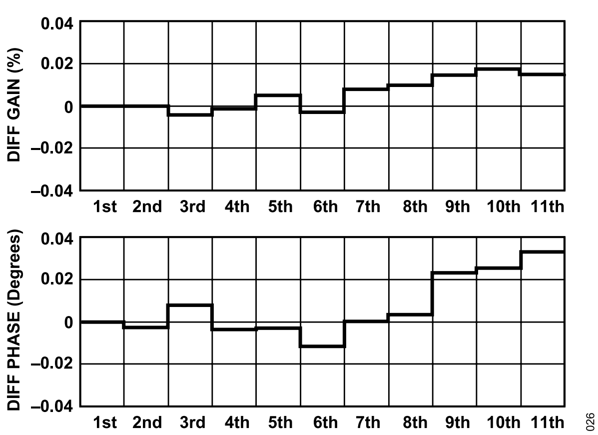


Figure 27. AD8047 Differential Gain and Phase Error, G = +2, R_L = 150 Ω, R_F = 200 Ω, R_{IN} = 200 Ω

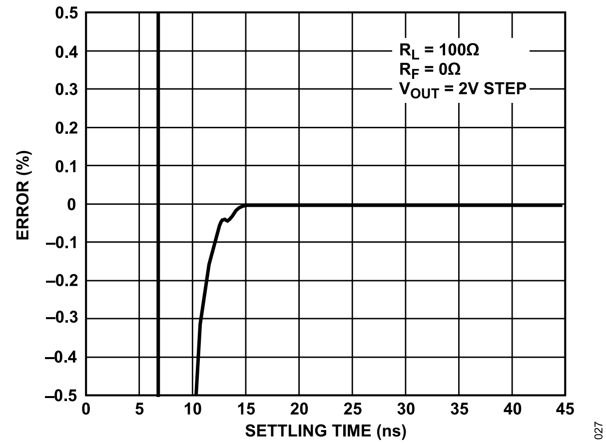


Figure 28. AD8047 Short-Term Settling Time, G = +1

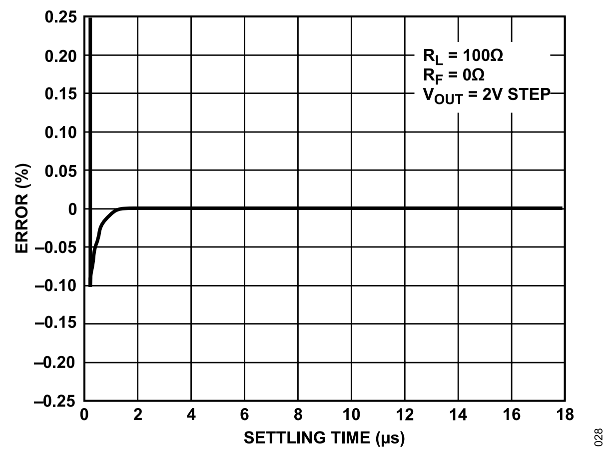


Figure 29. AD8047 Long-Term Settling Time, G = +1

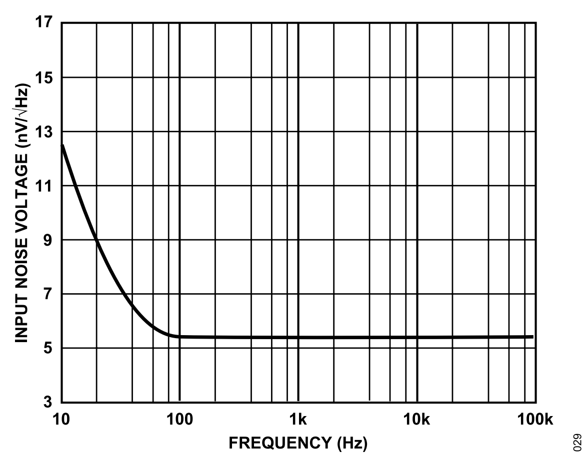


Figure 30. AD8047 Noise vs. Frequency

TYPICAL PERFORMANCE CHARACTERISTICS

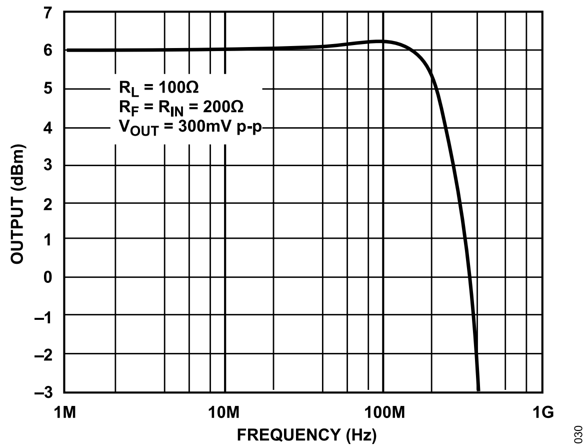


Figure 31. AD8048 Small Signal Frequency Response, G = +2

