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REVISION HISTORY

2/11—Rev. 0 to Rev. A

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Updated Outline Dimensions	13
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12/05—Revision 0: Initial Version

SPECIFICATIONS

$V_S = \pm 5.0\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

Table 1.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V _{OS}	0°C ≤ T _A ≤ 70°C −40°C ≤ T _A ≤ +125°C		40	150 250 350	μV μV μV
Input Bias Current	I _B	−40°C ≤ T _A ≤ +125°C		0.2	1	nA
Input Offset Current	I _{OS}	−40°C ≤ T _A ≤ +125°C		0.1	1	nA
Input Voltage Range			−3.5		+3.5	V
Common-Mode Rejection Ratio	CMRR	V _{CM} = ±3 V −40°C ≤ T _A ≤ +125°C	120 120	127		dB dB
Open-Loop Gain	A _{VO}	R _L = 2 kΩ to ground, V _O = ±3 V −40°C ≤ T _A ≤ +125°C	1000 1000	10,000		V/mV V/mV
Offset Voltage Drift	ΔV _{OS} /ΔT	0°C ≤ T _A ≤ 70°C −40°C ≤ T _A ≤ +125°C		0.5 0.5	1.8 1.4	μV/°C μV/°C
OUTPUT CHARACTERISTICS						
Output Voltage Swing	V _{OUT}	R _L = 10 kΩ to ground −40°C ≤ T _A ≤ +125°C R _L = 2 kΩ to ground −40°C ≤ T _A ≤ +125°C	±3.95 ±3.95 ±3.9 ±3.9	±4.1		V V V V
Short-Circuit Current	I _{SC}			27		mA
Output Current	I _O	V _O = 3.5 V		15		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V _S = ±4.0 V to ±18.0 V 0°C ≤ T _A ≤ 70°C −40°C ≤ T _A ≤ +125°C	115 115 110	130		dB dB dB
Supply Current/Amplifier	I _{SY}	V _O = 0 V 0°C ≤ T _A ≤ 70°C −40°C ≤ T _A ≤ +125°C		1.1	1.25 1.45 1.75	mA mA mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R _L = 10 kΩ		0.2		V/μs
Gain Bandwidth Product	GBP			0.6		MHz
Phase Margin				80		Degrees
NOISE PERFORMANCE						
Voltage Noise	e _{n p-p}	0.1 Hz to 10 Hz		0.28		μV p-p
Voltage Noise Density	e _n	f = 1 kHz		10		nV/√Hz
Current Noise Density	i _n	f = 1 kHz		0.074		pA/√Hz

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$V_s = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

Table 2.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}	$0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		45	150 250 350	μV μV μV
Input Bias Current	I_B	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		0.2	1	nA
Input Offset Current	I_{OS}	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		0.2	1 1 1	nA nA nA
Input Voltage Range			-13.5		+13.5	V
Common-Mode Rejection Ratio	CMRR	$V_{CM} = \pm 13.0\text{ V}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	120	140		dB
Open-Loop Gain	A_{VO}	$R_L = 2\text{ k}\Omega$ to ground, $V_O = \pm 11\text{ V}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	120 1000 1000	10,000		dB V/mV V/mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		0.5 0.5	2.5 1.5	$\mu\text{V}/^\circ\text{C}$ $\mu\text{V}/^\circ\text{C}$
OUTPUT CHARACTERISTICS						
Output Voltage Swing	V_{OUT}	$R_L = 10\text{ k}\Omega$ to ground $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ $R_L = 2\text{ k}\Omega$ to ground $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	± 13.95 ± 13.9 ± 13.75 ± 13.7	± 14 ± 13.8		V V V V
Short-Circuit Current	I_{SC}			30		mA
Output Current	I_O	$V_O = 13.5\text{ V}$		15		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	$V_s = \pm 4.0\text{ V}$ to $\pm 18.0\text{ V}$ $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	115 115 110	130		dB dB dB
Supply Current/Amplifier	I_{SY}	$V_O = 0\text{ V}$ $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		1.1	1.3 1.55 1.85	mA mA mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	$R_L = 10\text{ k}\Omega$		0.2		V/ μs
Gain Bandwidth Product	GBP			0.6		MHz
Phase Margin				80		Degrees
NOISE PERFORMANCE						
Voltage Noise	$e_{n\text{ p-p}}$	0.1 Hz to 10 Hz		0.25		$\mu\text{V p-p}$
Voltage Noise Density	e_n	$f = 1\text{ kHz}$		10		nV/ $\sqrt{\text{Hz}}$
Current Noise Density	i_n	$f = 1\text{ kHz}$		0.074		pA/ $\sqrt{\text{Hz}}$

ABSOLUTE MAXIMUM RATINGS

Table 3.

Parameter	Rating
Supply Voltage	$\pm 18\text{ V}$
Input Voltage	$\pm V$ supply
Differential Input Voltage	$\pm 0.7\text{ V}$
Output Short-Circuit Duration to GND	Indefinite
Storage Temperature Range	-65°C to $+150^{\circ}\text{C}$
Operating Temperature Range	-40°C to $+125^{\circ}\text{C}$
Junction Temperature Range	-65°C to $+150^{\circ}\text{C}$
Lead Temperature (Soldering, 10 sec)	$+300^{\circ}\text{C}$

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 worst-case conditions, that is, a device soldered in a circuit board for surface-mount packages.

Table 4.

