15 MHz, Rail-to-Rail, Dual Operational Amplifier

OP262-EP

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
- Enhanced product change notification
- Qualification data available on request
- Wide bandwidth: 15 MHz
- Low offset voltage: 325 µV maximum
- Low noise: 9.5 nV/√Hz @ 1 kHz
- Single-supply operation: 2.7 V to 12 V
- Low supply current: 850 µA maximum
- Rail-to-rail output swing
- Low TCV_{OS}: 1 µV/°C typical
- High slew rate: 13 V/µs
- No phase inversion
- Unity-gain stable

APPLICATIONS

- Portable instrumentation
- Sampling ADC amplifiers
- Precision filters

PIN CONFIGURATION

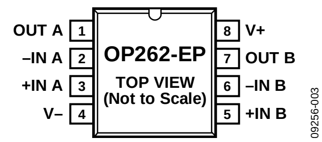

Figure 1. 8-Lead Narrow-Body SOIC (R Suffix)

GENERAL DESCRIPTION

The OP262-EP is a low power, precision op amp that features a rail-to-rail output and a 15 MHz bandwidth. With its low offset voltage of 45 µV (typical) and low noise, it is well suited for precision filter and control applications.

This product operates from a single supply as low as 2.7 V or from dual supplies up to ±6 V. The OP262-EP is specified over the military temperature range (−55°C to +125°C) and is available in an 8-lead SOIC_N package.

Additional applications information is available in the OP162/OP262/OP462 data sheet.

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REVISION HISTORY

7/10—Revision 0: Initial Version

SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

V_S = 5.0 V, V_{CM} = 0 V, T_A = 25°C, unless otherwise noted.

Table 1.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			45	325	µV
		−55°C ≤ T_A ≤ +125°C			1	mV
Input Bias Current	I_B			360	600	nA
		−55°C ≤ T_A ≤ +125°C			650	nA
Input Offset Current	I_{OS}			±2.5	±25	nA
		−55°C ≤ T_A ≤ +125°C			±40	nA
Input Voltage Range	V_{CM}		0		4	V
Common-Mode Rejection	CMRR	0 V ≤ V_{CM} ≤ 4.0 V, −55°C ≤ T_A ≤ +125°C	70	110		dB
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, 0.5 ≤ V_{OUT} ≤ 4.5 V		30		V/mV
		R_L = 10 kΩ, 0.5 ≤ V_{OUT} ≤ 4.5 V	65	88		V/mV
		R_L = 10 kΩ, −55°C ≤ T_A ≤ +125°C	40			V/mV
Offset Voltage Drift[1]	$\Delta V_{OS}/\Delta T$			1		µV/°C
Bias Current Drift	$\Delta I_B/\Delta T$			250		pA/°C
OUTPUT CHARACTERISTICS						
Output Voltage Swing High	V_{OH}	I_L = 250 µA, −55°C ≤ T_A ≤ +125°C	4.95	4.99		V
		I_L = 5 mA	4.85	4.94		V
Output Voltage Swing Low	V_{OL}	I_L = 250 µA, −55°C ≤ T_A ≤ +125°C		14	50	mV
		I_L = 5 mA		65	150	mV
Short-Circuit Current	I_{SC}	Short to ground		±80		mA
Maximum Output Current	I_{OUT}			±30		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = 2.7 V to 7 V		120		dB
		−55°C ≤ T_A ≤ +125°C	90			dB
Supply Current/Amplifier	I_{SY}	V_{OUT} = 2.5 V		500	700	µA
		−55°C ≤ T_A ≤ +125°C			850	µA
DYNAMIC PERFORMANCE						
Slew Rate	SR	1 V < V_{OUT} < 4 V, R_L = 10 kΩ		10		V/µs
Settling Time	t_S	To 0.1%, A_V = −1, V_O = 2 V step		540		ns
Gain Bandwidth Product	GBP			15		MHz
Phase Margin	φ_m			61		Degrees
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		0.5		µV p-p
Voltage Noise Density	e_n	f = 1 kHz		9.5		nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.4		pA/√Hz

[1] Offset voltage drift is the average of the −55°C to +25°C delta and the +25°C to +125°C delta.

V_S = 3.0 V, V_{CM} = 0 V, T_A = 25°C, unless otherwise noted.

