

### FEATURES

**TL082/TL084 compatible**  
**Low input bias current: 10 pA maximum**  
**Offset voltage**  
     5.5 mV maximum (ADTL082A/ADTL084A)  
     9 mV maximum (ADTL082J/ADTL084J)  
**±15 V operation**  
**Low noise: 16 nV/√Hz**  
**Wide bandwidth: 5 MHz**  
**Slew rate: 20 V/μs**  
**CMRR: 80 dB minimum**  
**Total harmonic distortion: 0.001%**  
**Supply current: 1.2 mA typical**  
**Unity-gain stable**

### APPLICATIONS

**General-purpose amplification**  
**Power control and monitoring**  
**Active filters**  
**Industrial/process control**  
**Data acquisition**  
**Sample and hold circuits**  
**Integrators**  
**Input buffering**

### GENERAL DESCRIPTION

The ADTL082 and ADTL084 are JFET input amplifiers that provide industry-leading performance over TL08x devices. The ADTL082A and ADTL084A are improved versions of TL08x A, I, and Q grades. The ADTL082J and ADTL084J are industry alternatives to the TL08x standard and C grades.

The ADTL08x family offers lower noise, offset voltage, offset drift over temperature, and bias current over the TL08x. In addition, the ADTL08x family has better common-mode rejection and slew rates.

These op amps are ideal for various applications, including process control, industrial and instrumentation equipment,

active filtering, data conversion, buffering, and power control and monitoring.

The A grade amplifiers are available in lead-free packaging. The standard grade amplifiers are available in both leaded and lead-free packaging.

The ADTL082A and ADTL084A are specified over the extended industrial (−40°C to +125°C) temperature range. The ADTL082J and ADTL084J are specified over the commercial (0°C to 70°C) temperature range.

### PIN CONFIGURATIONS

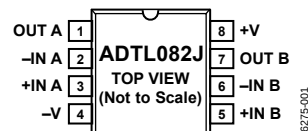


Figure 1. 8-Lead SOIC\_N (R-8)

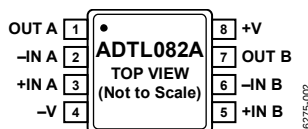


Figure 2. 8-Lead MSOP (RM-8)

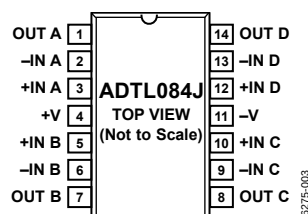


Figure 3. 14-Lead SOIC\_N (R-14)

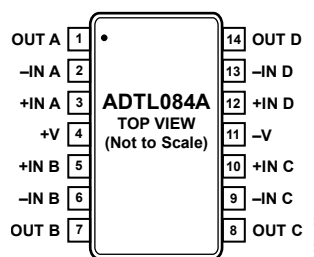


Figure 4. 14-Lead TSSOP (RU-14)

#### Rev. B

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REVISION HISTORY

|                                  |    |
|----------------------------------|----|
| 11/07—Rev. A to Rev. B           |    |
| Changes to Ordering Guide .....  | 10 |
| 4/07—Rev. 0 to Rev. A            |    |
| Changes to Table 1 .....         | 3  |
| 1/07—Revision 0: Initial Version |    |

## SPECIFICATIONS

$V_{CC} = \pm 15\text{ V}$ ,  $V_{CM} = 0\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , over all grades, unless otherwise noted.

Table 1.

