

## 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

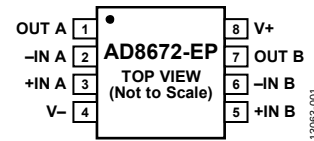


Figure 1.

## 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.

TABLE OF CONTENTS

|                                                    |   |                                                     |   |
|----------------------------------------------------|---|-----------------------------------------------------|---|
| Features .....                                     | 1 | Electrical Characteristics, $\pm 15\text{ V}$ ..... | 4 |
| Enhanced Product Features .....                    | 1 | Absolute Maximum Ratings .....                      | 5 |
| Applications.....                                  | 1 | Thermal Resistance .....                            | 5 |
| Pin Configuration.....                             | 1 | ESD Caution.....                                    | 5 |
| General Description .....                          | 1 | Typical Performance Characteristics .....           | 6 |
| Revision History .....                             | 2 | Outline Dimensions .....                            | 8 |
| Specifications.....                                | 3 | Ordering Guide .....                                | 8 |
| Electrical Characteristics, $\pm 5\text{ V}$ ..... | 3 |                                                     |   |

REVISION HISTORY

9/15—Revision 0: Initial Version

## SPECIFICATIONS

### ELECTRICAL CHARACTERISTICS, $\pm 5$ V

$V_{SY} = \pm 5.0$  V,  $V_{CM} = 0$  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               | $V_{OS}$                 | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      | 20       | 75   | $\mu\text{V}$                |
|                              |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      | 30       | 125  | $\mu\text{V}$                |
| Offset Voltage Drift         | $\Delta V_{OS}/\Delta T$ | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      | 0.3      | 0.8  | $\mu\text{V}/^\circ\text{C}$ |
| Input Bias Current           | $I_B$                    | $25^\circ\text{C} < T_A < 125^\circ\text{C}$                       | -14  | +3       | +14  | nA                           |
|                              |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -20  | +5       | +20  | nA                           |
|                              |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -60  | +8       | +60  | nA                           |
| Input Offset Current         | $I_{OS}$                 | $25^\circ\text{C} < T_A < 125^\circ\text{C}$                       | -14  | +6       | +14  | nA                           |
|                              |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -20  | +6       | +20  | nA                           |
|                              |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -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    | $A_{VO}$                 | $R_L = 2$ k $\Omega$ , $V_O = -3$ 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      |      | G $\Omega$                   |
| Differential Mode            | $R_{INDM}$               |                                                                    |      | 15       |      | M $\Omega$                   |
| OUTPUT CHARACTERISTICS       |                          |                                                                    |      |          |      |                              |
| Output Voltage               |                          |                                                                    |      |          |      |                              |
| High                         | $V_{OH}$                 | $R_L = 2$ k $\Omega$ , $-55^\circ\text{C}$ to $+125^\circ\text{C}$ | +3.8 | +4.0     |      | V                            |
|                              |                          | $R_L = 600$ $\Omega$                                               | +3.7 | +3.9     |      | V                            |
| Low                          | $V_{OL}$                 | $R_L = 2$ k $\Omega$ , $-55^\circ\text{C}$ to $+125^\circ\text{C}$ |      | -3.9     | -3.8 | V                            |
|                              |                          | $R_L = 600$ $\Omega$                                               |      | -3.8     | -3.7 | V                            |
| Output Current               | $I_{OUT}$                |                                                                    |      | $\pm 10$ |      | mA                           |
| POWER SUPPLY                 |                          |                                                                    |      |          |      |                              |
| Power Supply Rejection Ratio | PSRR                     | $V_S = \pm 4$ V to $\pm 18$ V                                      | 110  | 130      |      | dB                           |
| Supply Current per Amplifier | $I_{SY}$                 | $V_O = 0$ V                                                        |      | 3        | 3.5  | mA                           |
|                              |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      |          | 4.2  | mA                           |
| DYNAMIC PERFORMANCE          |                          |                                                                    |      |          |      |                              |
| Slew Rate                    | SR                       | $R_L = 2$ k $\Omega$                                               |      | 4        |      | V/ $\mu\text{s}$             |
| Settling Time                | $t_S$                    | To 0.1% (4 V step, $G = 1$ )                                       |      | 1.4      |      | $\mu\text{s}$                |
|                              |                          | To 0.01% (4 V step, $G = 1$ )                                      |      | 5.1      |      | $\mu\text{s}$                |
| Gain Bandwidth Product       | GBP                      |                                                                    |      | 10       |      | MHz                          |
| NOISE PERFORMANCE            |                          |                                                                    |      |          |      |                              |
| Peak-to-Peak Noise           | $e_{n\text{ p-p}}$       | 0.1 Hz to 10 Hz                                                    |      | 77       | 100  | nV p-p                       |
| Voltage Noise Density        | $e_n$                    | $f = 1$ kHz                                                        |      | 2.8      | 3.8  | nV/ $\sqrt{\text{Hz}}$       |
| Current Noise Density        | $i_n$                    | $f = 1$ kHz                                                        |      | 0.3      |      | pA/ $\sqrt{\text{Hz}}$       |
| Channel Separation           | $C_S$                    | $f = 1$ kHz                                                        |      | -130     |      | dB                           |
|                              |                          | $f = 10$ kHz                                                       |      | -105     |      | dB                           |

