# TLE208x and TLE208xA Excalibur High-Speed Operational Amplifiers

## 1 Features

- Direct upgrades to TL05x, TL07x, and TL08x operational amplifiers
- Greater than twice the bandwidth (10MHz) than TL08x
- Wider supply rails increase dynamic signal range to ±19V

## 2 Applications

- AC charging (pile) station
- AC drive power stage module
- Electricity meter
- Digital multimeter (DMM)
- Flight control unit
- Oscilloscopes and digitizers
- High speed data acquisition
- Low-power audio processing
- Portable and battery-powered devices

## 3 Description

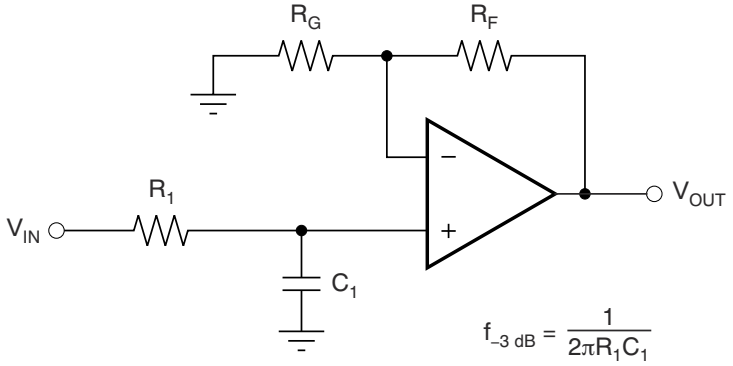
The TLE208x and TLE208xA family is a family of high voltage amplifiers which offer excellent DC precision and AC performance. This includes low noise floor and high slew rate, making TLE208x and TLE208xA family a flexible, high-performance amplifier.

The TLE208xA family is offered in a range of package options and temperature ranges, coming in a single, dual or quad package, with a maximum temperature range of –55°C to 125°C. For more information, see Section 10.

**Product Information**

| PART NUMBER | PACKAGE(1) | PACKAGE SIZE(2) |
|---|---|---|
| TLE2081 | P (PDIP, 8) | 9.81mm × 9.43mm |
| | D (SOIC, 8) | 4.9mm × 6.0mm |
| TLE2082 | P (PDIP, 8) | 9.81mm × 9.43mm |
| | D (SOIC, 8) | 4.9mm × 6.0mm |
| TLE2084 | N (PDIP, 14) | 19.3mm × 9.4mm |
| | DW (SOIC, 16) | 10.3mm × 10.3mm |
| TLE2081A | P (PDIP, 8) | 9.81mm × 9.43mm |
| | D (SOIC, 8) | 4.9mm × 6.0mm |
| TLE2082A | P (PDIP, 8) | 9.81mm × 9.43mm |
| | D (SOIC, 8) | 4.9mm × 6.0mm |
| TLE2084A | N (PDIP, 14) | 19.3mm × 9.4mm |
| | DW (SOIC, 16) | 10.3mm × 10.3mm |

(1) For more information, see the Mechanical, Packaging, and Orderable Information.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.




$$\frac{V_{OUT}}{V_{IN}} = \left(1 + \frac{R_F}{R_G}\right)\left(\frac{1}{1 + sR_1C_1}\right)$$

**TLE208X and TLE208XA in a Single-Pole, Low-Pass Filter**

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# 4 TLE208x Package Comparison Tables

**Table 4-1. TLE2081 Available Options**

| $T_A$ | $V_{IO-max}$ at 25°C | PACKAGED DEVICES | |
|---|---|---|---|
| | | SMALL OUTLINE (D)(1) | PLASTIC DIP (P) |
| 0°C to 70°C | 3mV | TLE2081ACD | TLE2081ACP |
| | 6mV | TLE2081CD | TLE2081CP |
| –40°C to 85°C | 3mV | TLE2081AID | TLE2081AIP |
| | 6mV | TLE2081ID | TLE2081IP |

(1) The D packages are available taped and reeled. Add R suffix to device type (for example, TLE2081ACDR).