| Parameter                    | Symbol               | Conditions                                                                          | J Grade |                  |     | A Grade |                  |     | Unit    |
|------------------------------|----------------------|-------------------------------------------------------------------------------------|---------|------------------|-----|---------|------------------|-----|---------|
|                              |                      |                                                                                     | Min     | Typ              | Max | Min     | Typ              | Max |         |
| INPUT CHARACTERISTICS        |                      |                                                                                     |         |                  |     |         |                  |     |         |
| Offset Voltage               | V <sub>OS</sub>      |                                                                                     |         | 2                | 9   |         | 1.5              | 5.5 | mV      |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ +70°C                                                        |         |                  |     |         |                  | 8   | mV      |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     |         |                  | 9   | mV      |
| Offset Voltage Drift         | ΔV <sub>OS</sub> /ΔT | 0°C ≤ T <sub>A</sub> ≤ +70°C                                                        |         | 15               |     |         |                  |     | μV/°C   |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     | 10      |                  |     | μV/°C   |
| Input Bias Current           | I <sub>B</sub>       |                                                                                     |         | 2                | 100 |         | 2                | 100 | pA      |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ +70°C                                                        |         |                  | 3   |         |                  | 3   | nA      |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     |         |                  | 5   | nA      |
| Input Offset Current         | I <sub>OS</sub>      |                                                                                     |         | 2                | 100 |         | 2                | 100 | pA      |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ 70°C                                                         |         |                  | 3   |         |                  | 3   | nA      |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     |         |                  | 5   | nA      |
| Input Voltage Range          | V <sub>CM</sub>      |                                                                                     | −11     |                  | +15 | −11     |                  | +15 | V       |
| Common-Mode Rejection Ratio  | CMRR                 | V <sub>CM</sub> = −11 V to +15 V                                                    | 80      | 86               |     | 80      | 86               |     | dB      |
| Input Impedance              | R <sub>IN</sub>      |                                                                                     |         | 10 <sup>12</sup> |     |         | 10 <sup>12</sup> |     | Ω       |
| Large Signal Voltage Gain    | A <sub>VO</sub>      | R <sub>L</sub> = 2 kΩ,<br>V <sub>O</sub> = −10 V to +10 V                           | 100     | 200              |     | 100     | 200              |     | V/mV    |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ 70°C                                                         | 90      | 200              |     | 90      | 200              |     | V/mV    |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     | 50      | 200              |     | V/mV    |
| OUTPUT CHARACTERISTICS       |                      |                                                                                     |         |                  |     |         |                  |     |         |
| Maximum Output Voltage Swing | V <sub>O</sub>       | R <sub>L</sub> = 10 kΩ                                                              | ±12     | ±13.5            |     | ±13     | ±13.5            |     | V       |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ +70°C                                                        | ±12     |                  |     | ±13     |                  |     | V       |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     | ±13     |                  |     | V       |
|                              |                      | R <sub>L</sub> = 2 kΩ                                                               |         |                  |     | ±12.5   | ±13.3            |     | V       |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ +70°C                                                        | ±10     |                  |     | ±12     |                  |     | V       |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     | ±12     |                  |     | V       |
| Short-Circuit Output Current | I <sub>SC</sub>      |                                                                                     |         | ±27              |     |         | ±27              |     | mA      |
| POWER SUPPLY                 |                      |                                                                                     |         |                  |     |         |                  |     |         |
| Power Supply Rejection Ratio | PSRR                 | V <sub>DD</sub> = 8 V to 36 V                                                       | 80      | 86               |     | 80      | 86               |     | dB      |
| Supply Current per Amplifier | I <sub>SY</sub>      |                                                                                     |         | 1.2              | 1.8 |         | 1.2              | 1.8 | mA      |
|                              |                      | 0°C ≤ T <sub>A</sub> ≤ +70°C                                                        |         |                  | 1.9 |         |                  | 1.9 | mA      |
|                              |                      | −40°C ≤ T <sub>A</sub> ≤ +125°C                                                     |         |                  |     |         |                  | 2.0 | mA      |
| DYNAMIC PERFORMANCE          |                      |                                                                                     |         |                  |     |         |                  |     |         |
| Slew Rate                    | SR                   |                                                                                     |         | 20               |     |         | 20               |     | V/μs    |
| Gain Bandwidth Product       | GBP                  |                                                                                     |         | 5                |     |         | 5                |     | MHz     |
| Phase Margin                 | φ <sub>M</sub>       |                                                                                     |         | 63               |     |         | 63               |     | Degrees |
| Total Harmonic Distortion    | THD                  | V <sub>IN</sub> = 6 V rms, f = 1 kHz,<br>A <sub>V</sub> = +1, R <sub>L</sub> = 2 kΩ |         | 0.001            |     |         | 0.001            |     | %       |
| Channel Separation           | CS                   | f = 10 kHz                                                                          |         | 120              |     |         | 120              |     | dB      |
| NOISE PERFORMANCE            |                      |                                                                                     |         |                  |     |         |                  |     |         |
| Voltage Noise Density        | e <sub>n</sub>       | f = 1 kHz                                                                           |         | 16               |     |         | 16               |     | nV/√Hz  |