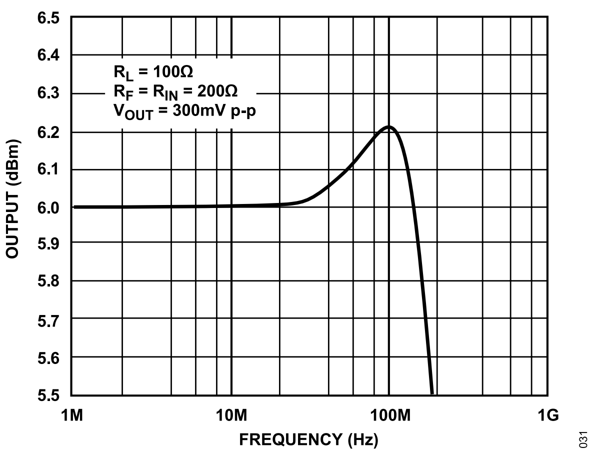


Figure 32. AD8048 0.1 dB Flatness, G = +2

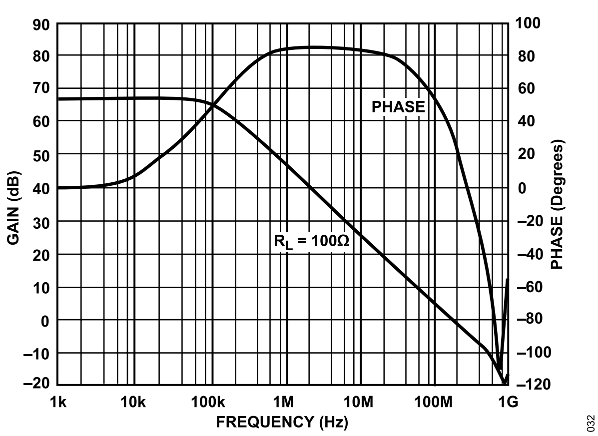


Figure 33. AD8048 Open-Loop Gain and Phase Margin vs. Frequency

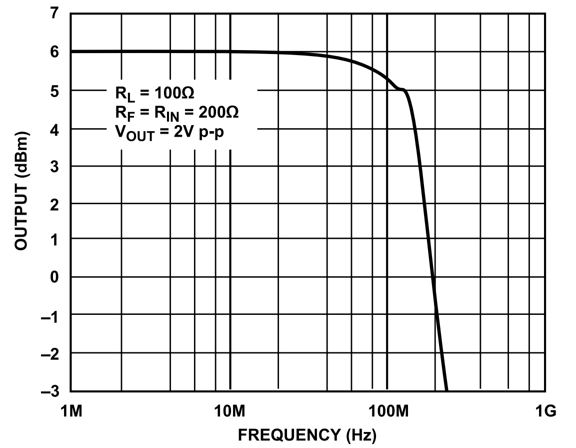


Figure 34. AD8048 Large Signal Frequency Response, G = +2

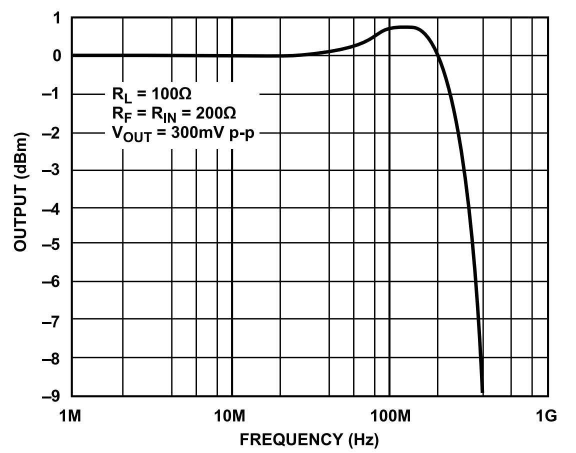


Figure 35. AD8048 Small Signal Frequency Response, G = –1

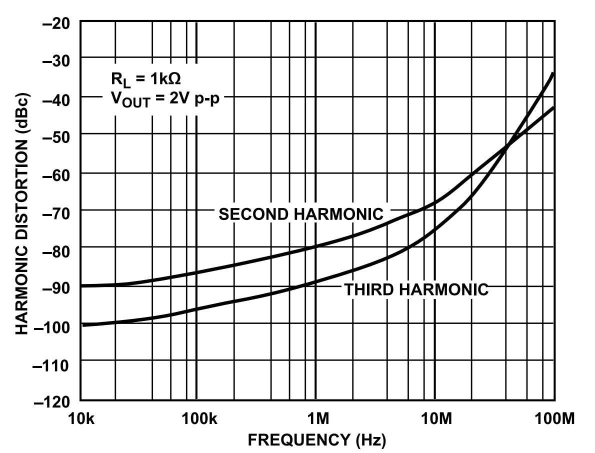


Figure 36. AD8048 Harmonic Distortion vs. Frequency, G = +2

TYPICAL PERFORMANCE CHARACTERISTICS