Table 2.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			50	325	µV
		−55°C ≤ T_A ≤ +125°C			1	mV
Input Bias Current	I_B			360	600	nA
Input Offset Current	I_{OS}			±2.5	±25	nA
Input Voltage Range	V_{CM}		0		2	V
Common-Mode Rejection	CMRR	0 V ≤ V_{CM} ≤ 2.0 V, −55°C ≤ T_A ≤ +125°C	70	110		dB
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, 0.5 V ≤ V_{OUT} ≤ 2.5 V		20		V/mV
		R_L = 10 kΩ, 0.5 V ≤ V_{OUT} ≤ 2.5 V	20	30		V/mV
OUTPUT CHARACTERISTICS						
Output Voltage Swing High	V_{OH}	I_L = 250 µA	2.95	2.99		V
		I_L= 5 mA	2.85	2.93		V
Output Voltage Swing Low	V_{OL}	I_L = 250 µA		14	50	mV
		I_L= 5 mA		66	150	mV
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = 2.7 V to 7 V		110		dB
		−55°C ≤ T_A ≤ +125°C	60			dB
Supply Current/Amplifier	I_{SY}	V_{OUT} = 1.5 V		500	650	µA
		−55°C ≤ T_A ≤ +125°C			850	µA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 10 kΩ		10		V/µs
Settling Time	t_S	To 0.1%, A_V = −1, V_O = 2 V step		575		ns
Gain Bandwidth Product	GBP			15		MHz
Phase Margin	φ_m			59		Degrees
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		0.5		µV p-p
Voltage Noise Density	e_n	f = 1 kHz		9.5		nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.4		pA/√Hz

V_S = ±5.0 V, V_{CM} = 0 V, T_A = 25°C, unless otherwise noted.

Table 3.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			25	325	μV
		−55°C ≤ T_A ≤ +125°C			1	mV
Input Bias Current	I_B			260	500	nA
		−55°C ≤ T_A ≤ +125°C			650	nA
Input Offset Current	I_{OS}			±2.5	±25	nA
		−55°C ≤ T_A ≤ +125°C			±40	nA
Input Voltage Range	V_{CM}		−5		+4	V
Common-Mode Rejection	CMRR	−4.9 V ≤ V_{CM} ≤ +4.0 V, −55°C ≤ T_A ≤ +125°C	70	110		dB
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, −4.5 V ≤ V_{OUT} ≤ +4.5 V		35		V/mV
		R_L = 10 kΩ, −4.5 V ≤ V_{OUT} ≤ +4.5 V	75	120		V/mV
		−55°C ≤ T_A ≤ +125°C	25			V/mV
Long-Term Offset Voltage[1]	V_{OS}				600	μV
Offset Voltage Drift[2]	$\Delta V_{OS}/\Delta T$			1		μV/°C
Bias Current Drift	$\Delta I_B/\Delta T$			250		pA/°C
OUTPUT CHARACTERISTICS						
Output Voltage Swing High	V_{OH}	I_L = 250 μA, −55°C ≤ T_A ≤ +125°C	4.95	4.99		V
		I_L= 5 mA	4.85	4.94		V
Output Voltage Swing Low	V_{OL}	I_L = 250 μA, −55°C ≤ T_A ≤ +125°C		−4.99	−4.95	V
		I_L= 5 mA		−4.94	−4.85	V
Short-Circuit Current	I_{SC}	Short to ground		±80		mA
Maximum Output Current	I_{OUT}			±30		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = ±1.35 V to ±6 V		110		dB
		−55°C ≤ T_A ≤ +125°C	60			dB
Supply Current/Amplifier	I_{SY}	V_{OUT} = 0 V		650	800	μA
		−55°C ≤ T_A ≤ +125°C			1.15	mA
		V_{OUT} = 0 V		550	775	μA
		−55°C ≤ T_A ≤ +125°C			1	mA
Supply Voltage Range	V_S		3.0 (±1.5)		12 (±6)	V
DYNAMIC PERFORMANCE						
Slew Rate	SR	−4 V < V_{OUT} < +4 V, R_L = 10 kΩ		13		V/μs
Settling Time	t_S	To 0.1%, A_V = −1, V_O = 2 V step		475		ns
Gain Bandwidth Product	GBP			15		MHz
Phase Margin	φ_m			64		Degrees
NOISE PERFORMANCE						
Voltage Noise	e_n p-p	0.1 Hz to 10 Hz		0.5		μV p-p
Voltage Noise Density	e_n	f = 1 kHz		9.5		nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.4		pA/√Hz

[1] Long-term offset voltage is guaranteed by a 1000 hour life test performed on three independent lots at 125°C, with an LTPD of 1.3.
[2] Offset voltage drift is the average of the −55°C to +25°C delta and the +25°C to +125°C delta.