## ABSOLUTE MAXIMUM RATINGS

Table 2.

| Parameter                           | Rating                                          |
|-------------------------------------|-------------------------------------------------|
| Supply Voltage                      | $\pm 18\text{ V}$ or $+36\text{ V}$             |
| Input Voltage                       | $\pm V$ supply                                  |
| Differential Input Voltage          | $\pm V$ supply                                  |
| Output Short Circuit to GND         | Indefinite                                      |
| Storage Temperature Range           | $-65^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |
| Operating Temperature Range         | $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ |
| Lead Temperature (Soldering 60 sec) | $300^{\circ}\text{C}$                           |
| Junction Temperature                | $150^{\circ}\text{C}$                           |

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

Table 3. Thermal Resistance

| Package Type          | $\theta_{JA}$ | $\theta_{JC}$ | Unit                 |
|-----------------------|---------------|---------------|----------------------|
| 8-Lead SOIC_N (R-8)   | 158           | 43            | $^{\circ}\text{C/W}$ |
| 8-Lead MSOP (RM-8)    | 210           | 45            | $^{\circ}\text{C/W}$ |
| 14-Lead SOIC_N (R-14) | 120           | 36            | $^{\circ}\text{C/W}$ |
| 14-Lead TSSOP (RU-14) | 180           | 35            | $^{\circ}\text{C/W}$ |

## POWER SEQUENCING

The op amp supplies must be established simultaneously with, or before, the application of any input signals.

If this is not possible, the input current must be limited to 10 mA.