Package Type	θ_{JA}	θ_{JC}	Unit
8-Lead DIP (N-8)	103	43	$^{\circ}\text{C}/\text{W}$
8-Lead SOIC (R-8)	158	43	$^{\circ}\text{C}/\text{W}$

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



TYPICAL PERFORMANCE CHARACTERISTICS

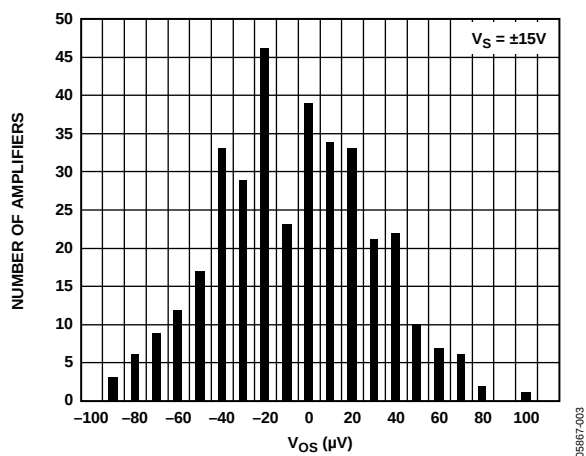


Figure 2. Number of Amplifiers vs. Offset Voltage

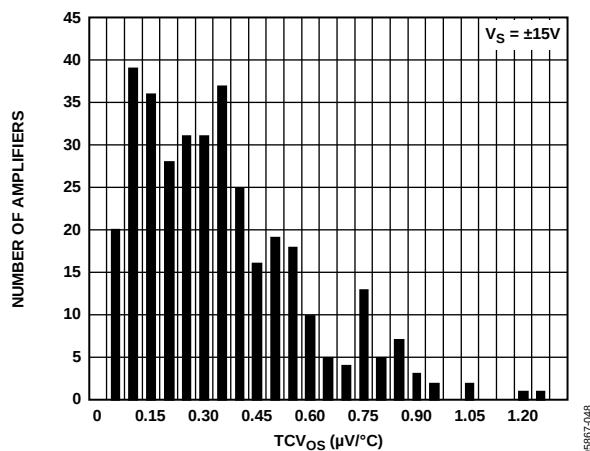


Figure 5. Number of Amplifiers vs. TCV_{OS}

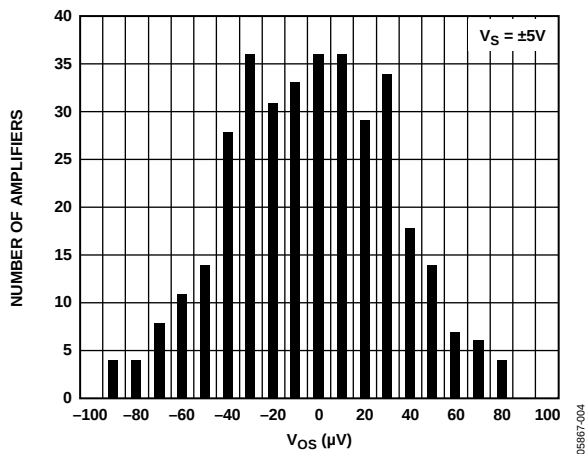


Figure 3. Number of Amplifiers vs. Offset Voltage

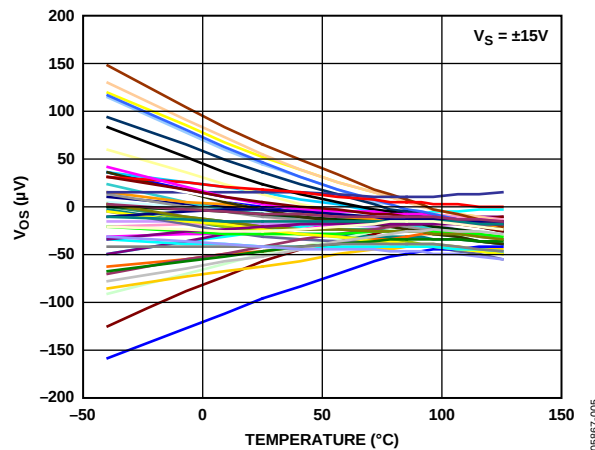


Figure 6. Offset Voltage vs. Temperature