**Table 4-2. TLE2082 Available Options**

| $T_A$ | $V_{IO-max}$ at 25°C | PACKAGED DEVICES | |
|---|---|---|---|
| | | SMALL OUTLINE (D)(1) | PLASTIC DIP (P) |
| 0°C to 70°C | 4mV | TLE2082ACD | TLE2082ACP |
| | 7mV | TLE2082CD | TLE2082CP |
| – 40°C to 85°C | 4mV | TLE2082AID | TLE2082AIP |
| | 7mV | TLE2082ID | TLE2082IP |

(1) The D packages are available taped and reeled. Add R suffix to device type (for example, TLE2082ACDR).

**Table 4-3. TLE2084 Available Options**

| $T_A$ | $V_{IOmax}$ at 25°C | PACKAGED DEVICES | |
|---|---|---|---|
| | | SMALL OUTLINE (DW)(1) | PLASTIC DIP (N) |
| 0°C to 70°C | 4mV | TLE2084ACDW | TLE2084ACN |
| | 7mV | TLE2084CDW | TLE2084CN |

(1) The DW packages are available taped and reeled. Add R suffix to device type (for example, TLE2084ACDWR).

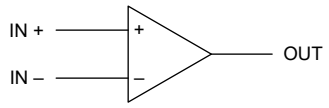



**Figure 4-1. Symbol**

## 5 Pin Configuration and Functions

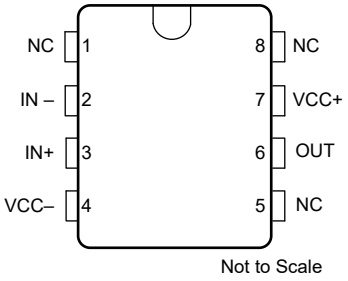



**Figure 5-1. TLE2081D, OR P PACKAGE (TOP VIEW)**

**Table 5-1. Pin Functions TLE2081D, OR P PACKAGE**

| PIN | | TYPE | DESCRIPTION |
|---|---|---|---|
| NAME | NO. | | |
| NC | 1 | — | Do not connect |
| IN– | 2 | Input | Inverting Input |
| IN+ | 3 | Input | Non Inverting Input |
| VCC– | 4 | — | Power supply negative |
| NC | 5 | — | Do not connect |
| OUT | 6 | Output | Output |
| VCC+ | 7 | — | Power supply positive |
| NC | 8 | — | Do not connect |

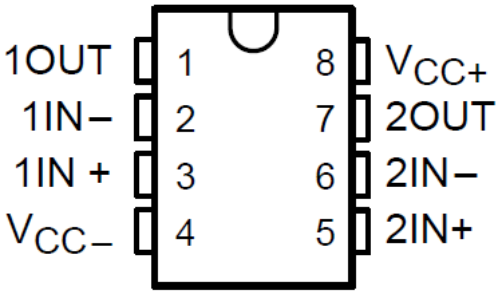



**Figure 5-2. TLE2082D OR P PACKAGE (TOP VIEW)**

**Table 5-2. Pin Functions TLE2082D OR P PACKAGE**

| PIN | | TYPE | DESCRIPTION |
|---|---|---|---|
| NAME | NO. | | |
| 1OUT | 1 | Output | Output Channel 1 |
| 1IN– | 2 | Input | Inverting input, channel 1 |
| 1IN+ | 3 | Input | Non-inverting input, channel 1 |
| VCC– | 4 | — | Power supply negative |
| 2IN+ | 5 | Input | Non-inverting input, channel 2 |
| 2IN– | 6 | Input | Inverting input, channel 2 |
| 2OUT | 7 | Output | Output Channel 2 |
| VCC+ | 8 | — | Power supply positive |

