ANALOG DEVICES

Precision, Very Low Noise, Low Input Bias Current Op Amp

Enhanced Product

AD8672-EP

FEATURES

Voltage noise density: 2.8 nV/√Hz typical
Peak-to-peak noise: 77 nV p-p typical
Gain bandwidth product: 10 MHz
Low input bias current: 14 nA maximum
Low offset voltage: 75 µV maximum
High open-loop gain: 1000 V/mV (120 dB)
Low supply current per amplifier: 3 mA typical
Dual-supply operation: ±5 V to ±15 V
Unity-gain stable
No phase reversal

ENHANCED PRODUCT FEATURES

Supports defense and aerospace applications (AQEC standard)
Extended 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

APPLICATIONS

Phase-locked loop (PLL) filters
Filters for GPS
Instrumentation
Sensors and controls
Professional quality audio

PIN CONFIGURATION

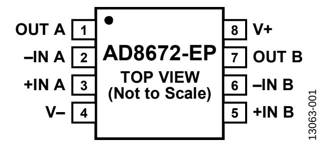

Figure 1.

GENERAL DESCRIPTION

The AD8672-EP is a very high precision amplifier featuring very low noise, very low offset voltage and drift, low input bias current, 10 MHz bandwidth, and low power consumption. Outputs are stable with capacitive loads of over 1000 pF. Supply current is less than 3 mA per amplifier at 30 V.

The combination of ultralow noise, high precision, speed, and stability within the AD8672-EP is unmatched. Applications for this amplifier include high quality PLL filters, precision filters, medical and analytical instrumentation, precision power supply controls, ATE, data acquisition, and precision controls, as well as professional quality audio.

The AD8672-EP is available in an 8-lead SOIC narrow package. It is specified over a −55°C to +125°C temperature range.

Additional application and technical information can be found in the AD8672 data sheet.

Rev. 0

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REVISION HISTORY

9/15—Revision 0: Initial Version

SPECIFICATIONS

ELECTRICAL CHARACTERISTICS, ±5 V

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

Table 1.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			20	75	µV
		−55°C < T_A < +125°C		30	125	µV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	−55°C < T_A < +125°C		0.3	0.8	µV/°C
Input Bias Current	I_B		−14	+3	+14	nA
		25°C < T_A < 125°C	−20	+5	+20	nA
		−55°C < T_A < +125°C	−60	+8	+60	nA
Input Offset Current	I_{OS}		−14	+6	+14	nA
		25°C < T_A < 125°C	−20	+6	+20	nA
		−55°C < T_A < +125°C	−60	+8	+60	nA
Input Voltage Range			−2.5		+2.5	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = −2.5 V to +2.5 V	100	120		dB
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, V_O = −3 V to +3 V	1000	6000		V/mV
Input Capacitance						
Common Mode	C_{INCM}			6.25		pF
Differential Mode	C_{INDM}			7.5		pF
Input Resistance						
Common Mode	R_{IN}			3.5		GΩ
Differential Mode	R_{INDM}			15		MΩ
OUTPUT CHARACTERISTICS						
Output Voltage						
High	V_{OH}	R_L = 2 kΩ, −55°C to +125°C	+3.8	+4.0		V
		R_L = 600 Ω	+3.7	+3.9		V
Low	V_{OL}	R_L = 2 kΩ, −55°C to +125°C		−3.9	−3.8	V
		R_L = 600 Ω		−3.8	−3.7	V
Output Current	I_{OUT}			±10		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = ±4 V to ±18 V	110	130		dB
Supply Current per Amplifier	I_{SY}	V_O = 0 V		3	3.5	mA
		−55°C < T_A < +125°C			4.2	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 2 kΩ		4		V/µs
Settling Time	t_S	To 0.1% (4 V step, G = 1)		1.4		µs
		To 0.01% (4 V step, G = 1)		5.1		µs
Gain Bandwidth Product	GBP			10		MHz
NOISE PERFORMANCE						
Peak-to-Peak Noise	$e_{n\ p\text{-}p}$	0.1 Hz to 10 Hz		77	100	nV p-p
Voltage Noise Density	e_n	f = 1 kHz		2.8	3.8	nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.3		pA/√Hz
Channel Separation	C_S	f = 1 kHz		−130		dB
		f = 10 kHz		−105		dB

ELECTRICAL CHARACTERISTICS, ±15 V

V_S = ±15.0 V, V_{CM} = 0 V, T_A = 25°C, unless otherwise specified.