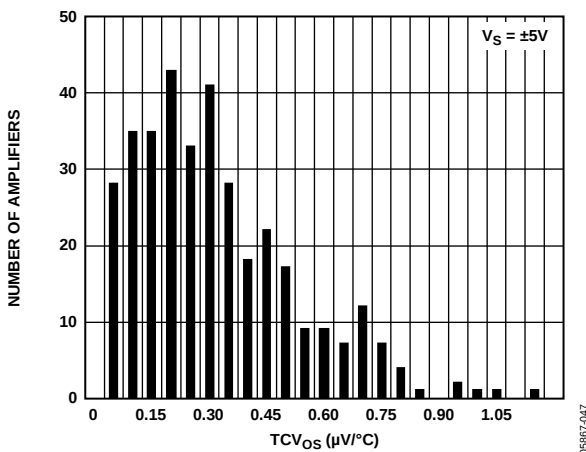


Figure 4. Number of Amplifiers vs. TCV_{OS}

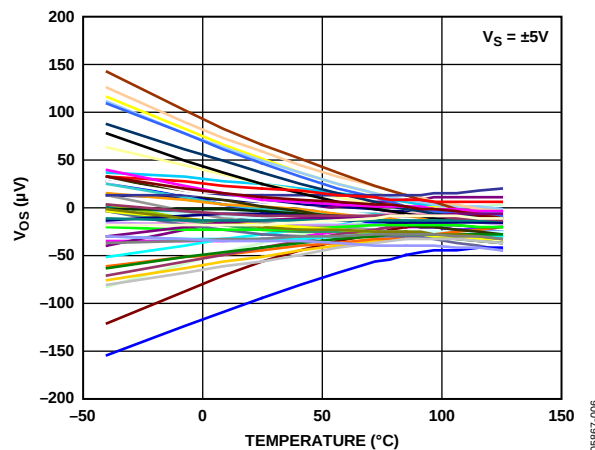


Figure 7. Offset Voltage vs. Temperature

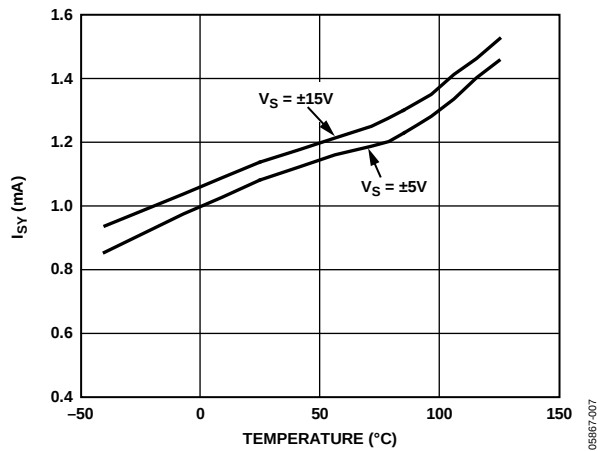


Figure 8. Supply Current vs. Temperature

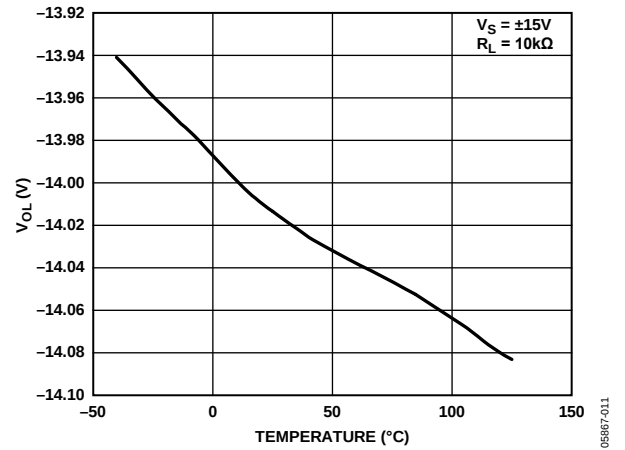


Figure 11. Negative Output Voltage Swing vs. Temperature

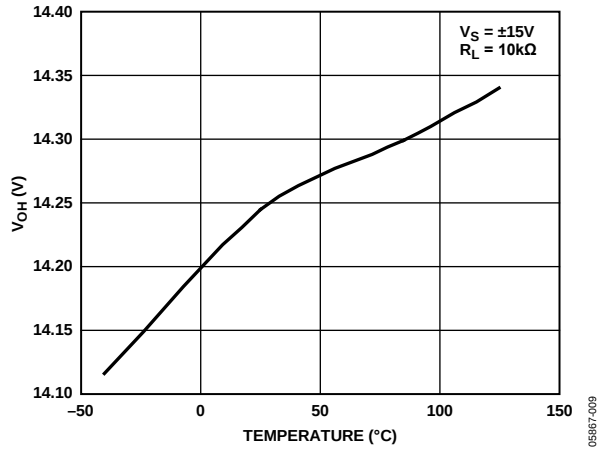


Figure 9. Positive Output Voltage Swing vs. Temperature

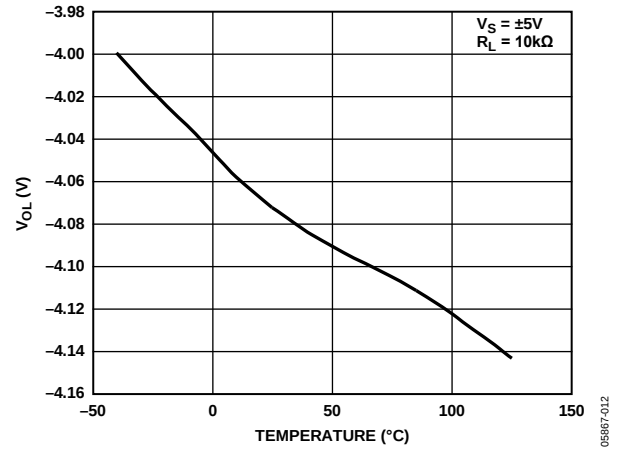


Figure 12. Negative Output Voltage Swing vs. Temperature

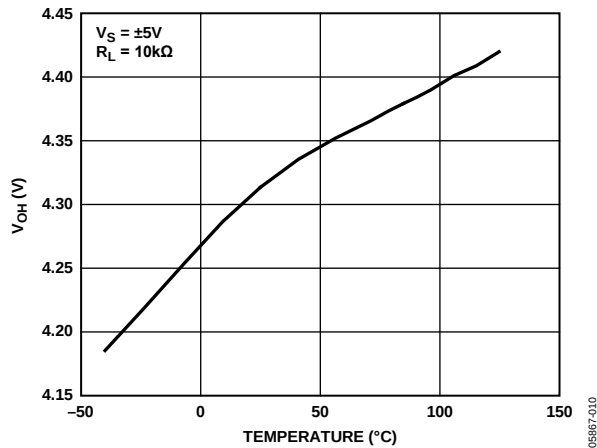