## 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

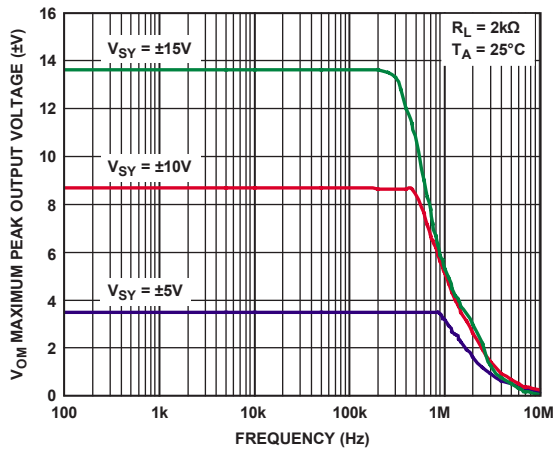


Figure 5. Maximum Peak Output Voltage vs. Frequency

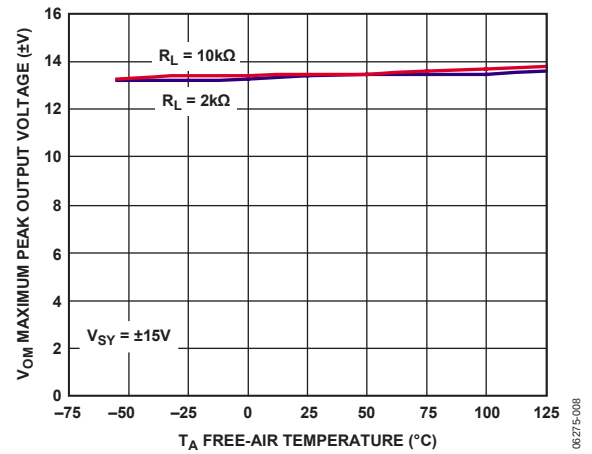


Figure 8. Maximum Peak Output Voltage vs. Free-Air Temperature

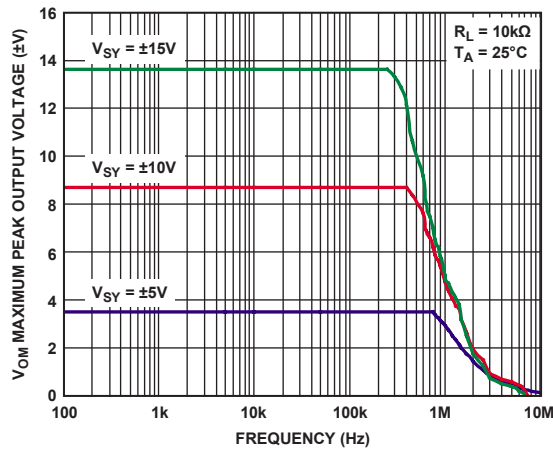


Figure 6. Maximum Peak Output Voltage vs. Frequency

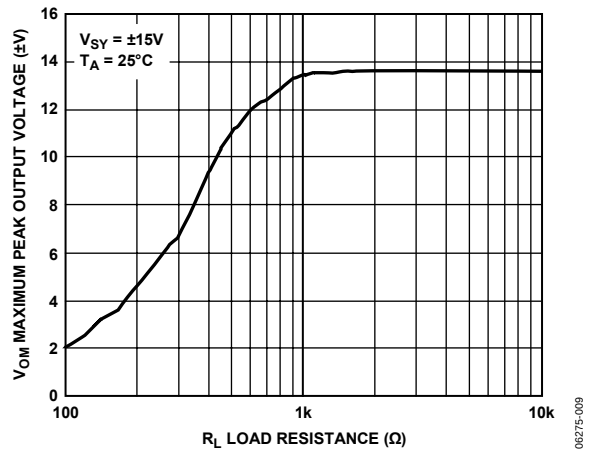


Figure 9. Maximum Peak Output Voltage vs. Load Resistance

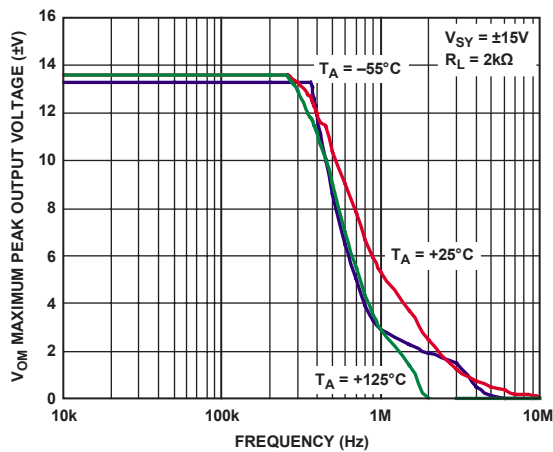


Figure 7. Maximum Peak Output Voltage vs. Frequency

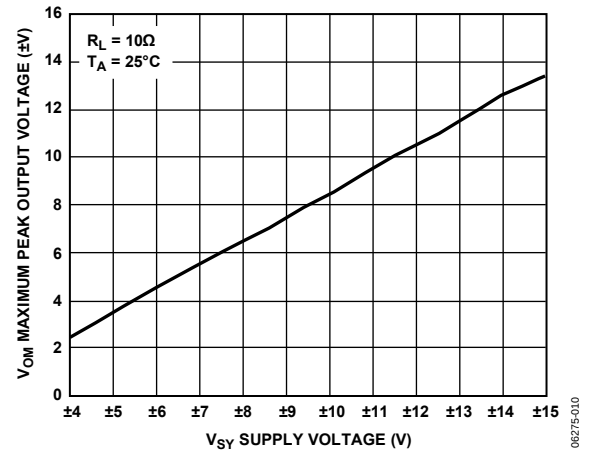


Figure 10. Maximum Peak Output Voltage vs. Supply Voltage

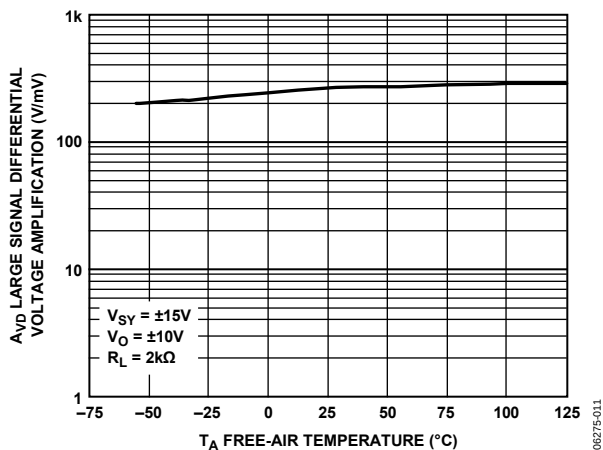


Figure 11. Large Signal Differential Voltage Amplification vs. Free-Air Temperature