**ELECTRICAL CHARACTERISTICS,  $\pm 15$  V**

$V_S = \pm 15.0$  V,  $V_{CM} = 0$  V,  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

**Table 2.**

| Parameter                     | Symbol                   | Test Conditions/Comments                                           | Min  | Typ      | Max   | Unit                         |
|-------------------------------|--------------------------|--------------------------------------------------------------------|------|----------|-------|------------------------------|
| <b>INPUT CHARACTERISTICS</b>  |                          |                                                                    |      |          |       |                              |
| Offset Voltage                | $V_{OS}$                 | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      | 20       | 75    | $\mu\text{V}$                |
|                               |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      | 30       | 125   | $\mu\text{V}$                |
| Offset Voltage Drift          | $\Delta V_{OS}/\Delta T$ | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      | 0.3      | 0.8   | $\mu\text{V}/^\circ\text{C}$ |
| Input Bias Current            | $I_B$                    | $25^\circ\text{C} < T_A < 125^\circ\text{C}$                       | -14  | +3       | +14   | nA                           |
|                               |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -20  | +5       | +20   | nA                           |
|                               |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -60  | +8       | +60   | nA                           |
| Input Offset Current          | $I_{OS}$                 | $25^\circ\text{C} < T_A < 125^\circ\text{C}$                       | -14  | +6       | +14   | nA                           |
|                               |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -20  | +6       | +20   | nA                           |
|                               |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     | -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     | $A_{VO}$                 | $R_L = 2$ k $\Omega$ , $V_O = -10$ 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      |       | G $\Omega$                   |
| Differential Mode             | $R_{INDM}$               |                                                                    |      | 15       |       | M $\Omega$                   |
| <b>OUTPUT CHARACTERISTICS</b> |                          |                                                                    |      |          |       |                              |
| Output Voltage                |                          |                                                                    |      |          |       |                              |
| High                          | $V_{OH}$                 | $R_L = 2$ k $\Omega$ , $-55^\circ\text{C}$ to $+125^\circ\text{C}$ | 13.2 | 13.8     |       | V                            |
|                               |                          | $R_L = 600$ $\Omega$                                               | 11   | 12.3     |       | V                            |
| Low                           | $V_{OL}$                 | $R_L = 2$ k $\Omega$ , $-55^\circ\text{C}$ to $+125^\circ\text{C}$ |      | -13.8    | -13.2 | V                            |
|                               |                          | $R_L = 600$ $\Omega$                                               |      | -12.4    | -11   | V                            |
| Output Current                | $I_{OUT}$                |                                                                    |      | $\pm 20$ |       | mA                           |
| Short Circuit Current         | $I_{SC}$                 |                                                                    |      | $\pm 30$ |       | mA                           |
| <b>POWER SUPPLY</b>           |                          |                                                                    |      |          |       |                              |
| Power Supply Rejection Ratio  | PSRR                     | $V_S = \pm 4$ V to $\pm 18$ V                                      | 110  | 130      |       | dB                           |
| Supply Current per Amplifier  | $I_{SY}$                 | $V_O = 0$ V                                                        |      | 3        | 3.5   | mA                           |
|                               |                          | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                     |      |          | 4.2   | mA                           |
| <b>DYNAMIC PERFORMANCE</b>    |                          |                                                                    |      |          |       |                              |
| Slew Rate                     | SR                       | $R_L = 2$ k $\Omega$                                               |      | 4        |       | V/ $\mu\text{s}$             |
| Settling Time                 | $t_s$                    | To 0.1% (10 V step, $G = 1$ )                                      |      | 2.2      |       | $\mu\text{s}$                |
|                               |                          | To 0.01% (10 V step, $G = 1$ )                                     |      | 6.3      |       | $\mu\text{s}$                |
| Gain Bandwidth Product        | GBP                      |                                                                    |      | 10       |       | MHz                          |
| <b>NOISE PERFORMANCE</b>      |                          |                                                                    |      |          |       |                              |
| Peak-to-Peak Noise            | $e_{n\text{ p-p}}$       | 0.1 Hz to 10 Hz                                                    |      | 77       | 100   | nV p-p                       |
| Voltage Noise Density         | $e_n$                    | $f = 1$ kHz                                                        |      | 2.8      | 3.8   | nV/ $\sqrt{\text{Hz}}$       |
| Current Noise Density         | $i_n$                    | $f = 1$ kHz                                                        |      | 0.3      |       | pA/ $\sqrt{\text{Hz}}$       |
| 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                 | $\pm 0.7$ V                                     |
| Output Short-Circuit Duration              | Indefinite                                      |
| Storage Temperature Range                  | $-65^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |
| Operating Temperature Range                | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ |
| Junction Temperature Range                 | $-65^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |
| Lead Temperature Range (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