Figure 10. Positive Output Voltage Swing vs. Temperature

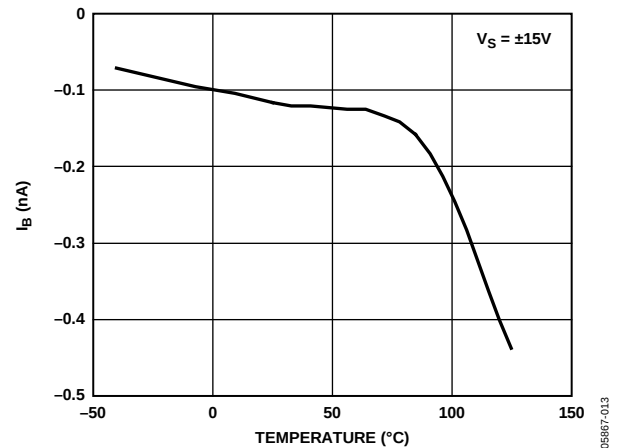


Figure 13. Input Bias Current vs. Temperature

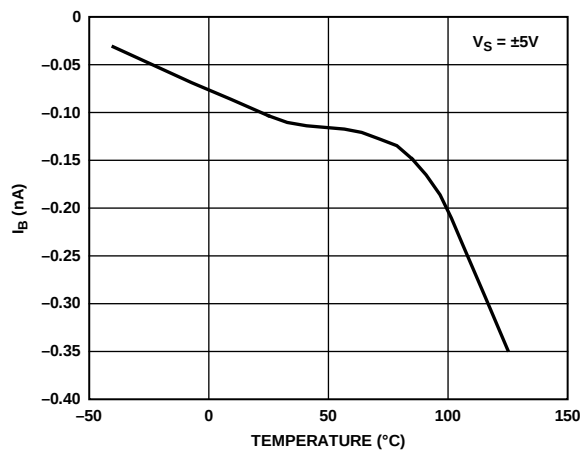


Figure 14. Input Bias Current vs. Temperature

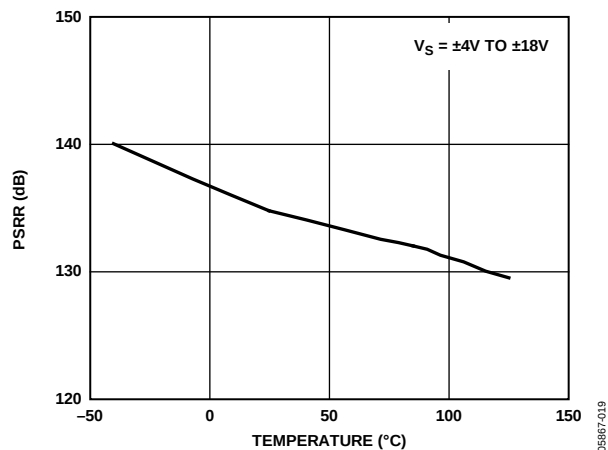


Figure 17. PSRR vs. Temperature

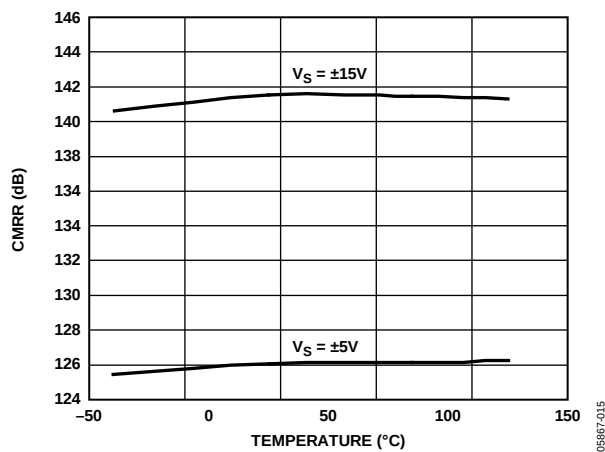


Figure 15. CMRR vs. Temperature

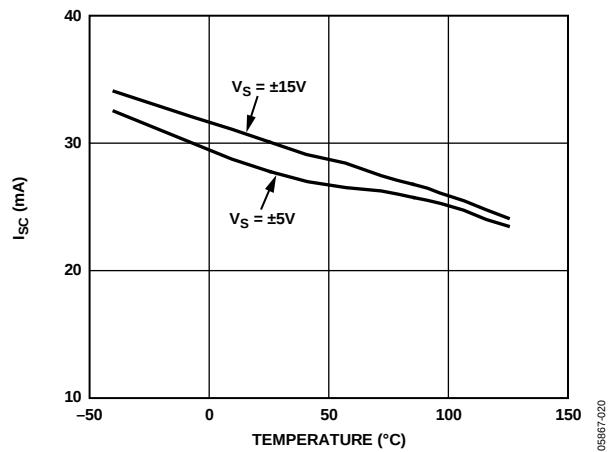


Figure 18. Short-Circuit Current vs. Temperature

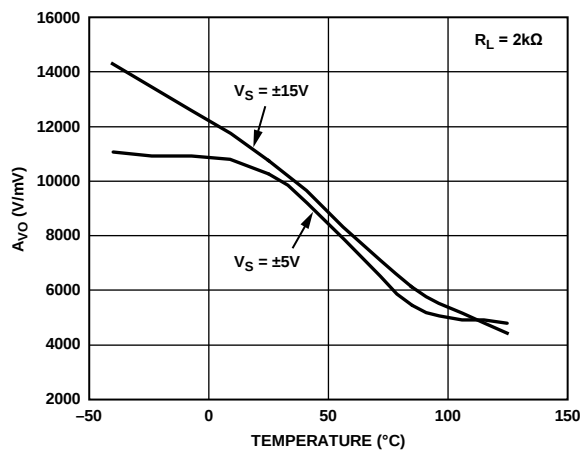


Figure 16. Open-Loop Gain vs. Temperature