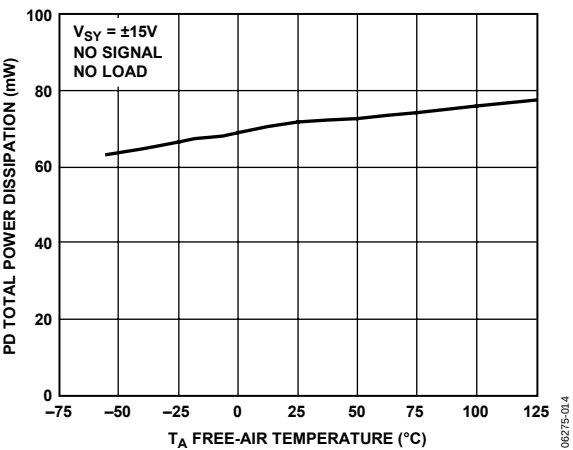


Figure 14. Total Power Dissipation vs. Free-Air Temperature

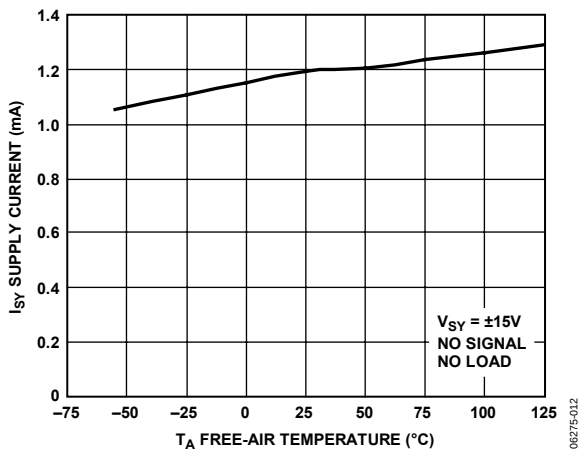


Figure 12. Supply Current Per Amplifier vs. Free-Air Temperature

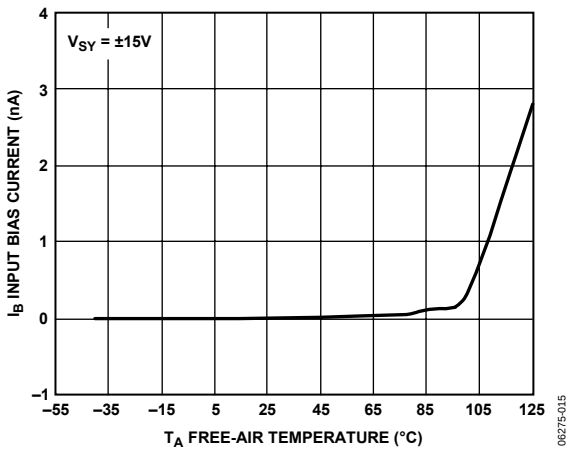


Figure 15. Input Bias Current vs. Free-Air Temperature

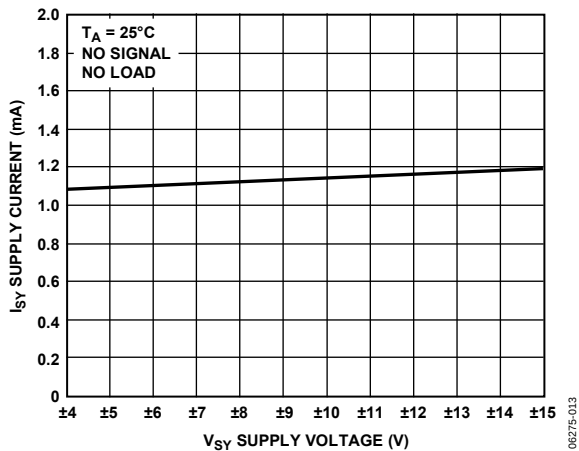


Figure 13. Supply Current vs. Supply Voltage

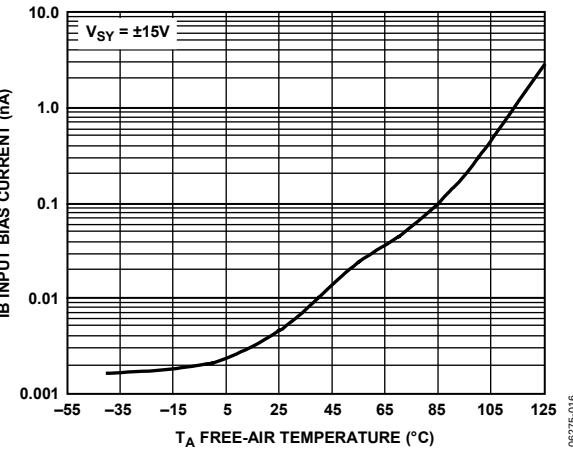