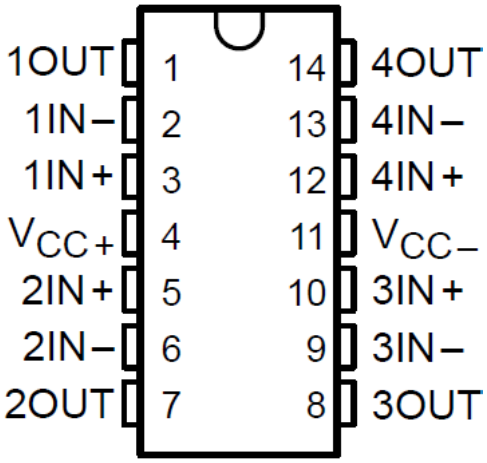



**Figure 5-3. TLE2084N PACKAGE**
**(TOP VIEW)**

**Table 5-3. Pin Functions TLE2084N PACKAGE**

| PIN | | TYPE | DESCRIPTION |
|---|---|---|---|
| NAME | NO. | | |
| 1OUT | 1 | Output | Output channel 1 |
| 1IN– | 2 | Input | Inverting input, channel 1 |
| 1IN+ | 3 | Input | Non-inverting input, channel 1 |
| VCC+ | 4 | — | Power supply positive |
| 2IN+ | 5 | Input | Non-inverting input, channel 2 |
| 2IN– | 6 | Input | Inverting input, channel 2 |
| 2OUT | 7 | Output | Output channel 2 |
| 3OUT | 8 | Output | Output channel 3 |
| 3IN– | 9 | Input | Inverting input, channel 3 |
| 3IN+ | 10 | Input | Non-inverting input, channel 3 |
| VCC– | 11 | — | Power supply negative |
| 4IN+ | 12 | Input | Non-inverting input, channel 4 |
| 4IN– | 13 | Input | Inverting input, channel 4 |
| 4OUT | 14 | Output | Output channel 4 |

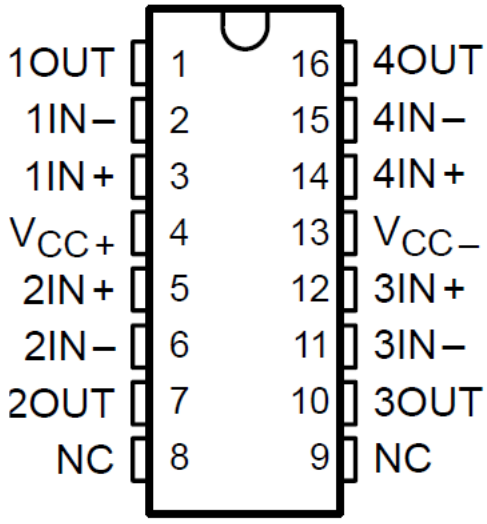



**Figure 5-4. TLE2084 DW PACKAGE**
**(TOP VIEW)**

**Table 5-4. Pin Functions TLE2084 DW PACKAGE**

| PIN | | TYPE | DESCRIPTION |
|---|---|---|---|
| NAME | NO. | | |
| 1OUT | 1 | Output | Output channel 1 |
| 1IN– | 2 | Input | Inverting input, channel 1 |
| 1IN+ | 3 | Input | Non-inverting input, channel 1 |
| VCC+ | 4 | — | Power supply positive |
| 2IN+ | 5 | Input | Non-inverting input, channel 2 |
| 2IN– | 6 | Input | Inverting input, channel 2 |
| 2OUT | 7 | Output | Output channel 2 |
| NC | 8 | — | Do not connect |
| NC | 9 | — | Do not connect |
| 3OUT | 10 | Output | Output channel 3 |
| 3IN– | 11 | Input | Inverting input, channel 3 |
| 3IN+ | 12 | Input | Non-inverting input, channel 3 |
| VCC– | 13 | — | Power supply negative |
| 4IN+ | 14 | Input | Non-inverting input, channel 4 |
| 4IN– | 15 | Input | Inverting input, channel 4 |
| 4OUT | 16 | Output | Output channel 4 |