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

Table 4.

| Package Type        | $\theta_{JA}$ | $\theta_{JC}$ | Unit                        |
|---------------------|---------------|---------------|-----------------------------|
| 8-Lead SOIC_N (R-8) | 120           | 43            | $^{\circ}\text{C}/\text{W}$ |

## 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 CHARACTERISTICS

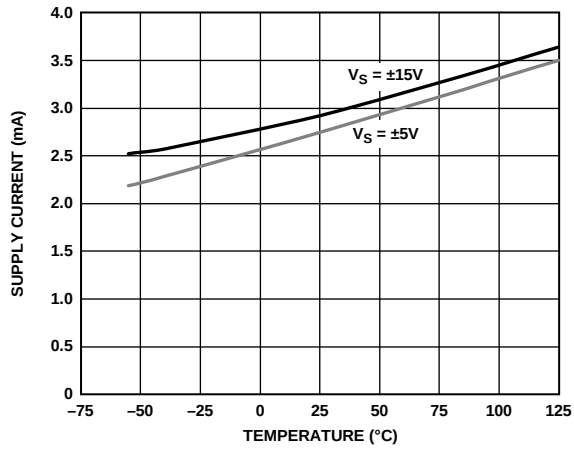


Figure 2. Supply Current vs. Temperature

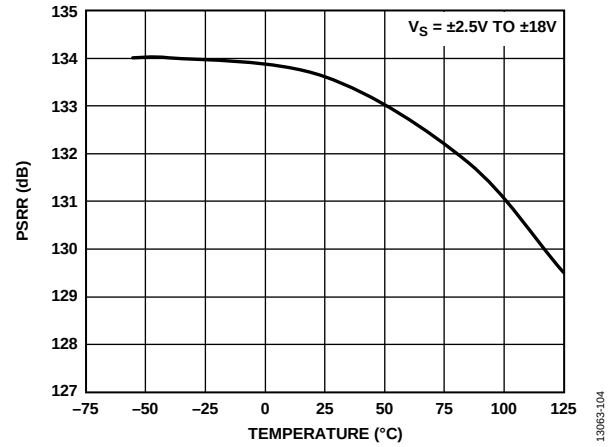
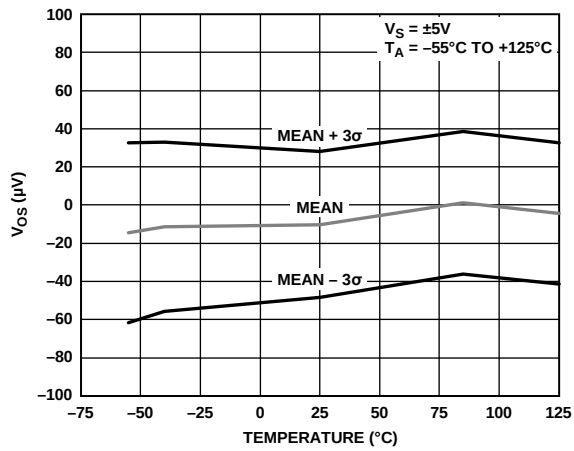
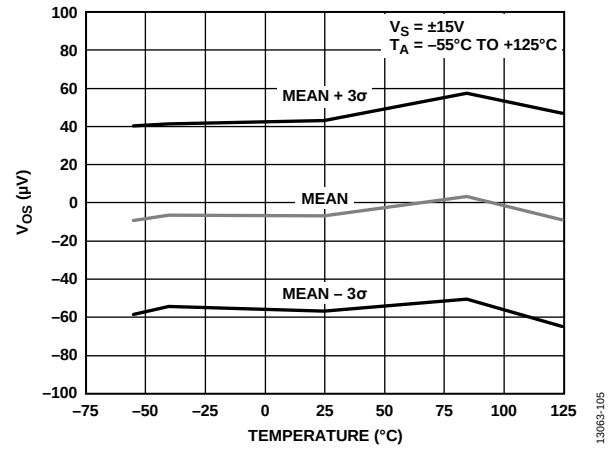
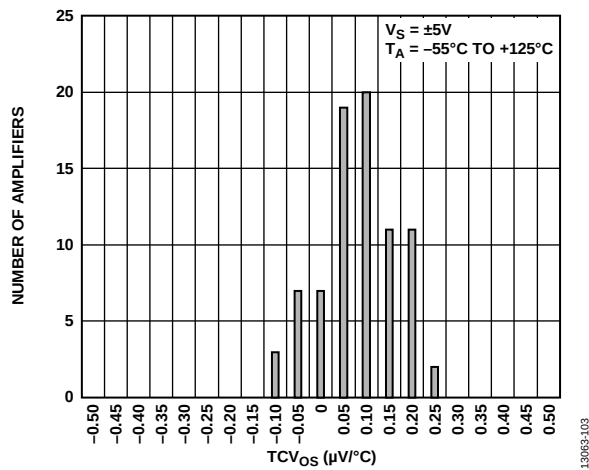
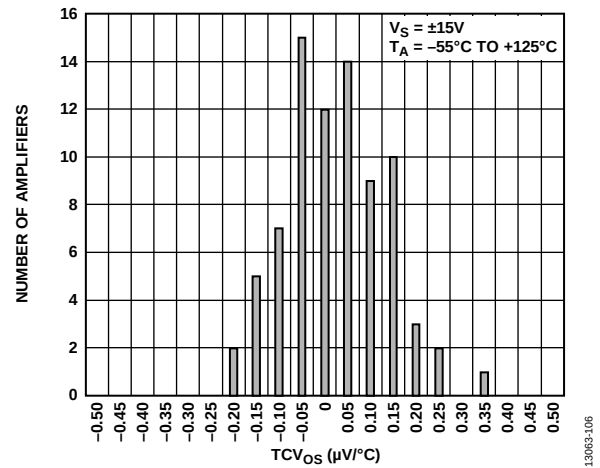