Figure 16. Input Bias Current vs. Free-Air Temperature

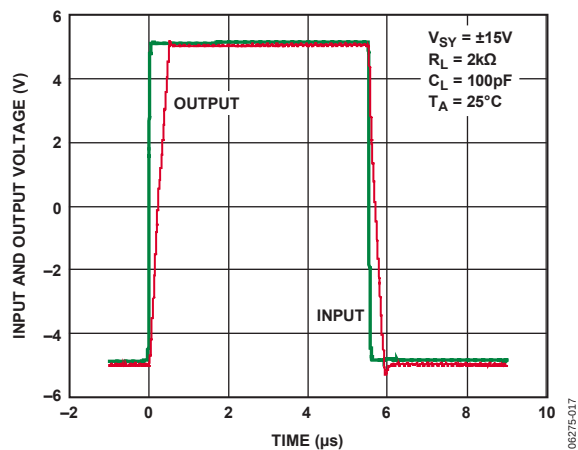


Figure 17. Large Signal Response

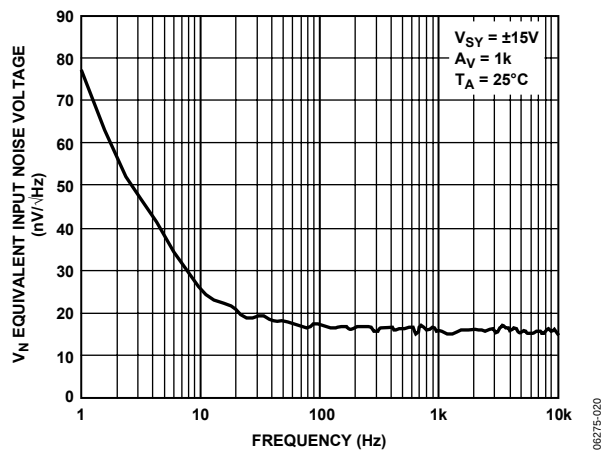


Figure 20. Voltage Noise Density vs. Frequency

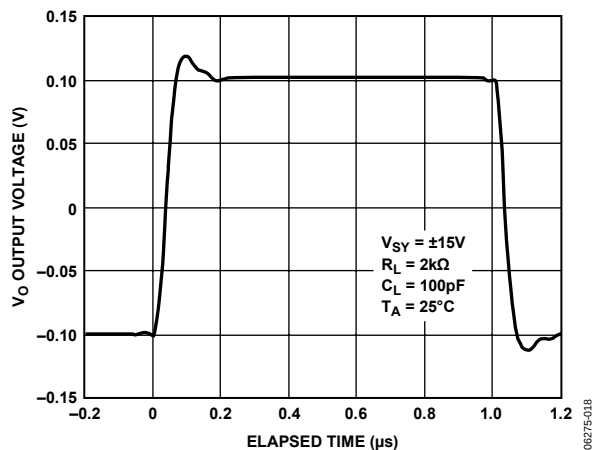


Figure 18. Small Signal Response

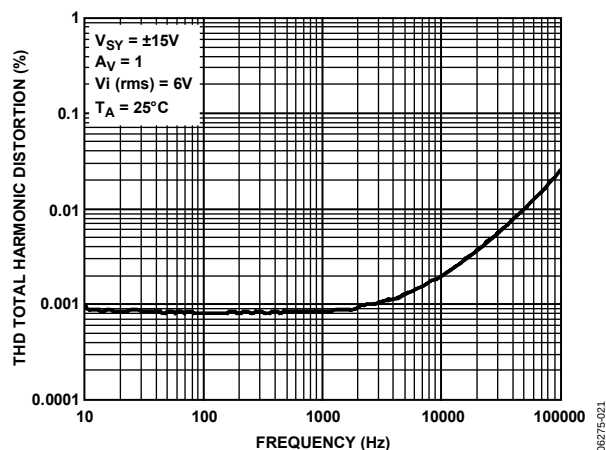


Figure 21. Total Harmonic Distortion vs. Frequency

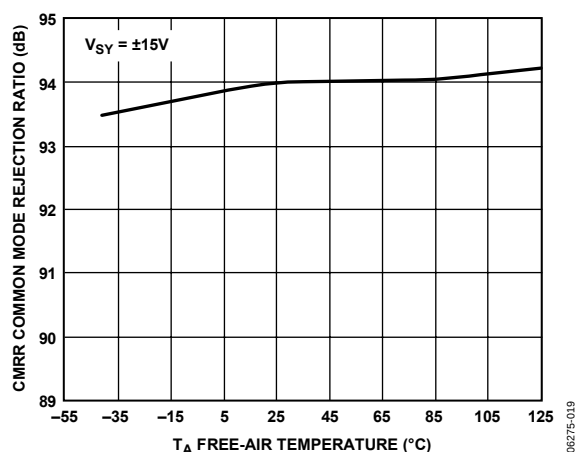