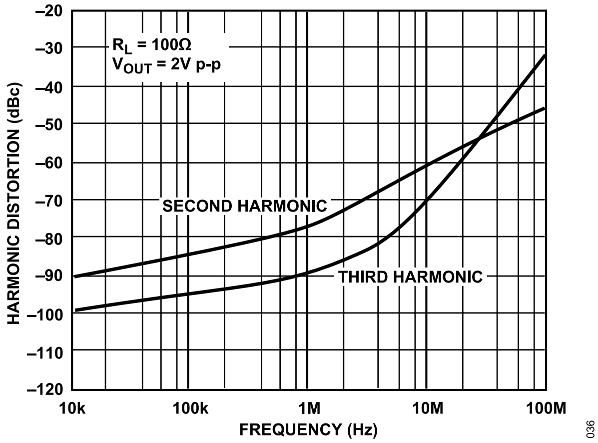


Figure 37. AD8048 Harmonic Distortion vs. Frequency, G = +2

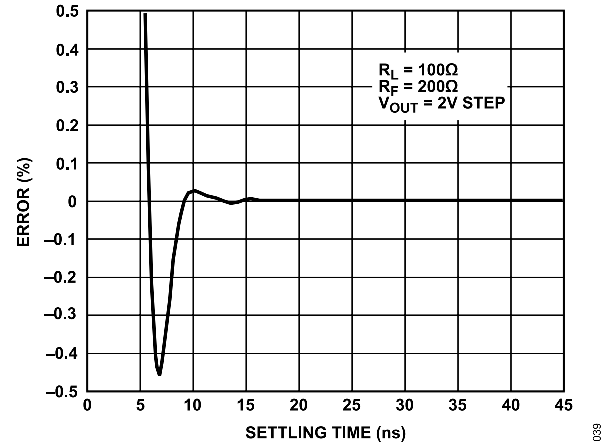


Figure 40. AD8048 Short-Term Settling Time, G = +2

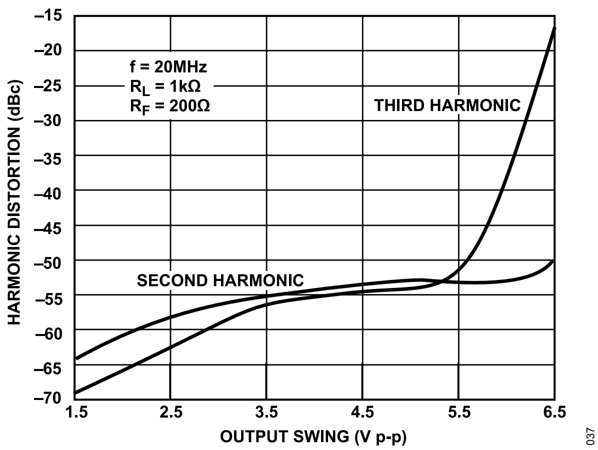


Figure 38. AD8048 Harmonic Distortion vs. Output Swing, G = +2

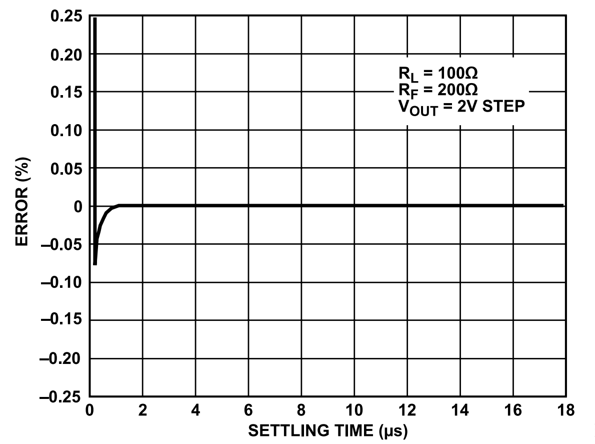


Figure 41. AD8048 Long-Term Settling Time 2 V Step, G = +2

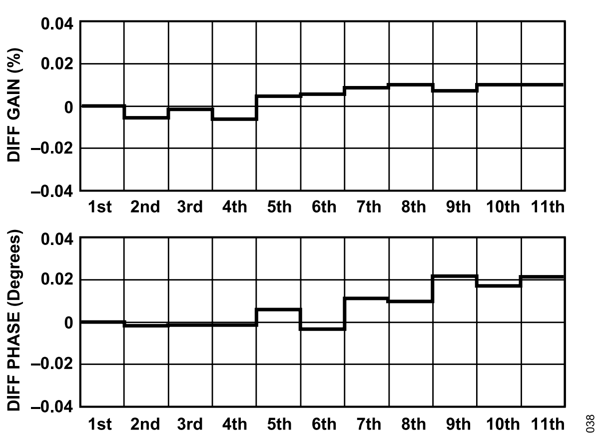


Figure 39. AD8048 Differential Gain and Phase Error, G = +2, R_L = 150 Ω, R_F = 200 Ω, R_{IN} = 200 Ω