# 6 Specifications

## 6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$+ | Supply voltage(2) $V_S$= (V+)−(V−) | | | 38 | V |
| $V_{ID}$ | Differential input voltage range(3) | | | VS + 0.2 | |
| $V_I$ | Input voltage range | | (V–) – 0.5 | (V+) + 0.5 | V |
| $I_I$ | Input current | | | ±1 | mA |
| $I_O$ | Output current | | | Continuous | mA |
| | Duration of short-circuit current at (or below) 25°C(4) | | | Unlimited | |
| | Continuous total dissipation | | See Section 6.2 | | |
| $T_A$ | Operating free-air temperature range | C suffix | 0 | 70 | °C |
| | | I suffix | –40 | 85 | |
| $T_{stg}$ | Storage temperature | | 65 | 150 | °C |
| | Lead temperature 1.6mm (1/16 inch) from case for 10 seconds | DW package | | 260 | °C |
| | | N package | | | |

(1) Operation outside the *Absolute Maximum Ratings* may cause permanent device damage. *Absolute Maximum Ratings* do not imply functional operation of the device at these or any other conditions beyond those listed under *Recommended Operating Conditions*. If used outside the *Recommended Operating Conditions* but within the *Absolute Maximum Ratings*, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
(2) All voltage values are with respect to network ground terminal GND.
(3) Differential voltages are at IN+ with respect to IN –.
(4) The output can be shorted to either supply. Temperatures and/or supply voltages must be limited to make sure that the maximum dissipation rate is not exceeded.

## 6.2 Dissipation Rating Table

| PACKAGE | TA ≤ 25°C POWER RATING | DERATING FACTOR ABOVE $T_A$ = 25°C | $T_A$ = 70°C POWER RATING | $T_A$ = 85°C POWER RATING | $T_A$ = 125°C POWER RATING |
|---|---|---|---|---|---|
| D | 725mW | 5.8mW/°C | 464mW | 377mW | 145mW |
| DW | 1025mW | 8.2mW/°C | 656mW | 533mW | 205mW |
| N | 1150mW | 9.2mW/°C | 736mW | 598mW | 230mW |
| P | 1000mW | 8.0mW/°C | 640mW | 344mW | 200mW |

## 6.3 Recommended Operating Conditions

| | | | C SUFFIX | | I SUFFIX | | M SUFFIX | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| $V_{CC±}$ | Supply voltage | | ±2.25 | ±19 | ±2.25 | ±19 | ±2.25 | ±19 | V |
| $V_{IC}$ | Common-mode input voltage, | $V_{CC±}$ = ± 5V | –0.9 | 5 | –0.8 | 5 | –0.8 | 5 | V |
| | | $V_{CC±}$ = ±15V | –10.9 | 15 | –10.8 | 15 | –10.8 | 15 | |
| $T_A$ | Operating free-air temperature | | 0 | 70 | –40 | 85 | –55 | 125 | °C |