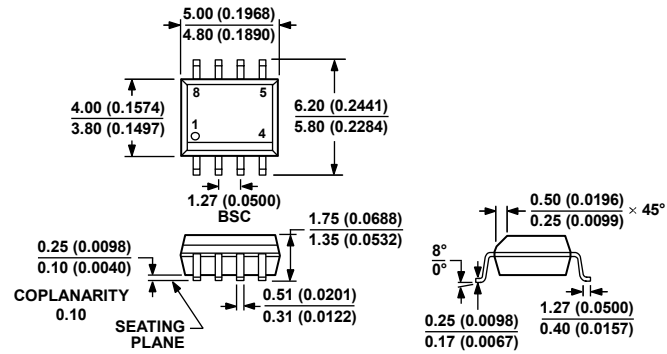


Figure 19. Common-Mode Rejection Ratio vs. Free-Air Temperature

## OUTLINE DIMENSIONS

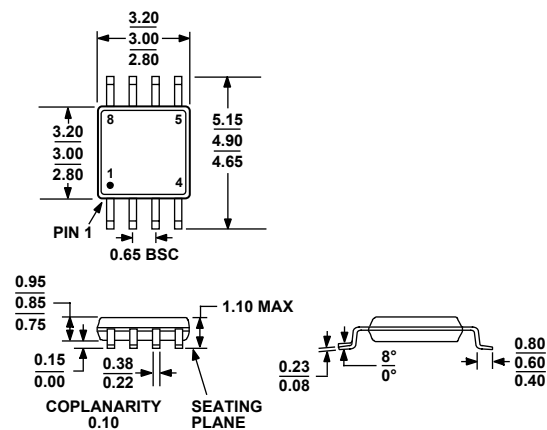


COMPLIANT TO JEDEC STANDARDS MS-012-AA

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 22. 8-Lead Standard Small Outline Package [SOIC\_N]  
Narrow Body (R-8)

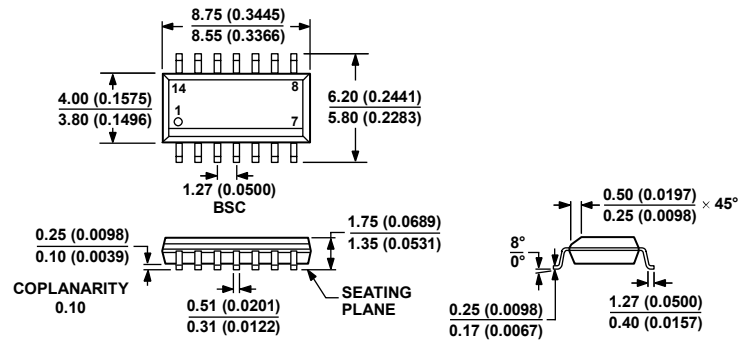
Dimensions shown in millimeters and (inches)