ABSOLUTE MAXIMUM RATINGS

Table 4.

Parameter	Min
Supply Voltage	±6 V
Input Voltage[1]	±6 V
Differential Input Voltage[2]	±0.6 V
Internal Power Dissipation	
SOIC (S)	Observe Derating Curves
Output Short-Circuit Duration	Observe Derating Curves
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−55°C to +125°C
Junction Temperature Range	−65°C to +150°C
Lead Temperature Range, (Soldering, 10 sec)	300°C

[1] For supply voltages greater than 6 V, the input voltage is limited to less than or equal to the supply voltage.
[2] For differential input voltages greater than 0.6 V, the input current should be limited to less than 5 mA to prevent degradation or destruction of the input devices.

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.

Table 5.

Package Type	θ_{JA}[1]	θ_{JC}	Unit
8-Lead SOIC (R)	157	56	°C/W

[1] θ_{JA} is specified for the worst-case conditions, that is, θ_{JA} is specified for a device soldered in circuit board for SOIC package.

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.

TYPICAL PERFORMANCE CHARACTERISTICS

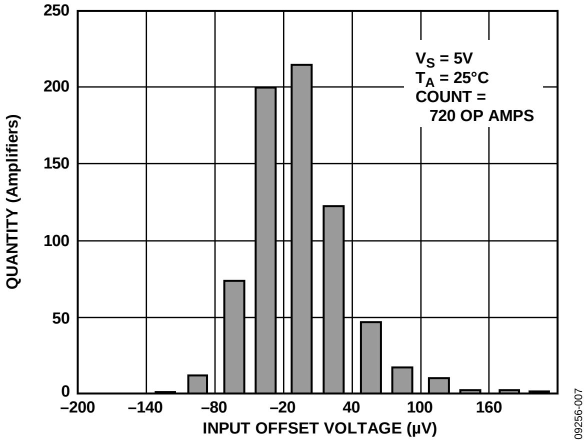

Figure 2. Input Offset Voltage Distribution

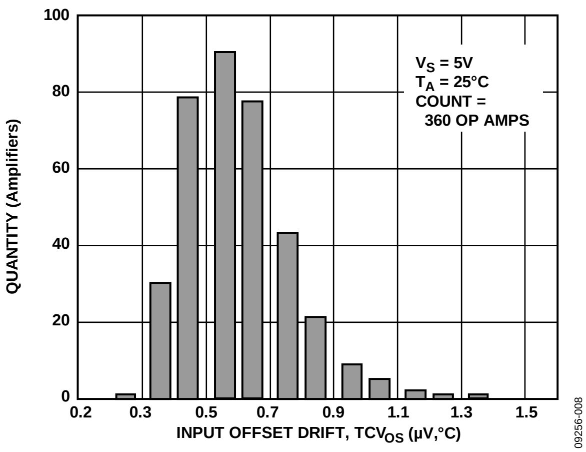

Figure 3. Input Offset Voltage Drift (TCV_{OS})