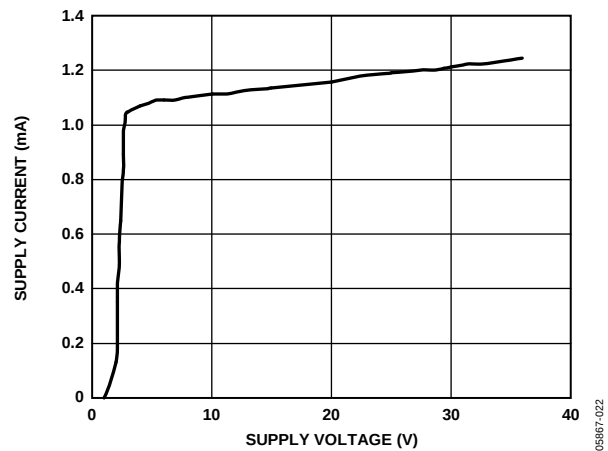


Figure 19. Supply Current vs. Supply Voltage

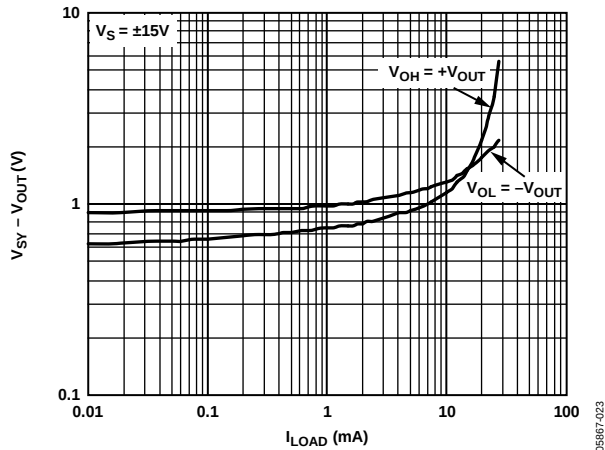


Figure 20. Output Voltage Swing vs. Load Current

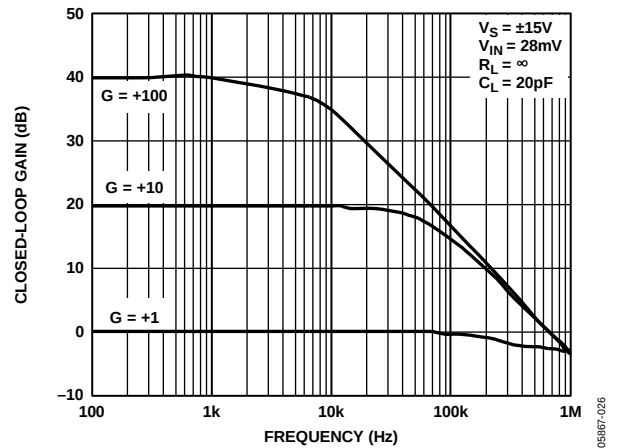


Figure 23. Closed-Loop Gain vs. Frequency

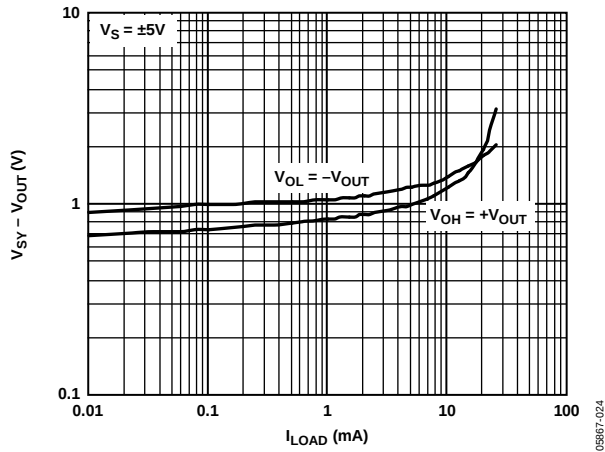


Figure 21. Output Voltage Swing vs. Load Current

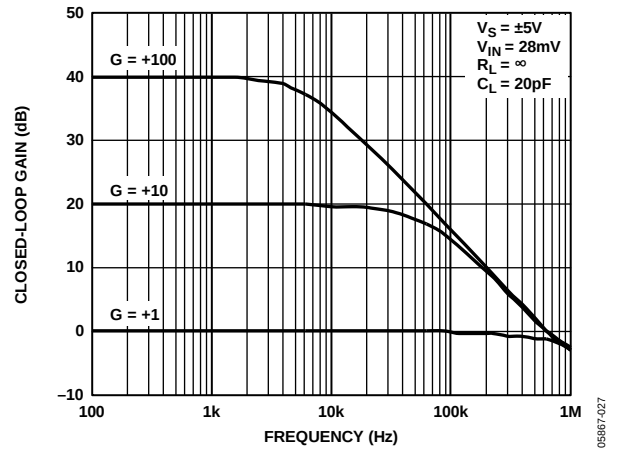


Figure 24. Closed-Loop Gain vs. Frequency

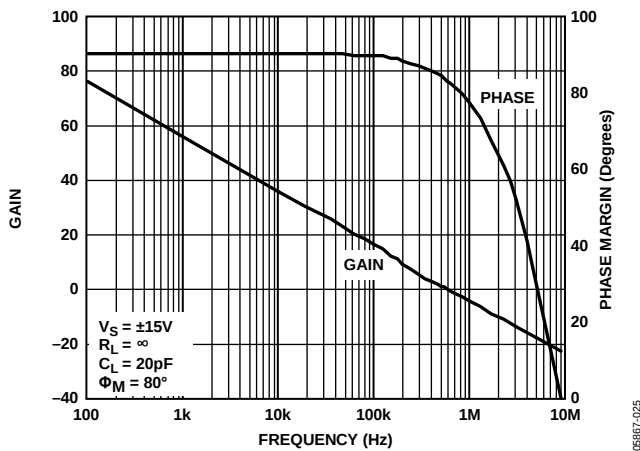


Figure 22. Open-Loop Gain and Phase vs. Frequency

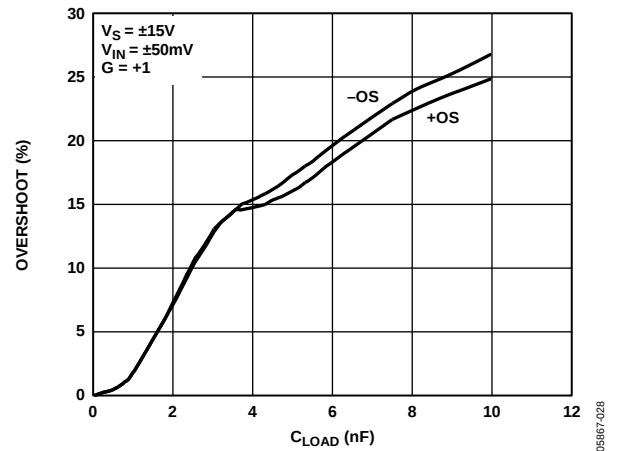