Table 2.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			20	75	μV
		−55°C < T_A < +125°C		30	125	μV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	−55°C < T_A < +125°C		0.3	0.8	μV/°C
Input Bias Current	I_B		−14	+3	+14	nA
		25°C < T_A < 125°C	−20	+5	+20	nA
		−55°C < T_A < +125°C	−60	+8	+60	nA
Input Offset Current	I_{OS}		−14	+6	+14	nA
		25°C < T_A < 125°C	−20	+6	+20	nA
		−55°C < T_A < +125°C	−60	+8	+60	nA
Input Voltage Range			−12		+12	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = −12 V to +12 V	100	120		dB
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, V_O = −10 V to +10 V	1000	6000		V/mV
Input Capacitance						
Common Mode	C_{INCM}			6.25		pF
Differential Mode	C_{INDM}			7.5		pF
Input Resistance						
Common Mode	R_{IN}			3.5		GΩ
Differential Mode	R_{INDM}			15		MΩ
OUTPUT CHARACTERISTICS						
Output Voltage						
High	V_{OH}	R_L = 2 kΩ, −55°C to +125°C	13.2	13.8		V
		R_L = 600 Ω	11	12.3		V
Low	V_{OL}	R_L = 2 kΩ, −55°C to +125°C		−13.8	−13.2	V
		R_L = 600 Ω		−12.4	−11	V
Output Current	I_{OUT}			±20		mA
Short Circuit Current	I_{SC}			±30		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = ±4 V to ±18 V	110	130		dB
Supply Current per Amplifier	I_{SY}	V_O = 0 V		3	3.5	mA
		−55°C < T_A < +125°C			4.2	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 2 kΩ		4		V/μs
Settling Time	t_S	To 0.1% (10 V step, G = 1)		2.2		μs
		To 0.01% (10 V step, G = 1)		6.3		μs
Gain Bandwidth Product	GBP			10		MHz
NOISE PERFORMANCE						
Peak-to-Peak Noise	$e_{n\,p\text{-}p}$	0.1 Hz to 10 Hz		77	100	nV p-p
Voltage Noise Density	e_n	f = 1 kHz		2.8	3.8	nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.3		pA/√Hz
Channel Separation	C_S	f = 1 kHz		−130		dB
		f = 10 kHz		−105		dB

ABSOLUTE MAXIMUM RATINGS

Table 3.

Parameter	Rating
Supply Voltage	36 V
Input Voltage	V_{S-} to V_{S+}
Differential Input Voltage	±0.7 V
Output Short-Circuit Duration	Indefinite
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, 60 sec)	300°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.

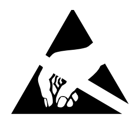
THERMAL RESISTANCE

θ_{JA} is specified for the worst-case conditions, that is, θ_{JA} is specified for the device soldered on a 4-layer circuit board for surface-mount packages.

Table 4.