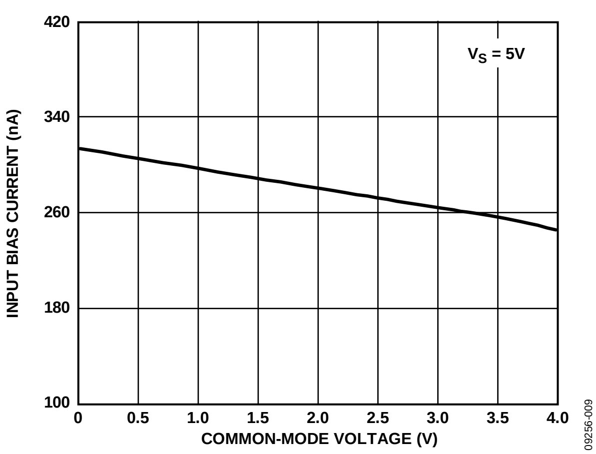

Figure 4. Input Bias Current vs. Common-Mode Voltage

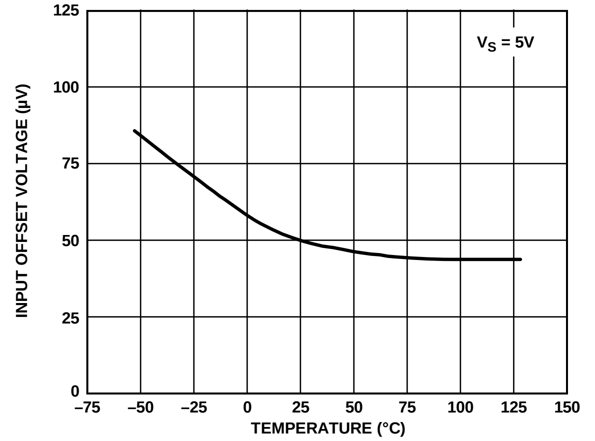

Figure 5. Input Offset Voltage vs. Temperature

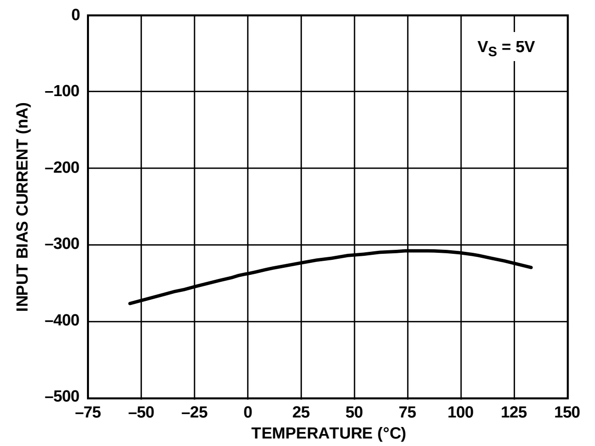

Figure 6. Input Bias Current vs. Temperature

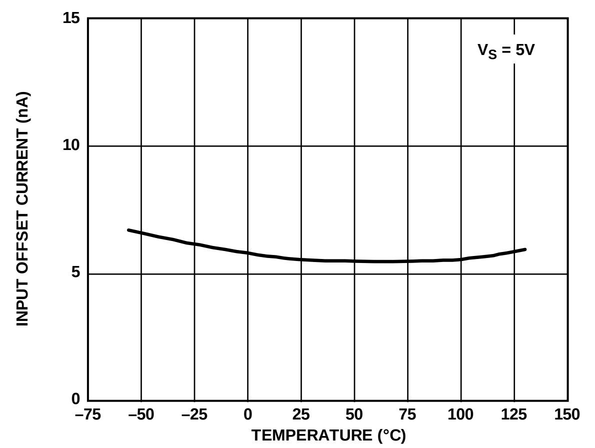

Figure 7. Input Offset Current vs. Temperature

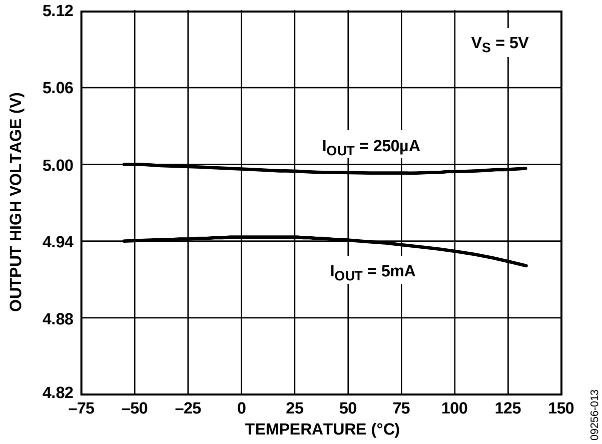

Figure 8. Output High Voltage vs. Temperature

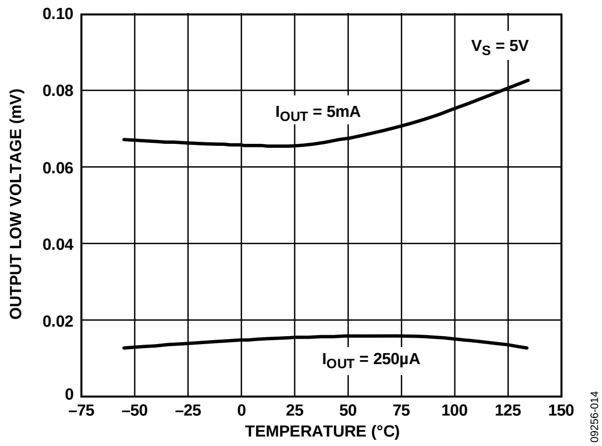