Figure 25. Overshoot vs. Capacitive Load

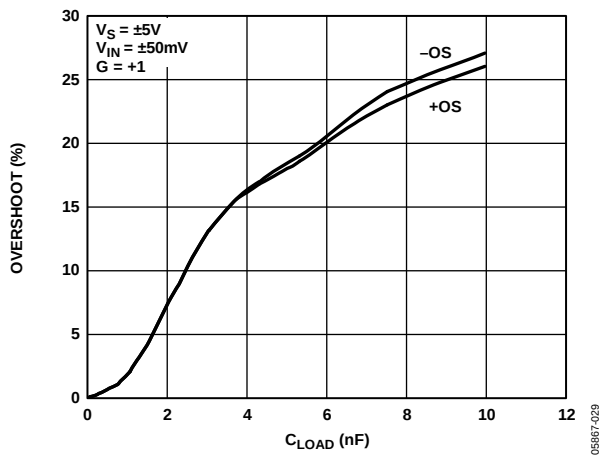


Figure 26. Overshoot vs. Capacitive Load

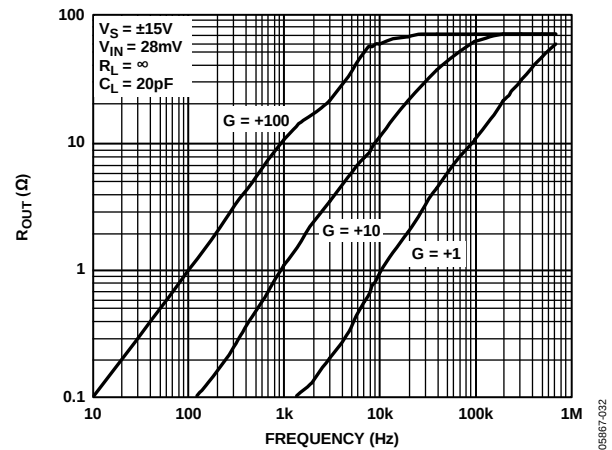


Figure 29. Output Impedance vs. Frequency

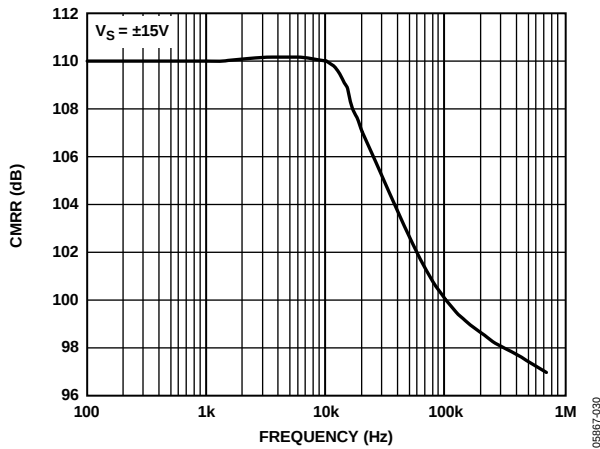


Figure 27. CMRR vs. Frequency

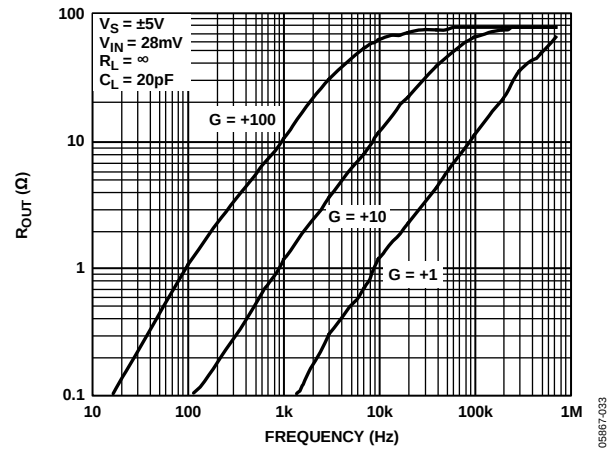


Figure 30. Output Impedance vs. Frequency

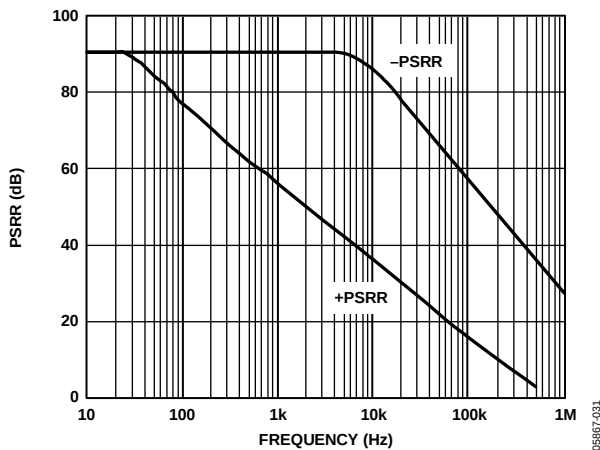


Figure 28. PSRR vs. Frequency

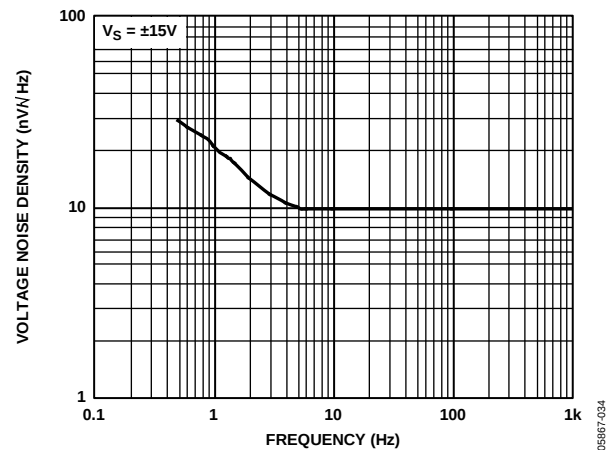


Figure 31. Voltage Noise Density vs. Frequency

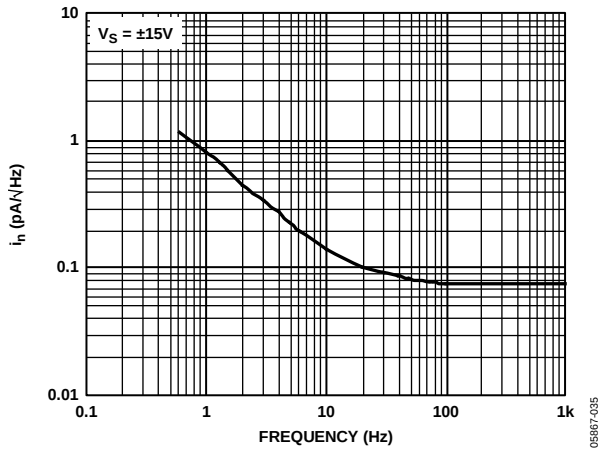