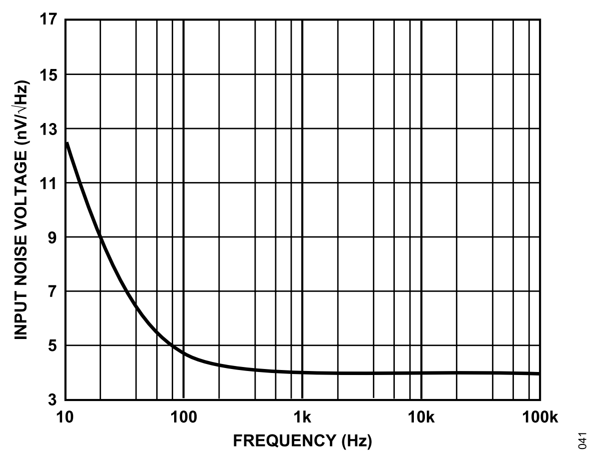


Figure 42. AD8048 Noise vs. Frequency

TYPICAL PERFORMANCE CHARACTERISTICS

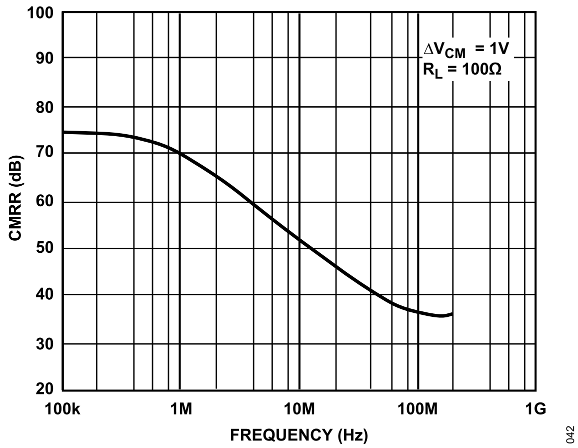


Figure 43. AD8047 CMRR vs. Frequency

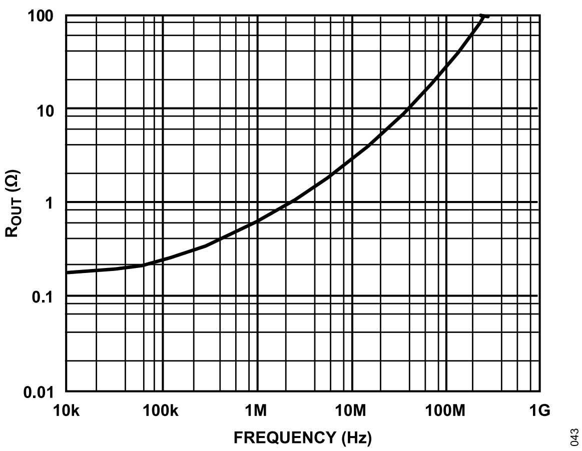


Figure 44. AD8047 Output Resistance vs. Frequency, G = +1

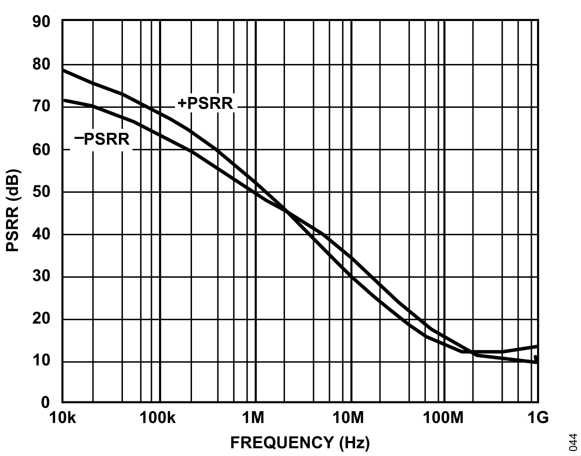


Figure 45. AD8047 PSRR vs. Frequency

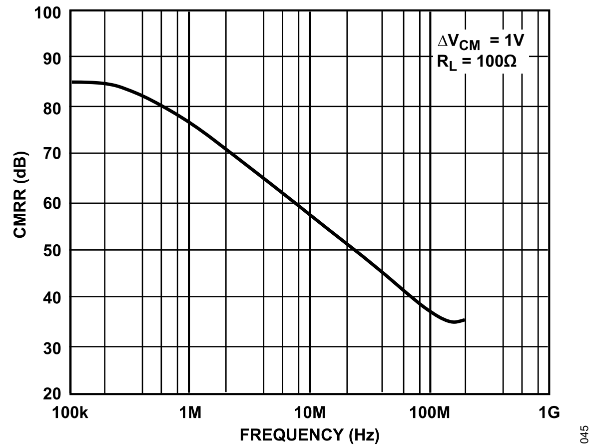


Figure 46. AD8048 CMRR vs. Frequency

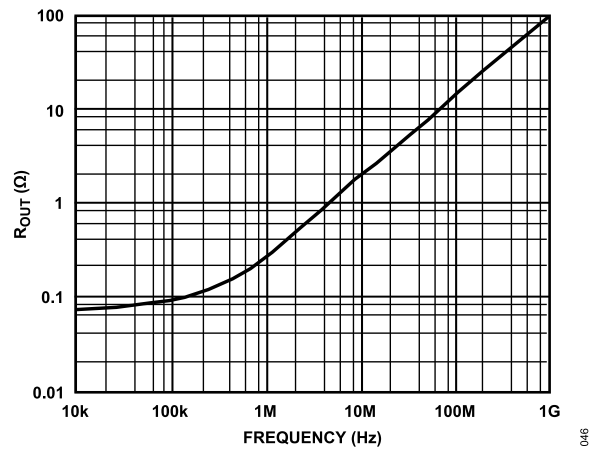


Figure 47. AD8048 Output Resistance vs. Frequency, G = +2

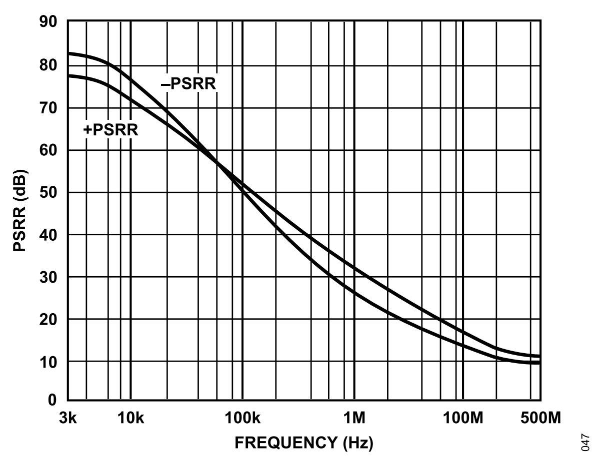


Figure 48. AD8048 PSRR vs. Frequency, G = +2

TYPICAL PERFORMANCE CHARACTERISTICS

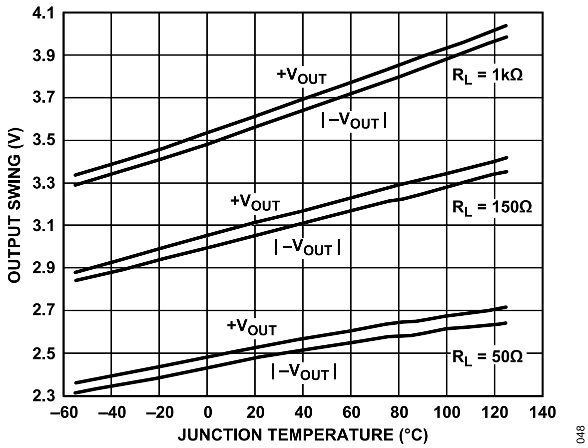


Figure 49. AD8047/AD8048 Output Swing vs. Temperature

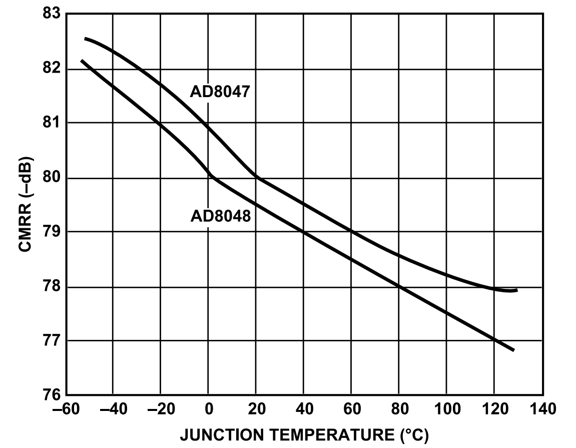


Figure 52. AD8047/AD8048 CMRR vs. Temperature