Figure 9. Output Low Voltage vs. Temperature

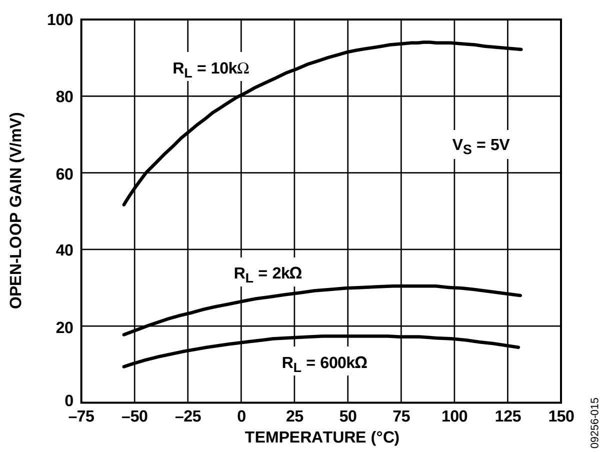

Figure 10. Open-Loop Gain vs. Temperature

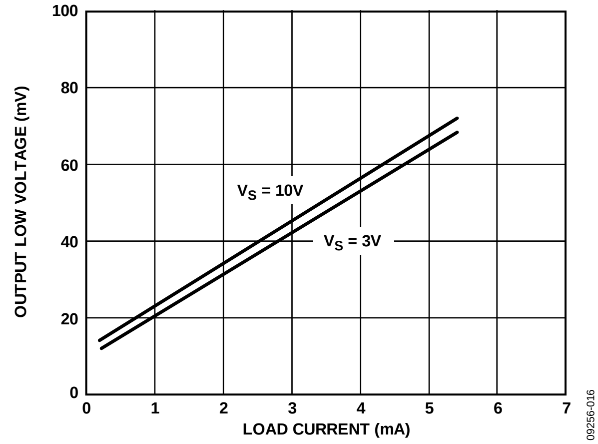

Figure 11. Output Low Voltage to Supply Rail vs. Load Current

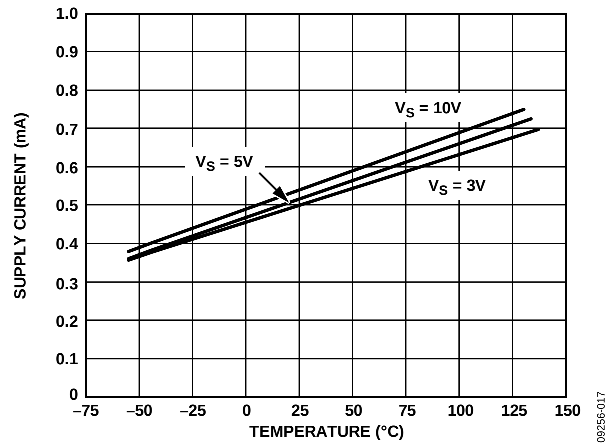

Figure 12. Supply Current/Amplifier vs. Temperature

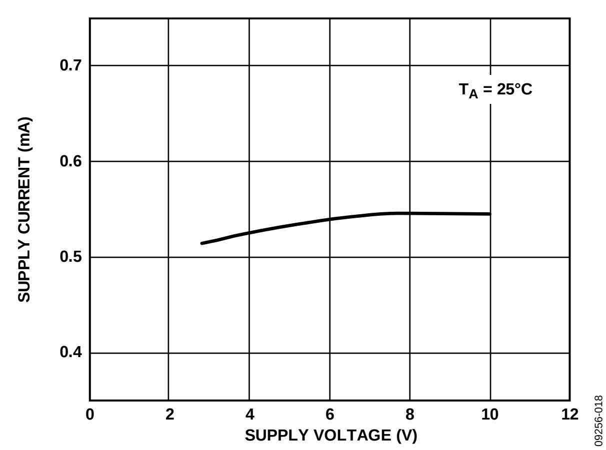

Figure 13. Supply Current/Amplifier vs. Supply Voltage

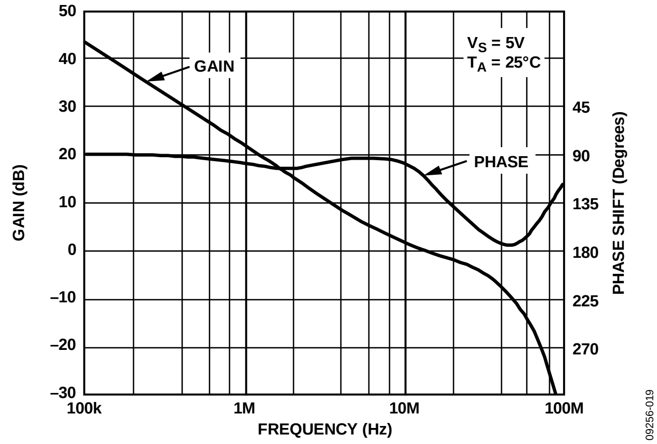

Figure 14. Open-Loop Gain and Phase vs. Frequency (No Load)