Figure 32. Current Noise Density vs. Frequency

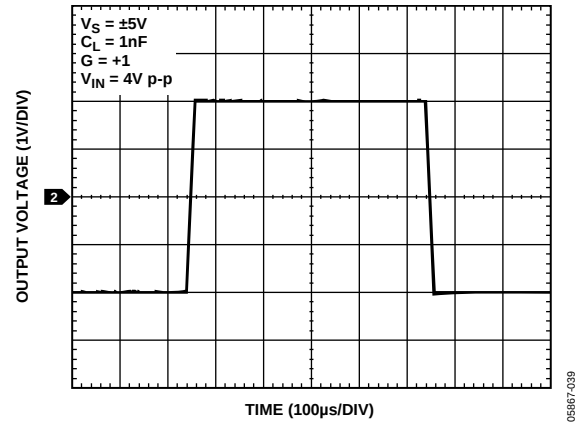


Figure 35. Large-Signal Transient

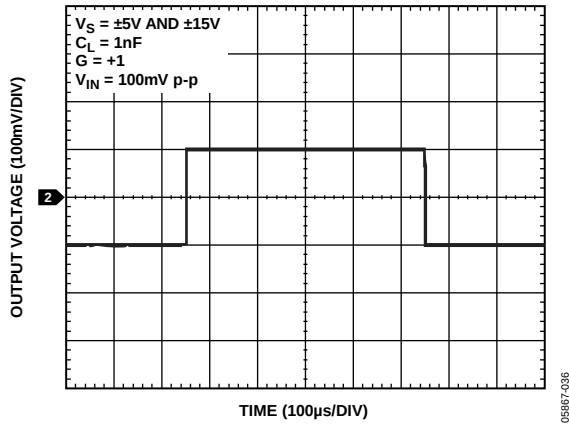


Figure 33. Small-Signal Transient

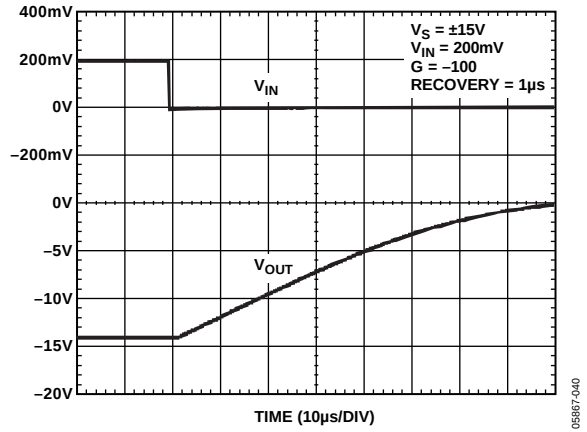


Figure 36. Positive Overload Recovery

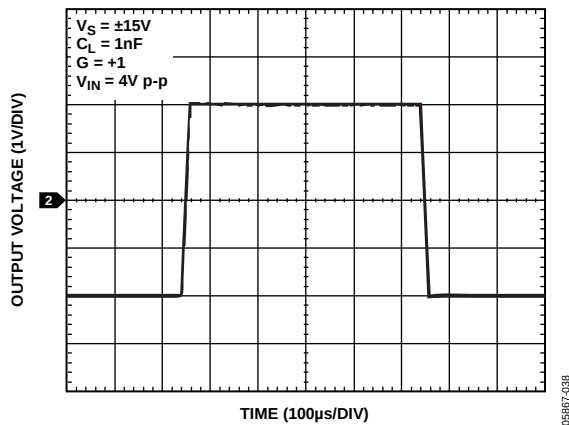


Figure 34. Large-Signal Transient

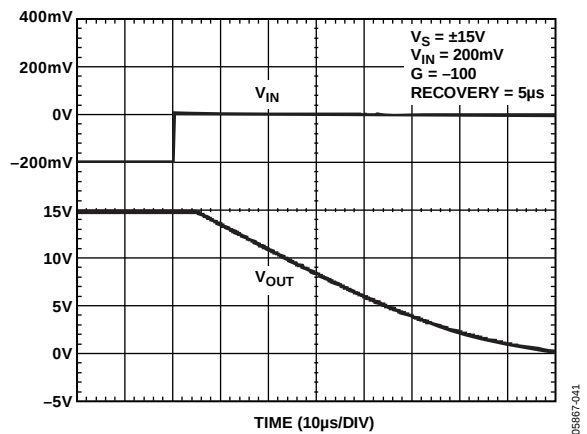


Figure 37. Negative Overload Recovery

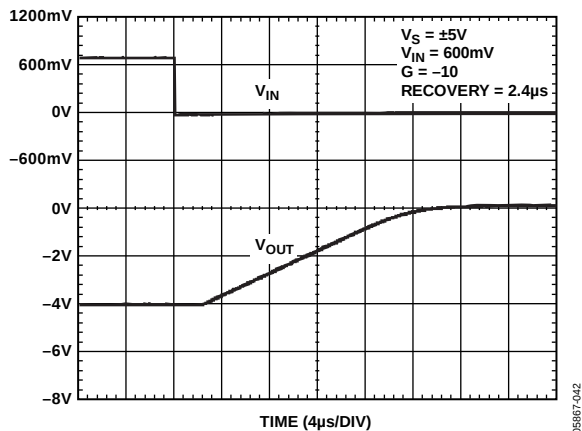


Figure 38. Positive Overload Recovery

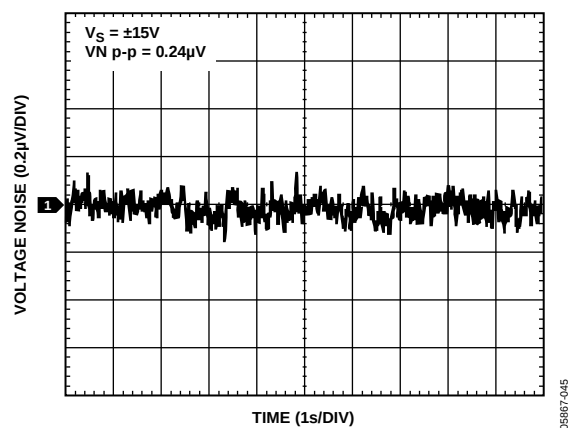


Figure 41. Voltage Noise (0.1 Hz to 10 Hz)