## 6.4 TLE2081C Electrical Characteristics

at specified free-air temperature, $V_{CC±}$ = ± 5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.34 | 6 | | 0.3 | 3 | mV |
| | | | | Full range | | | 8 | | | 5 | |
| $\alpha_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 5 | 100 | | 5 | 100 | nA |
| | | | | Full range | | | 1.4 | | | 1.4 | |
| $I_{IB}$ | Input bias current | | | 25°C | | 15 | 175 | | 15 | 175 | nA |
| | | | | Full range | | | 5 | | | 5 | |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 5 to –1 | 5 to –1.9 | | 5 to –1 | 5 to –1.9 | | V |
| | | | | Full range | 5 to –0.9 | | | 5 to –0.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = –200µA | | 25°C | 3.8 | 4.985 | | 3.8 | 4.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 3.5 | 4.925 | | 3.5 | 4.925 | | |
| | | $I_O$ = –20mA | | 25°C | 1.5 | 4.5 | | 1.5 | 4.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –3.5 | –4.985 | | –3.5 | –4.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –3.7 | –4.925 | | –3.7 | –4.925 | | |
| | | $I_O$ = 20mA | | 25°C | –1.5 | –4.5 | | –1.5 | –4.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | $R_L$ = 600Ω | | 25°C | 80 | 91 | | 80 | 91 | | dB |
| | | $R_L$ = 2kΩ | | 25°C | 90 | 100 | | 90 | 100 | | |
| | | $R_L$ = 10kΩ | | 25°C | 95 | 106 | | 95 | 106 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC±}/\Delta V_{IO}$) | $V_{CC±}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 80 | | | |
| $I_{CC}$ | Supply current | $V_O$ = 0 | No load | 25°C | | 2.48 | 2.92 | | 2.48 | 2.92 | mA |

## 6.4 TLE2081C Electrical Characteristics (continued)

at specified free-air temperature, $V_{CC\pm}$ = ± 5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

(1) Full range is 0°C to 70°C.

## 6.5 TLE2081C Operating Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = −1, 2V step | To 10mV | 25°C | | 0.25 | | | 0.25 | | µs |
| | | | To 1mV | | | 0.4 | | | 0.4 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | $R_S$ = 20Ω | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $\mu V_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = 3$V_{RMS}$, G = 1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $\varphi_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 56° | | | 56° | | |

## 6.6 TLE2081C Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 15V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.49 | 6 | | 0.47 | 3 | mV |
| | | | | Full range | | | 8 | | | 5 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 6 | 100 | | 6 | 100 | nA |
| | | | | Full range | | | 1.4 | | | 1.4 | |
| $I_{IB}$ | Input bias current | | | 25°C | | 20 | 175 | | 20 | 175 | nA |
| | | | | Full range | | | 5 | | | 5 | |

## 6.6 TLE2081C Electrical Characteristics (continued)

at specified free-air temperature, $V_{CC\pm}$ = ± 15V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 15 to – 11 | 15 to – 11.9 | | 15 to – 11 | 15 to – 11.9 | | V |
| | | | | Full range | 15 to –10.9 | | | 15 to –10.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 13.8 | 14.985 | | 13.8 | 14.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 13.5 | 14.925 | | 13.5 | 14.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 11.5 | 14.5 | | 11.5 | 14.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –13.8 | – 14.985 | | –13.8 | – 14.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –13.5 | – 14.925 | | –13.5 | – 14.925 | | |
| | | $I_O$ = 20mA | | 25°C | –11.5 | –14.5 | | –11.5 | –14.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | $R_L$ = 600Ω | | 25°C | 80 | 96 | | 80 | 96 | | dB |
| | | $R_L$ = 2kΩ | | 25°C | 90 | 109 | | 90 | 109 | | |
| | | $R_L$ = 10kΩ | | 25°C | 95 | 118 | | 95 | 118 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 81 | | | |
| $I_{CC}$ | Supply current (per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.48 | 2.92 | | 2.48 | 2.92 | mA |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

(1) Full range is 0°C to 70°C.

## 6.7 TLE2081C Operating Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 15V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 10V step | To 10mV | 25°C | | 0.4 | | | 0.4 | | µs |
| | | | To 1mV | | | 1.5 | | | 1.5 | | |

at specified free-air temperature, $V_{CC\pm}$ = ± 15V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2081C | | | TLE2081AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 7 | | | 7 | | nV/√Hz |
| | | | f = 10kHz | | | 4.4 | | | 4.4 | | |
| $E_N$ | Peak-to:-peak equivalent input noise voltage | | f = 0.1Hz to: 10Hz | 25°C | | 2.77 | | | 2.77 | | $\mu V_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = 3$V_{RMS}$, G = 1, f = 1kHz, $R_L$= 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $\varphi_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 57° | | | 57° | | |