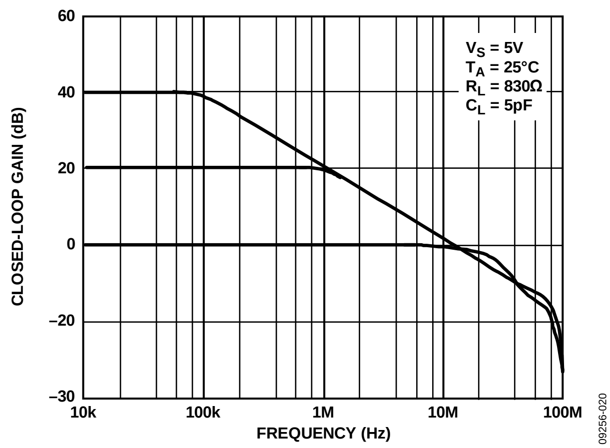

Figure 15. Closed-Loop Gain vs. Frequency

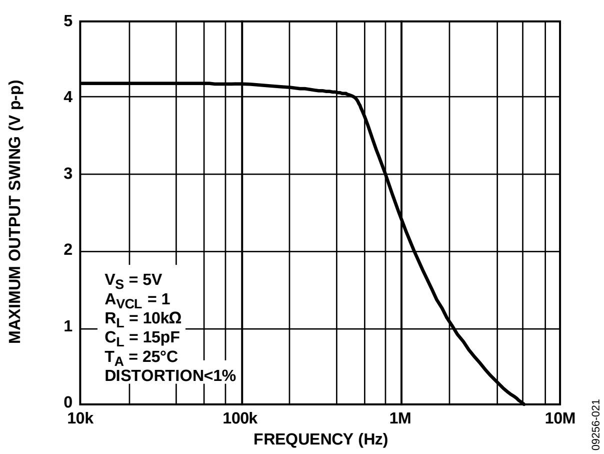

Figure 16. Maximum Output Swing vs. Frequency

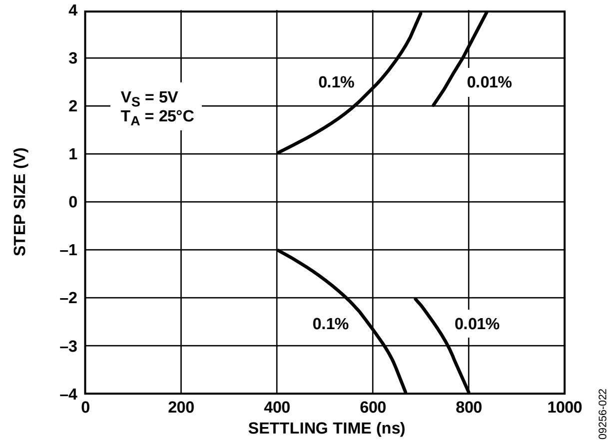

Figure 17. Step Size vs. Settling Time

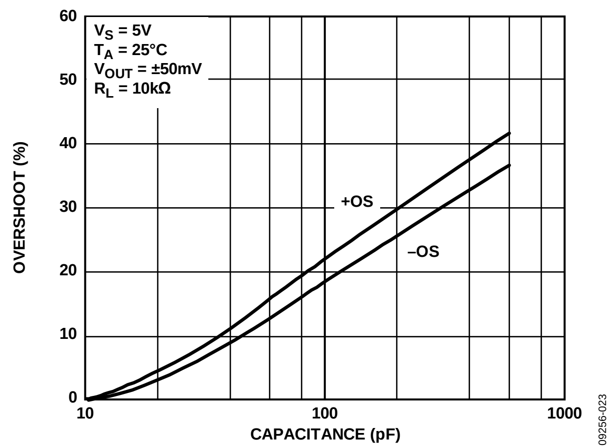

Figure 18. Small-Signal Overshoot vs. Capacitance

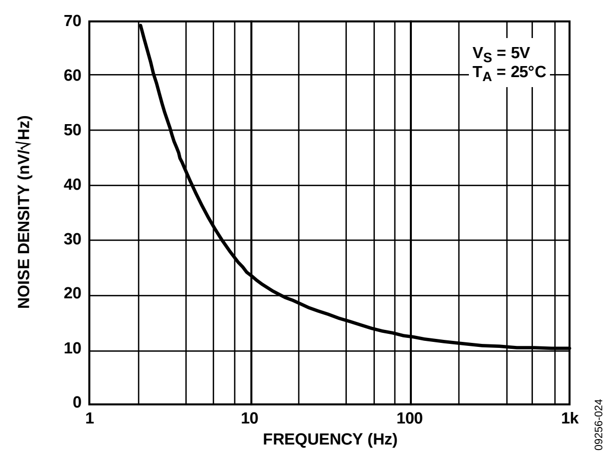

Figure 19. Voltage Noise Density vs. Frequency

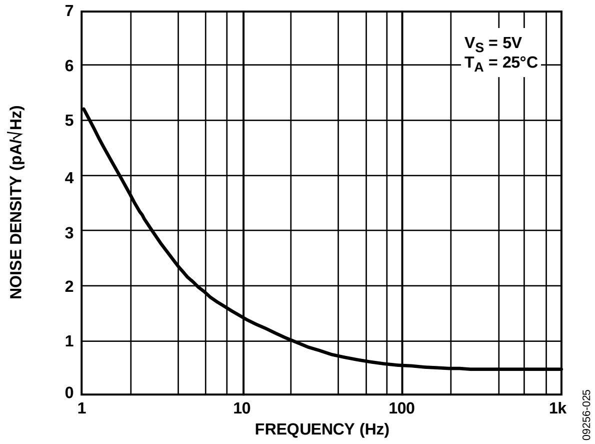

Figure 20. Current Noise Density vs. Frequency