Package Type	θ_{JA}	θ_{JC}	Unit
8-Lead SOIC_N (R-8)	120	43	°C/W

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 CHARATERISTICS

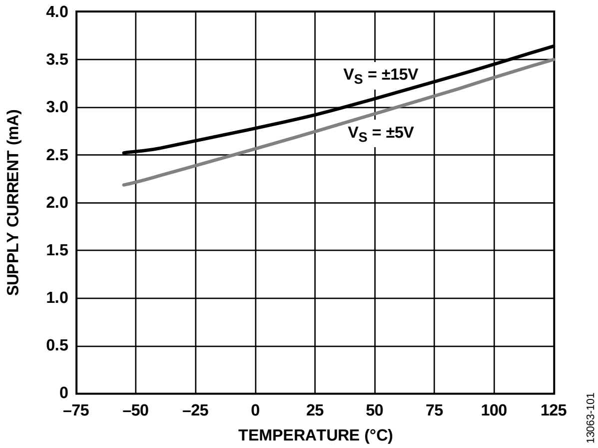


Figure 2. Supply Current vs. Temperature

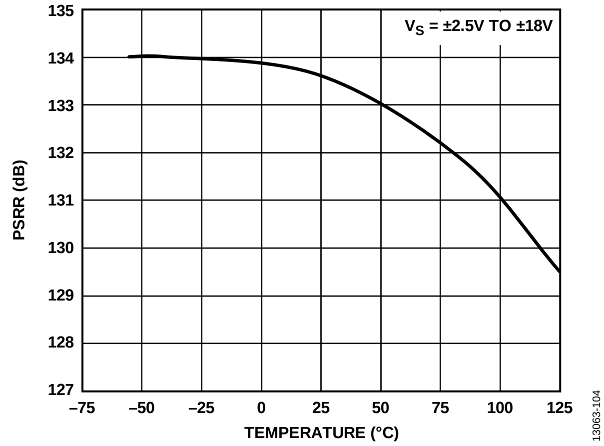


Figure 5. PSRR vs. Temperature

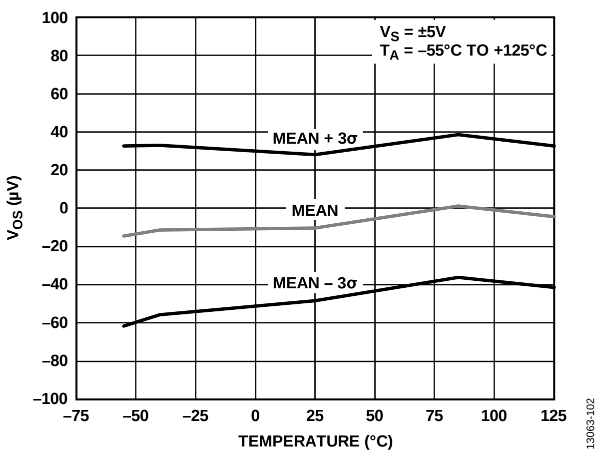


Figure 3. Input Offset Voltage (V_{OS}) vs. Temperature, V_S = ±5 V

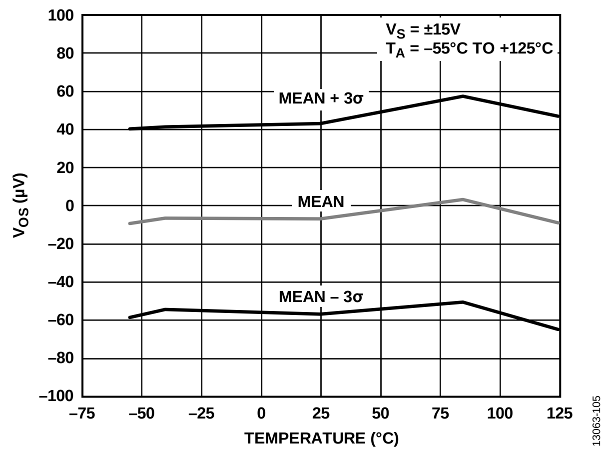


Figure 6. Input Offset Voltage (V_{OS}) vs. Temperature, V_S = ±15 V

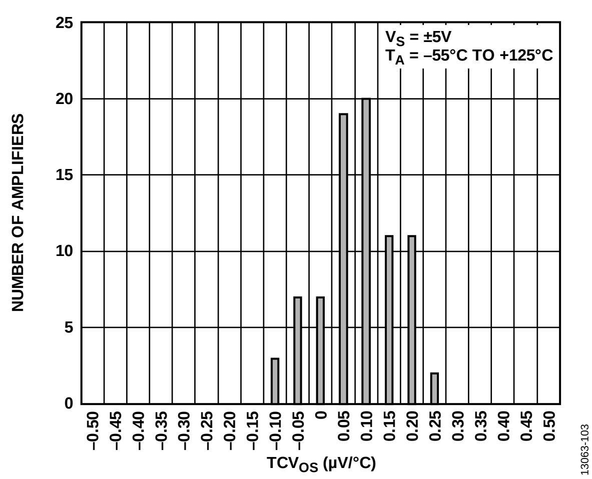


Figure 4. Input Offset Voltage Drift (TCV_{OS}) Distribution, V_S = ±5 V