## 6.8 TLE2081I Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2081I | | | TLE2081AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.34 | 6 | | 0.3 | 3 | mV |
| | | | | Full range | | | 7.6 | | | 5.6 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 5 | 100 | | 5 | 100 | pA |
| | | | | Full range | | | 5 | | | 5 | nA |
| $I_{IB}$ | Input bias current | | | 25°C | | 15 | 175 | | 15 | 175 | pA |
| | | | | Full range | | | 10 | | | 10 | nA |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 5 to –1 | 5 to –1.9 | | 5 to –1 | 5 to –1.9 | | V |
| | | | | Full range | 5 to –0.8 | | | 5 to –0.8 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 3.8 | 4.985 | | 3.8 | 4.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 3.5 | 4.925 | | 3.5 | 4.925 | | |
| | | $I_O$ = –20mA | | 25°C | 1.5 | 4.5 | | 1.5 | 4.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –3.8 | –4.985 | | –3.5 | –4.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –3.5 | –4.925 | | –3.7 | –4.925 | | |
| | | $I_O$ = 20mA | | 25°C | –1.5 | –4.5 | | –1.5 | –4.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | ±2.3V | $R_L$ = 600Ω | 25°C | 80 | 91 | | 80 | 91 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 100 | | 90 | 100 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 106 | | 95 | 106 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 80 | | | |
| $I_{CC}$ | Supply current (per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.48 | 2.92 | | 2.48 | 2.92 | mA |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

(1) Full range is – 40°C to 85°C.

## 6.9 TLE2081I Operating Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 5V

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2081I | | | TLE2081AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 2V step | To 10mV | 25°C | | 0.25 | | | 0.25 | | µs |
| | | | To 1mV | | | 0.4 | | | 0.4 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 7 | | | 7 | | nV/√Hz |
| | | | f = 10kHz | | | 4.4 | | | 4.4 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $\mu V_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$= 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = $3V_{RMS}$, G=1, f = 1kHz, $R_L$= 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $\varphi_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 56° | | | 56° | | |

(1) Full range is –40°C to 85°C.

## 6.10 TLE2081I Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 15V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2081I | | | TLE2081AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.49 | 6 | | 0.47 | 3 | mV |
| | | | | Full range | | | 8 | | | 5 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 6 | 100 | | 6 | 100 | nA |
| | | | | Full range | | | 1.4 | | | 1.4 | |
| $I_{IB}$ | Input bias current | | | 25°C | | 20 | 175 | | 20 | 175 | nA |
| | | | | Full range | | | 5 | | | 5 | |
| $V_{ICR}$ | Common-mode input voltager ange | $R_S$ = 50Ω | | 25°C | 15 to – 11 | 15 to – 11.9 | | 15 to – 11 | 15 to – 11.9 | | V |
| | | | | Full range | 15 to –10.9 | | | 15 to –10.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 13.8 | 14.985 | | 13.8 | 14.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 13.5 | 14.925 | | 13.5 | 14.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 11.5 | 14.5 | | 11.5 | 14.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –13.8 | – 14.985 | | –13.8 | – 14.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –13.5 | – 14.925 | | –13.5 | – 14.925 | | |
| | | $I_O$ = 20mA | | 25°C | –11.5 | –14.5 | | –11.5 | –14.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 96 | | 80 | 96 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 109 | | 90 | 109 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 118 | | 95 | 118 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | | 80 | | | 80 | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 81 | | | |
| $I_{CC}$ | Supply current | $V_O$ = 0 | No load | 25°C | | 2.48 | 2.92 | | 2.48 | 2.92 | mA |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