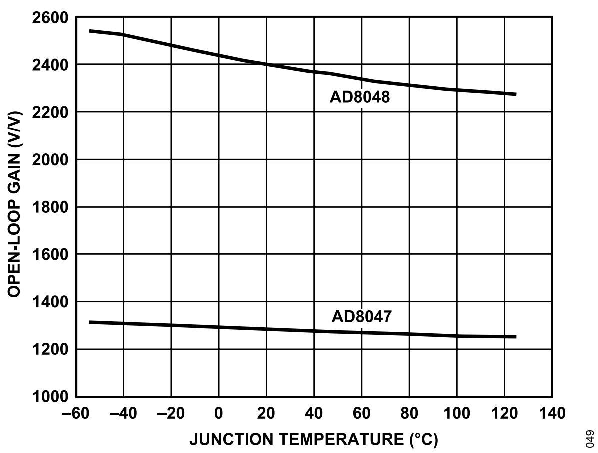


Figure 50. AD8047/AD8048 Open-Loop Gain vs. Temperature

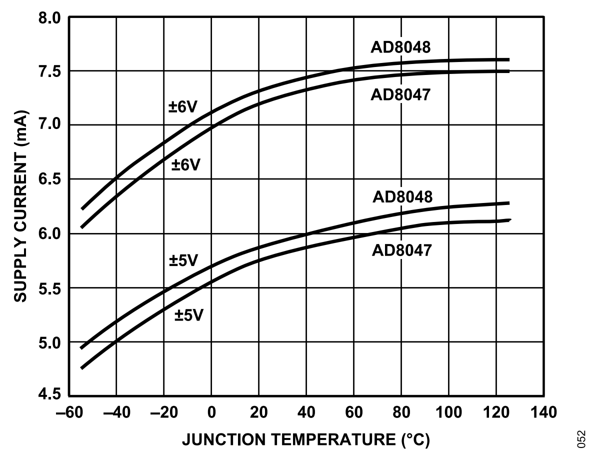


Figure 53. AD8047/AD8048 Supply Current vs. Temperature

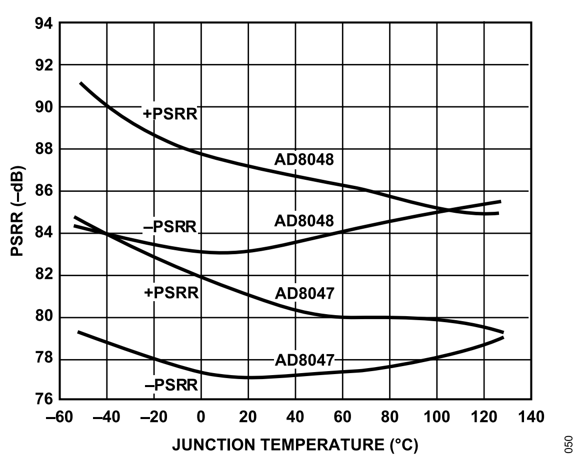


Figure 51. AD8047/AD8048 PSRR vs. Temperature

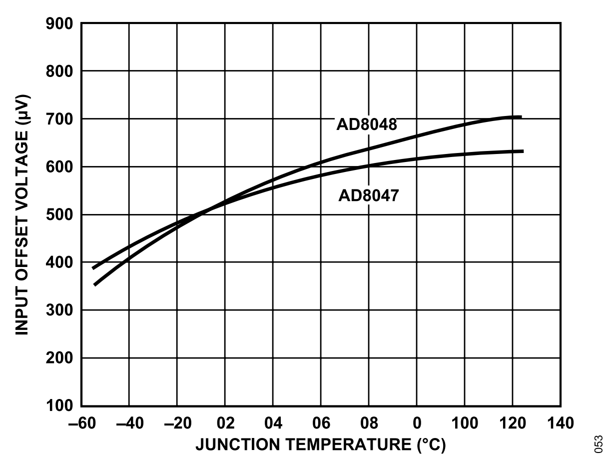


Figure 54. AD8047/AD8048 Input Offset Voltage vs. Temperature

THEORY OF OPERATION

GENERAL

The AD8047 and AD8048 are wide bandwidth, voltage feedback amplifiers. Since their open-loop frequency response follows the conventional 6 dB/octave roll-off, their gain bandwidth product is basically constant. Increasing their closed-loop gain results in a corresponding decrease in small signal bandwidth. This can be observed by noting the bandwidth specification between the AD8047 (G = +1) and AD8048 (G = +2).