Figure 5. PSRR vs. Temperature

Figure 3. Input Offset Voltage ( $V_{OS}$ ) vs. Temperature,  $V_S = \pm 5 V$ Figure 6. Input Offset Voltage ( $V_{OS}$ ) vs. Temperature,  $V_S = \pm 15 V$ Figure 4. Input Offset Voltage Drift ( $TCV_{OS}$ ) Distribution,  $V_S = \pm 5 V$ Figure 7. Input Offset Voltage Drift ( $TCV_{OS}$ ) Distribution,  $V_S = \pm 15 V$

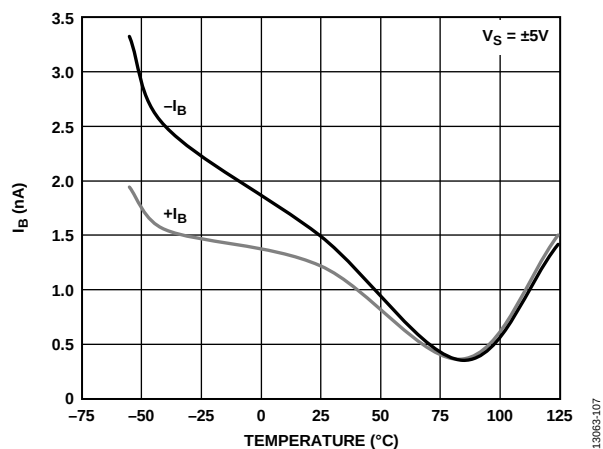
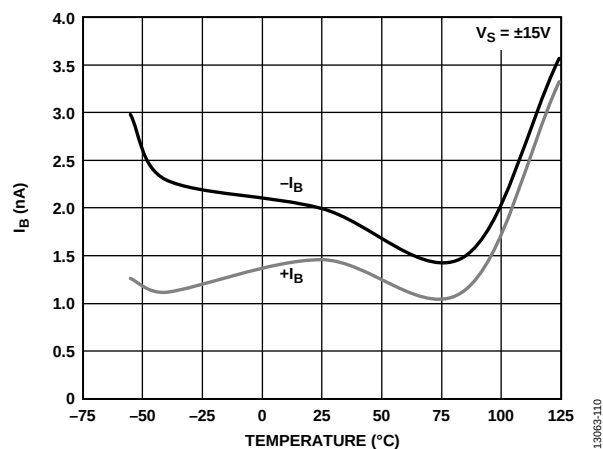
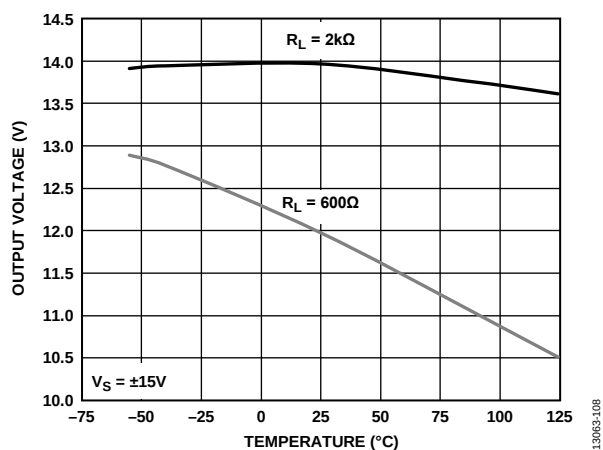
Figure 8. Input Bias Current ( $I_B$ ) vs. Temperature,  $V_S = \pm 5V$ Figure 11. Input Bias Current ( $I_B$ ) vs. Temperature,  $V_S = \pm 15V$ 