## 6.11 TLE2081I Operating Characteristics

at specified free-air temperature, $V_{CC±}$ =± 15V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2081I | | | TLE2081AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 2V step | To 10mV | 25°C | | 0.4 | | | 0.4 | | µs |
| | | | To 1mV | | | 1.5 | | | 1.5 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $µV_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = $3V_{RMS}$, G = 1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $φ_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 57° | | | 57° | | |

## 6.12 TLE2082C Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ±5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2082C | | | TLE2082AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.9 | 6 | | 0.65 | 4 | mV |
| | | | | Full range | | | 8.1 | | | 5.1 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 2.3 | 25 | | 2.3 | 25 | μV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 5 | 100 | | 5 | 100 | pA |
| | | | | Full range | | | 1.4 | | | 1.4 | nA |
| $I_{IB}$ | Input bias current | | | 25°C | | 15 | 175 | | 15 | 175 | pA |
| | | | | Full range | | | 5 | | | 5 | nA |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 5 to –1 | 5 to –1.9 | | 5 to –1 | 5 to –1.9 | | V |
| | | | | Full range | 5 to –0.9 | | | 5 to –0.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200μA | | 25°C | 3.8 | 4.985 | | 3.8 | 4.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 3.5 | 4.925 | | 3.5 | 4.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 1.5 | 4.5 | | 1.5 | 4.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200μA | | 25°C | –3.8 | – 4.985 | | –3.8 | – 4.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –3.5 | – 4.925 | | –3.5 | – 4.925 | | |
| | | $I_O$ = 20mA | | 25°C | –1.5 | –4.5 | | –1.5 | –4.5 | | |
| $A_{vd}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 91 | | 80 | 91 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 100 | | 90 | 100 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 106 | | 95 | 106 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}$ /$\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 80 | | | |
| $I_{CC}$ | Supply current (per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.4 | 2.8 | | 2.4 | 2.8 | mA |
| | Crosstalk attenuation | $V_{IC}$ = 0 | $R_L$ = 2kΩ | 25°C | | 120 | | | 120 | | dB |
| $I_{OS}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

(1) Full range is 0°C to 70°C.

## 6.13 TLE2082C Operating Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ±5V

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2082C | | | TLE2082AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 2V step | To 10mV | 25°C | | 0.25 | | | 0.25 | | µs |
| | | | To 1mV | | | 0.4 | | | 0.4 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 10Hz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $\mu V_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = $3V_{RMS}$, G = 1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $\varphi_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 56° | | | 56° | | |

(1) Full range is 0°C to 70°C.

## 6.14 TLE2082C Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 15V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2082C | | | TLE2082AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.49 | 6 | | 0.47 | 3 | mV |
| | | | | Full range | | | 8 | | | 5 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 6 | 100 | | 6 | 100 | nA |
| | | | | Full range | | | 1.4 | | | 1.4 | |
| $I_{IB}$ | Input bias current | | | 25°C | | 20 | 175 | | 20 | 175 | nA |
| | | | | Full range | | | 5 | | | 5 | |
| $V_{ICR}$ | Common-mode input voltager ange | $R_S$ = 50Ω | | 25°C | 15 to – 11 | 15 to – 11.9 | | 15 to – 11 | 15 to – 11.9 | | V |
| | | | | Full range | 15 to –10.9 | | | 15 to –10.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 13.8 | 14.985 | | 13.8 | 14.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 13.5 | 14.925 | | 13.5 | 14.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 11.5 | 14.5 | | 11.5 | 14.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –13.8 | – 14.985 | | –13.8 | – 14.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –13.5 | – 14.925 | | –13.5 | – 14.925 | | |
| | | $I_O$ = 20mA | | 25°C | –11.5 | –14.5 | | –11.5 | –14.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 96 | | 80 | 96 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 109 | | 90 | 109 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 118 | | 95 | 118 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 81 | | | |
| $I_{CC}$ | Supply current (Per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.4 | 2.8 | | 2.4 | 2.8 | mA |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