FEEDBACK RESISTOR CHOICE

The value of the feedback resistor is critical for optimum performance on the AD8047 and AD8048. For maximum flatness at a gain of 2, R_F and R_G should be set to 200 Ω for the AD8048. When the AD8047 is configured as a unity gain follower, R_F should be set to 0 Ω (no feedback resistor should be used) for the plastic DIP and 66.5 Ω for the SOIC.

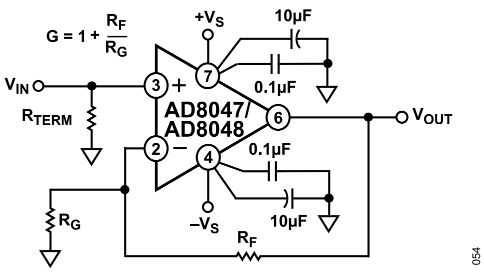


Figure 55. Noninverting Operation

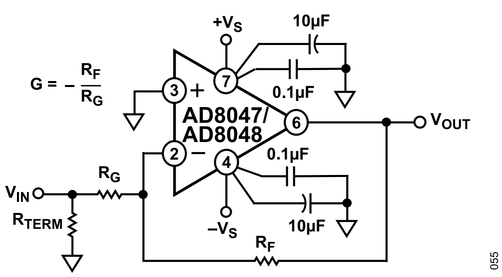


Figure 56. Inverting Operation

When the AD8047 is used in the transimpedance (I to V) mode, such as in photodiode detection, the values of R_F and diode capacitance (C_I) are usually known. Generally, the value of R_F selected will be in the kΩ range, and a shunt capacitor (C_F) across R_F will be required to maintain good amplifier stability. The value of C_F required to maintain optimal flatness (<1 dB peaking) and settling time can be estimated as

$$C_F \cong \left[\left(2\omega_O C_1 R_F - 1\right)/\omega^2 {R_F}^2\right]^{\frac{1}{2}} \quad (1)$$

where ω_O is equal to the unity gain bandwidth product of the amplifier in rad/sec, and C_I is the equivalent total input capacitance at the inverting input. Typically, $\omega_O = 800 \times 10^6$ rad/sec (see Figure 21 curve).

As an example, choosing R_F = 10 kΩ and C_I = 5 pF requires C_F to be 1.1 pF (Note: C_I includes both source and parasitic circuit capacitance). The bandwidth of the amplifier can be estimated using the C_F calculated as

$$f_{3dB} \cong \frac{1.6}{2\pi R_F C_F} \quad (2)$$

For general voltage gain applications, the amplifier bandwidth can be closely estimated as

$$f_{3dB} \cong \frac{\omega_O}{2\pi\left[1 + \left(\frac{R_F}{R_G}\right)\right]} \quad (3)$$

This estimation loses accuracy for gains of +2/–1 or lower due to the amplifier's damping factor. For these low gain cases, the bandwidth will actually extend beyond the calculated value (see Closed-Loop BW plots, Figure 19 and Figure 31).

As a general rule, capacitor C_F will not be required if

$$\left(R_F \parallel R_G\right) \times C_1 \leq \frac{NG}{4\omega_O} \quad (4)$$

where *NG* is the Noise Gain (1 + R_F/R_G) of the circuit. For most voltage gain applications, this should be the case.

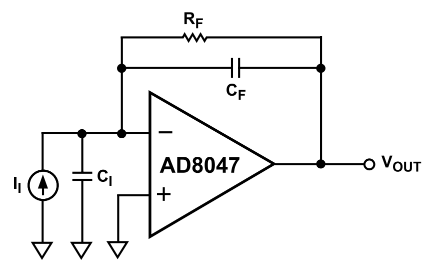


Figure 57. Transimpedance Configuration

PULSE RESPONSE

Unlike a traditional voltage feedback amplifier, where the slew speed is dictated by its front end dc quiescent current and gain bandwidth product, the AD8047 and AD8048 provide on demand current that increases proportionally to the input step signal amplitude. This results in slew rates (1000 V/µs) comparable to wideband current feedback designs. This, combined with relatively low input noise current (1.0 pA/√Hz), gives the AD8047 and AD8048 the best attributes of both voltage and current feedback amplifiers.

LARGE SIGNAL PERFORMANCE

The outstanding large signal operation of the AD8047 and AD8048 is due to a unique, proprietary design architecture. In order to maintain this level of performance, the maximum 180 V-MHz product must be observed (e.g., @ 100 MHz, $V_O \leq 1.8$ V p-p) on the AD8047 and the 250 V-MHz product must be observed on the AD8048.