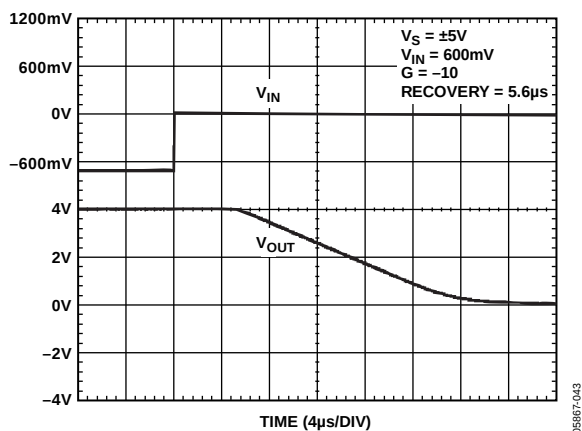


Figure 39. Negative Overload Recovery

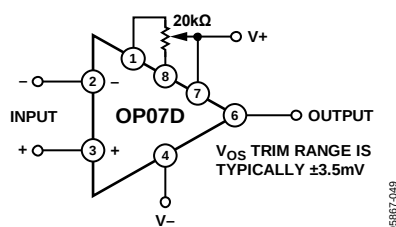


Figure 42. Optional Offset Nulling Circuit

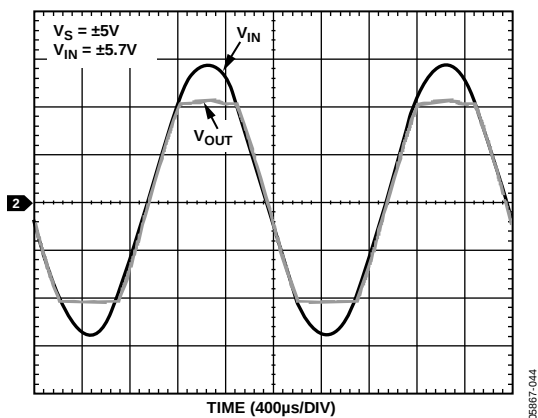


Figure 40. No Phase Reversal

OP07D

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Package Option
OP07DNZ	−40°C to +125°C	8-Lead PDIP	N-8
OP07DRZ	−40°C to +125°C	8-Lead SOIC_N	R-8
OP07DRZ-REEL	−40°C to +125°C	8-Lead SOIC_N	R-8
OP07DRZ-REEL7	−40°C to +125°C	8-Lead SOIC_N	R-8

¹ Z = RoHS Compliant Part.

NOTES

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NOTES