Figure 9. Output Voltage High vs. Temperature

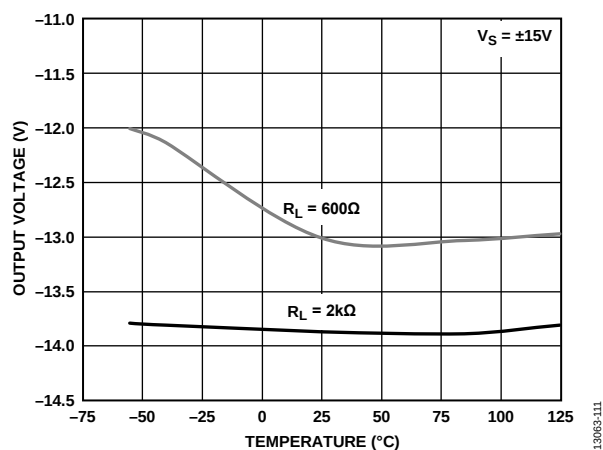
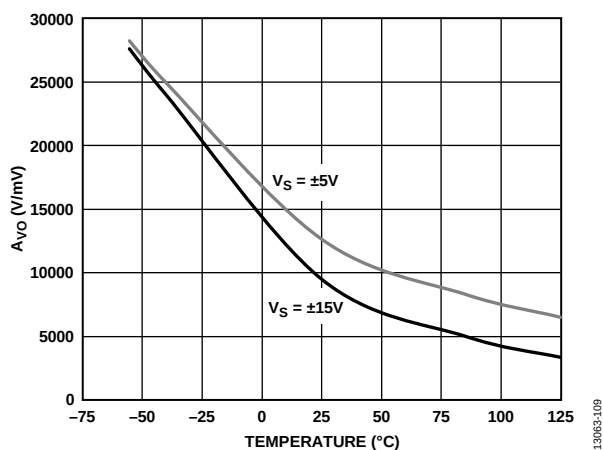
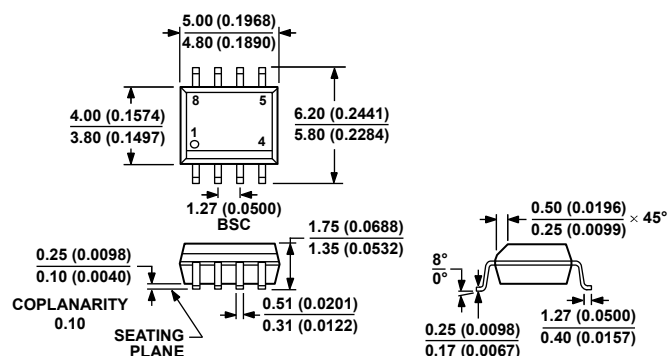


Figure 12. Output Voltage Low vs. Temperature

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

## OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AA  
 CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS  
 (IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR  
 REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 13. 8-Lead Standard Small Outline Package [SOIC\_N]  
 Narrow Body (R-8)

Dimensions shown in millimeters and (inches)

012407-A

## ORDERING GUIDE

| Model <sup>1</sup> | 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            |

<sup>1</sup> Z = RoHS Compliant Part.

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

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А