THEORY OF OPERATION

POWER SUPPLY BYPASSING

Adequate power supply bypassing can be critical when optimizing the performance of a high frequency circuit. Inductance in the power supply leads can form resonant circuits that produce peaking in the amplifier's response. In addition, if large current transients must be delivered to the load, then bypass capacitors (typically greater than 1 µF) will be required to provide the best settling time and lowest distortion. A parallel combination of at least 4.7 µF, and between 0.1 µF and 0.01 µF, is recommended. Some brands of electrolytic capacitors will require a small series damping resistor ≈4.7 Ω for optimum results.

DRIVING CAPACITIVE LOADS

The AD8047/AD8048 have excellent cap load drive capability for high speed op amps, as shown in Figure 59 and Figure 61. However, when driving cap loads greater than 25 pF, the best frequency response is obtained by the addition of a small series resistance. It is worth noting that the frequency response of the circuit when driving large capacitive loads will be dominated by the passive roll-off of R_{SERIES} and C_L.

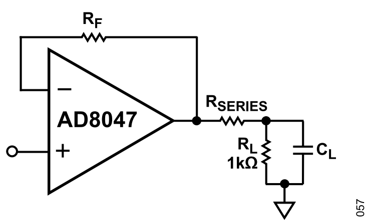


Figure 58. Driving Capacitive Loads

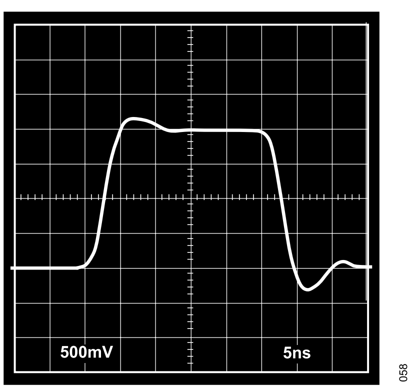


Figure 59. AD8047 Large Signal Transient Response; V_O = 2 V p-p, G = +1, R_F = 0 Ω, R_{SERIES} = 0 Ω, C_L = 27 pF

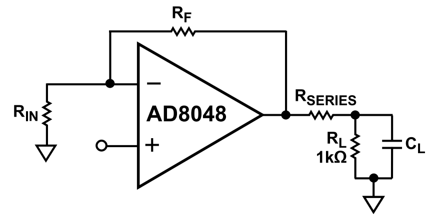


Figure 60. Driving Capacitive Loads

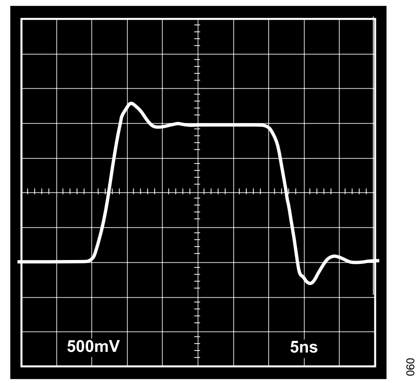


Figure 61. AD8048 Large Signal Transient Response; V_O = 2 V p-p, G = +2, R_F = R_{IN} = 200 Ω, R_{SERIES} = 0 Ω, C_L = 27 pF

APPLICATIONS

The AD8047 and AD8048 are voltage feedback amplifiers well suited for such applications as photodetectors, active filters, and log amplifiers. The devices' wide bandwidth (260 MHz), phase margin (65°), low noise current (1.0 pA/√Hz), and slew rate (1000 V/μs) give higher performance capabilities to these applications over previous voltage feedback designs.

With a settling time of 30 ns to 0.01% and 13 ns to 0.1%, the devices are an excellent choice for DAC I/V conversion. The same characteristics along with low harmonic distortion make them a good choice for ADC buffering/amplification. With superb linearity at relatively high signal frequencies, the AD8047 and AD8048 are ideal drivers for ADCs up to 12 bits.

OPERATION AS A VIDEO LINE DRIVER

The AD8047 and AD8048 have been designed to offer outstanding performance as video line drivers. The important specifications of differential gain (0.01%) and differential phase (0.02°) meet the most exacting HDTV demands for driving video loads.

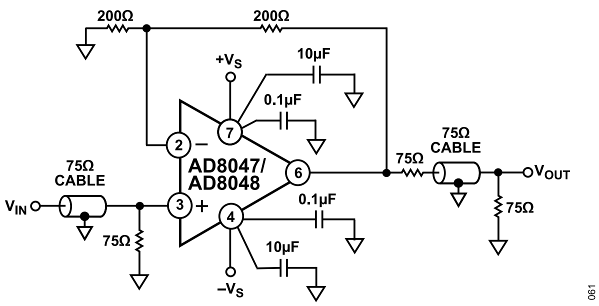


Figure 62. Video Line Driver

ACTIVE FILTERS

The wide bandwidth and low distortion of the AD8047 and AD8048 are ideal for the realization of higher bandwidth active filters. These characteristics, while being more common in many current feedback op amps, are offered in the AD8047 and AD8048 in a voltage feedback configuration. Many active filter configurations are not realizable with current feedback amplifiers.

A multiple feedback active filter requires a voltage feedback amplifier and is more demanding of op amp performance than other active filter configurations such as the Sallen-Key. In general, the amplifier should have a bandwidth that is at least 10 times the bandwidth of the filter if problems due to phase shift of the amplifier are to be avoided.

Figure 63 is an example of a 20 MHz low-pass multiple feedback active filter using an AD8048.