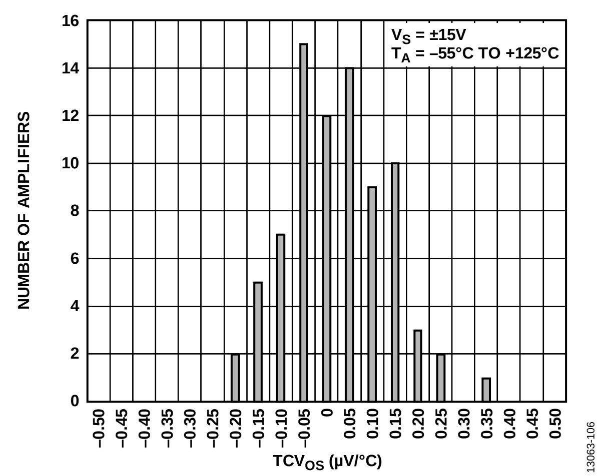


Figure 7. Input Offset Voltage Drift (TCV_{OS}) Distribution, V_S = ±15 V

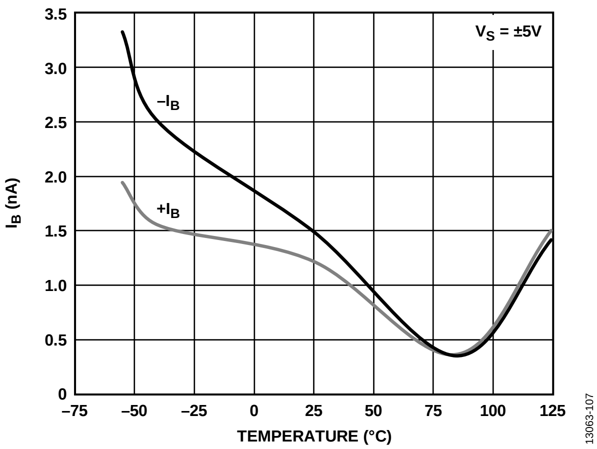


Figure 8. Input Bias Current (I_B) vs. Temperature, V_S = ±5 V

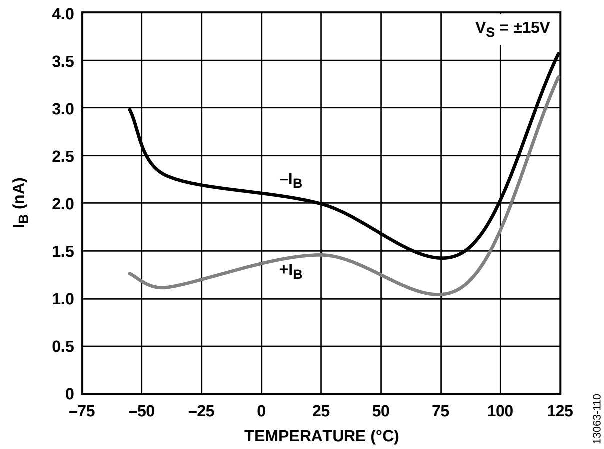


Figure 11. Input Bias Current (I_B) vs. Temperature, V_S = ±15 V

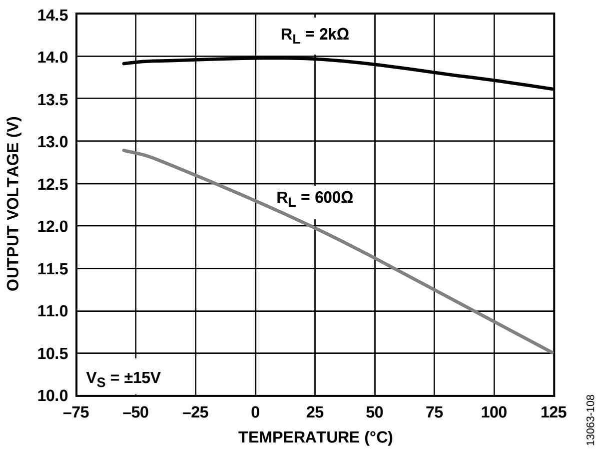


Figure 9. Output Voltage High vs. Temperature

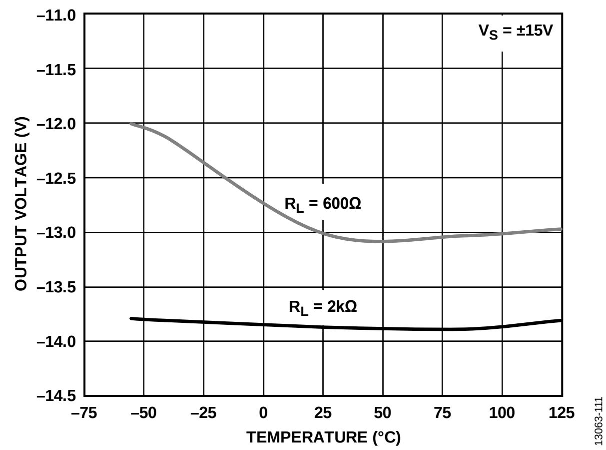


Figure 12. Output Voltage Low vs. Temperature

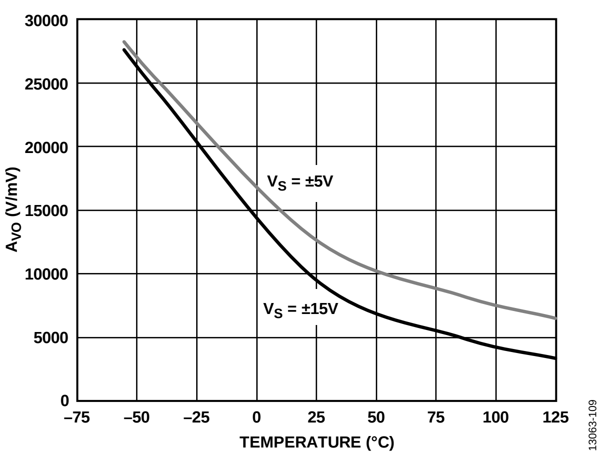


Figure 10. Open-Loop Gain (A_{VO}) vs. Temperature

OUTLINE DIMENSIONS

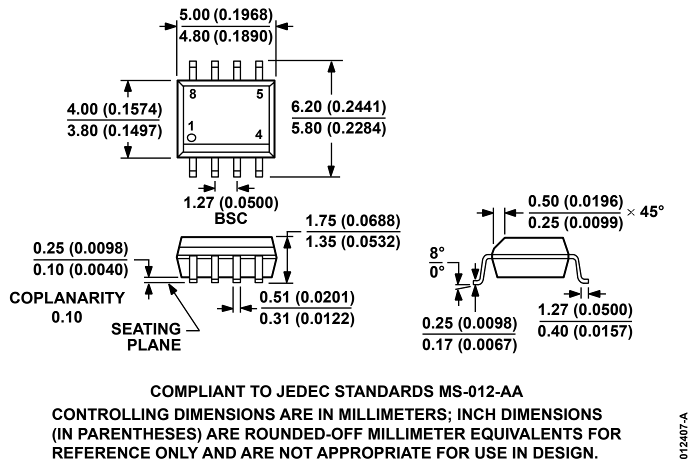


Figure 13. 8-Lead Standard Small Outline Package [SOIC_N]
Narrow Body (R-8)
Dimensions shown in millimeters and (inches)

ORDERING GUIDE

Model[1]	Temperature Range	Package Description	Package Option
AD8672TRZ-EP	−55°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8
AD8672TRZ-EP-R7	−55°C to +125°C	8-Lead Standard Small Outline Package [SOIC_N]	R-8

[1] Z = RoHS Compliant Part.

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- 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.);

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- 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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