COMPLIANT TO JEDEC STANDARDS MO-187-AA

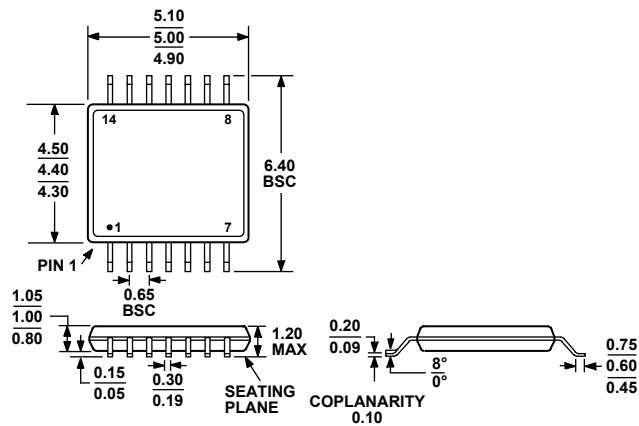
Figure 23. 8-Lead Mini Small Outline Package [MSOP]  
(RM-8)

Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MS-012-AB  
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 24. 14-Lead Standard Small Outline Package [SOIC\_N]  
Narrow Body (R-14)  
Dimensions shown in millimeters and (inches)



COMPLIANT TO JEDEC STANDARDS MO-153-AB-1

Figure 25. 14-Lead Thin Shrink Small Outline Package [TSSOP]  
(RU-14)  
Dimensions shown in millimeters

# ADTL082/ADTL084

## ORDERING GUIDE

| Model                         | Temperature Range | Package Description | Package Option | Branding |
|-------------------------------|-------------------|---------------------|----------------|----------|
| ADTL082JR                     | 0°C to +70°C      | 8-Lead SOIC_N       | R-8            | A18      |
| ADTL082JR-REEL                | 0°C to +70°C      | 8-Lead SOIC_N       | R-8            |          |
| ADTL082JR-REEL7               | 0°C to +70°C      | 8-Lead SOIC_N       | R-8            |          |
| ADTL082JRZ <sup>1</sup>       | 0°C to +70°C      | 8-Lead SOIC_N       | R-8            |          |
| ADTL082JRZ-REEL <sup>1</sup>  | 0°C to +70°C      | 8-Lead SOIC_N       | R-8            |          |
| ADTL082JRZ-REEL7 <sup>1</sup> | 0°C to +70°C      | 8-Lead SOIC_N       | R-8            |          |
| ADTL082ARZ <sup>1</sup>       | −40°C to +125°C   | 8-Lead SOIC_N       | R-8            |          |
| ADTL082ARZ-REEL <sup>1</sup>  | −40°C to +125°C   | 8-Lead SOIC_N       | R-8            |          |
| ADTL082ARZ-REEL7 <sup>1</sup> | −40°C to +125°C   | 8-Lead SOIC_N       | R-8            |          |
| ADTL082ARMZ-R2 <sup>1</sup>   | −40°C to +125°C   | 8-Lead MSOP         | RM-8           |          |
| ADTL082ARMZ-REEL <sup>1</sup> | −40°C to +125°C   | 8-Lead MSOP         | RM-8           | A18      |
| ADTL084JR                     | 0°C to +70°C      | 14-Lead SOIC_N      | R-14           |          |
| ADTL084JR-REEL                | 0°C to +70°C      | 14-Lead SOIC_N      | R-14           |          |
| ADTL084JR-REEL7               | 0°C to +70°C      | 14-Lead SOIC_N      | R-14           |          |
| ADTL084JRZ <sup>1</sup>       | 0°C to +70°C      | 14-Lead SOIC_N      | R-14           |          |
| ADTL084JRZ-REEL <sup>1</sup>  | 0°C to +70°C      | 14-Lead SOIC_N      | R-14           |          |
| ADTL084JRZ-REEL7 <sup>1</sup> | 0°C to +70°C      | 14-Lead SOIC_N      | R-14           |          |
| ADTL084ARZ <sup>1</sup>       | −40°C to +125°C   | 14-Lead SOIC_N      | R-14           |          |
| ADTL084ARZ-REEL <sup>1</sup>  | −40°C to +125°C   | 14-Lead SOIC_N      | R-14           |          |
| ADTL084ARZ-REEL7 <sup>1</sup> | −40°C to +125°C   | 14-Lead SOIC_N      | R-14           |          |
| ADTL084ARUZ <sup>1</sup>      | −40°C to +125°C   | 14-lead TSSOP       | RU-14          |          |
| ADTL084ARUZ-REEL <sup>1</sup> | −40°C to +125°C   | 14-lead TSSOP       | RU-14          |          |

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

**NOTES**

## **NOTES**