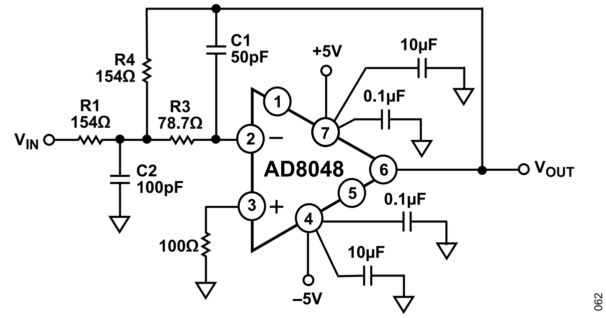


Figure 63. Active Filter Circuit

Choose

F_O = Cutoff Frequency = 20 MHz

α = Damping Ratio = 1/Q = 2

$$H = \text{Absolute Value of Circuit Gain} = \left|\frac{-R_4}{R_1}\right| = 1$$

Then,

$$k = 2\pi F_O C1$$
$$C2 = \frac{4C1(H+1)}{\alpha^2}$$
$$R1 = \frac{\alpha}{2Hk}$$
$$R3 = \frac{\alpha}{2k(H+1)}$$
$$R4 = H(R1)$$

A/D CONVERTER DRIVER

As A/D converters move toward higher speeds with higher resolutions, there becomes a need for high performance drivers that will not degrade the analog signal to the converter. It is desirable from a system's standpoint that the A/D be the element in the signal chain that ultimately limits overall distortion. This places new demands on the amplifiers used to drive fast, high resolution A/Ds.

With high bandwidth, low distortion, and fast settling time, the and AD8048 make high performance A/D drivers for advanced converters. Figure 64 is an example of an AD8047 used as an input driver for an AD872A, a 12-bit, 10 MSPS A/D converter.

APPLICATIONS

LAYOUT CONSIDERATIONS

The specified high speed performance of the AD8047 and AD8048 requires careful attention to board layout and component selection. Proper RF design techniques and low pass parasitic component selection are mandatory.

The PCB should have a ground plane covering all unused portions of the component side of the board to provide a low impedance path. The ground plane should be removed from the area near the input pins to reduce stray capacitance.

Chip capacitors should be used for the supply bypassing (see Figure 64). One end should be connected to the ground plane and the other within 1/8 inch of each power pin. An additional large (0.47 µF to 10 µF) tantalum electrolytic capacitor should be connected in parallel, though not necessarily so close, to the supply current for fast, large signal changes at the output.

The feedback resistor should be located close to the inverting input pin in order to keep the stray capacitance at this node to a minimum. Capacitance variations of less than 1 pF at the inverting input will significantly affect high speed performance.

Stripline design techniques should be used for long signal traces (greater than about 1 inch). These should be designed with a characteristic impedance of 50 Ω or 75 Ω and be properly terminated at each end.

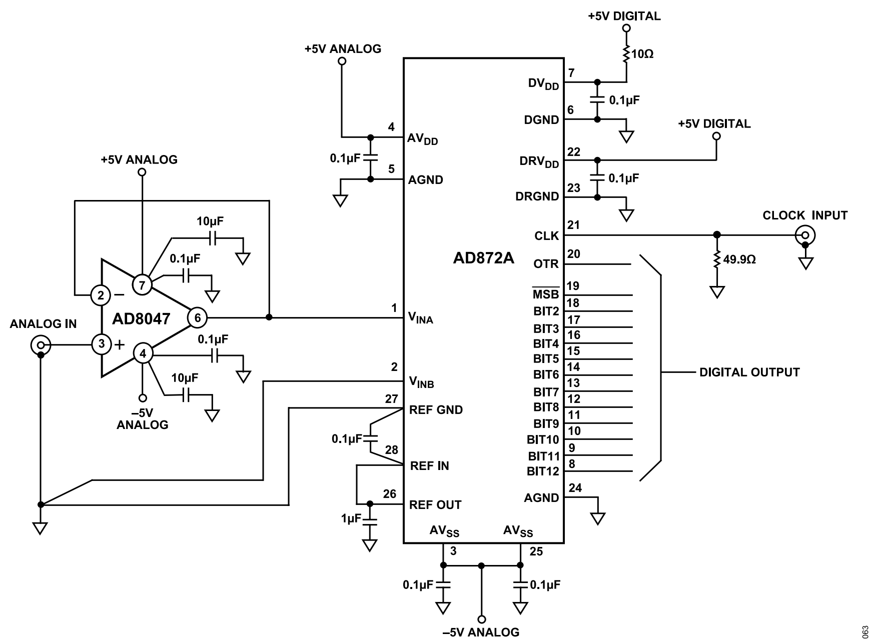


Figure 64. AD8047 Used as Driver for an AD872A, a 12-Bit, 10 MSPS A/D Converter

OUTLINE DIMENSIONS

Package Drawing (Option)	Package Type	Package Description
N-8	PDIP	8-Lead Plastic Dual In-Line Package
R-8	SOIC	8-Lead Standard Small Outline Package

For the latest package outline information and land patterns (footprints), go to Package Index.

ORDERING GUIDE

Model[1]	Temperature Range	Package Description	Packing Quantity	Package Option
AD8047ANZ	–40°C to +85°C	8-Lead PDIP	Tube, 50	N-8
AD8047ARZ	–40°C to +85°C	8-Lead SOIC	Tube, 98	R-8
AD8047ARZ-REEL7	–40°C to +85°C	8-Lead SOIC	Reel, 1000	R-8
AD8048ARZ	–40°C to +85°C	8-Lead SOIC	Tube, 98	R-8
AD8048ARZ-REEL7	–40°C to +85°C	8-Lead SOIC	Reel, 750	R-8

[1] Z = RoHS Compliant Part.