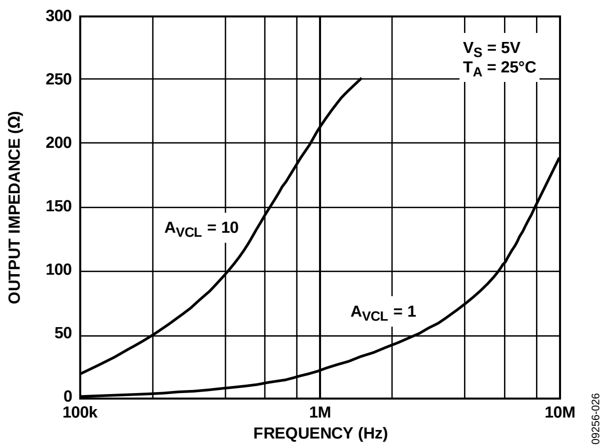

Figure 21. Output Impedance vs. Frequency

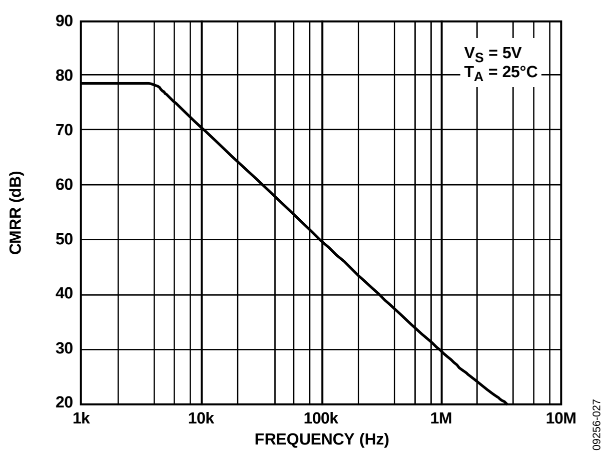

Figure 22. CMRR vs. Frequency

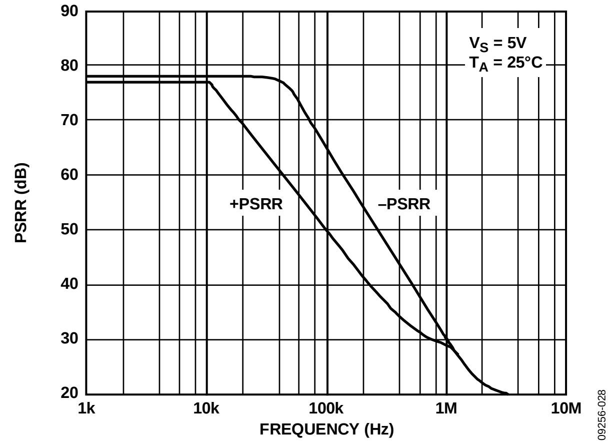

Figure 23. PSRR vs. Frequency

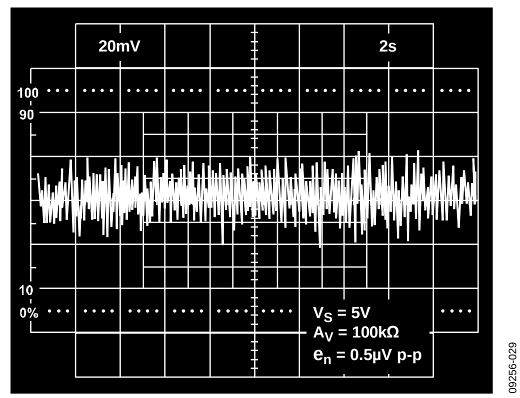

Figure 24. 0.1 Hz to 10 Hz Noise

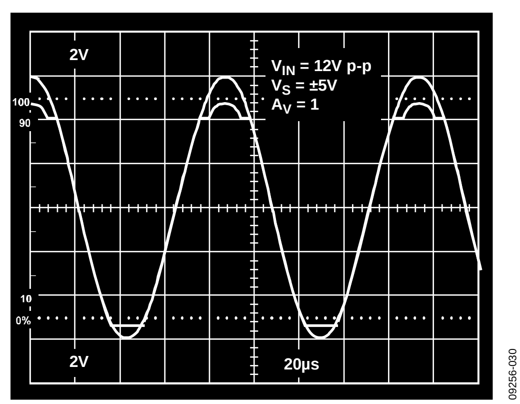

Figure 25. No Phase Reversal (V_{IN} = 12 V p-p, V_S = ±5 V, A_V = 1)

OUTLINE DIMENSIONS

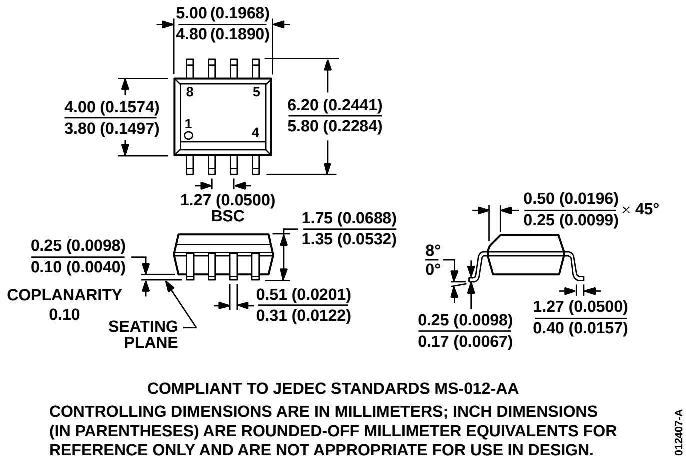

Figure 26. 8-Lead Standard Small Outline Package [SOIC_N]
Narrow Body
(R-8)
Dimensions shown in millimeters and (inches)

ORDERING GUIDE

Model[1]	Temperature Range	Package Description	Package Option
OP262TRZ-EP	−55°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8
OP262TRZ-EP-R7	−55°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8

[1] Z = RoHS Compliant Part.

NOTES

D09256-0-7/10(0)

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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Факс: 8 (812) 320-02-42
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Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.