## 6.15 TLE2082C Operating Characteristics

at specified free-air temperature, $V_{CC±}$ =± 15V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2082C | | | TLE2082AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 2V step | To 10mV | 25°C | | 0.4 | | | 0.4 | | µs |
| | | | To 1mV | | | 1.5 | | | 1.5 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $µV_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = $3V_{RMS}$, G = 1, f = 1kHz, $R_L$= 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $φ_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 57° | | | 57° | | |

## 6.16 TLE2082I Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2082I | | | TLE2082AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.34 | 6 | | 0.3 | 3 | mV |
| | | | | Full range | | | 8 | | | 5 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 5 | 100 | | 5 | 100 | nA |
| | | | | Full range | | | 1.4 | | | 1.4 | |
| $I_{IB}$ | Input bias current | | | 25°C | | 15 | 175 | | 15 | 175 | nA |
| | | | | Full range | | | 5 | | | 5 | |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 5 to –1 | 5 to –1.9 | | 5 to –1 | 5 to –1.9 | | V |
| | | | | Full range | 5 to –0.9 | | | 5 to –0.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 3.8 | 4.985 | | 3.8 | 4.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 3.5 | 4.925 | | 3.5 | 4.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 1.5 | 4.5 | | 1.5 | 4.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –3.5 | –4.985 | | –3.5 | –4.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –3.7 | –4.925 | | –3.7 | –4.925 | | |
| | | $I_O$ = 20mA | | 25°C | –1.5 | –4.5 | | –1.5 | –4.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 91 | | 80 | 91 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 100 | | 90 | 100 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 106 | | 95 | 106 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 80 | | | |
| $I_{CC}$ | Supply current (Per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.4 | 2.8 | | 2.4 | 2.8 | mA |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

## 6.17 TLE2082I Operating Characteristics

at specified free-air temperature, $V_{CC±}$ =± 5V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2082I | | | TLE2082AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 2V step | To 10mV | 25°C | | 0.25 | | | 0.25 | | µs |
| | | | To 1mV | | | 0.4 | | | 0.4 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $µV_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = $3V_{RMS}$, G = 1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $φ_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 56° | | | 56° | | |

## 6.18 TLE2082I Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ± 15V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2082I | | | TLE2082AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | 0.49 | 6 | | 0.47 | 3 | mV |
| | | | | Full range | | | 8 | | | 5 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 3.2 | 29 | | 3.2 | 29 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 6 | 100 | | 6 | 100 | nA |
| | | | | Full range | | | 1.4 | | | 1.4 | |
| $I_{IB}$ | Input bias current | | | 25°C | | 20 | 175 | | 20 | 175 | nA |
| | | | | Full range | | | 5 | | | 5 | |
| $V_{ICR}$ | Common-mode input voltager ange | $R_S$ = 50Ω | | 25°C | 15 to – 11 | 15 to – 11.9 | | 15 to – 11 | 15 to – 11.9 | | V |
| | | | | Full range | 15 to –10.9 | | | 15 to –10.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 13.8 | 14.985 | | 13.8 | 14.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 13.5 | 14.925 | | 13.5 | 14.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 11.5 | 14.5 | | 11.5 | 14.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –13.8 | – 14.985 | | –13.8 | – 14.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –13.5 | – 14.925 | | –13.5 | – 14.925 | | |
| | | $I_O$ = 20mA | | 25°C | –11.5 | –14.5 | | –11.5 | –14.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 96 | | 80 | 96 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 109 | | 90 | 109 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 118 | | 95 | 118 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | | 85 | | | 85 | | dB |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 81 | | | |
| $I_{CC}$ | Supply current (Per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.4 | 2.8 | | 2.4 | 2.8 | mA |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

## 6.19 TLE2082I Operating Characteristics

at specified free-air temperature, $V_{CC±}$ =± 15V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2082I | | | TLE2082AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 10V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $R_L$ = 1kΩ, $C_L$ = 100pF | To 10mV | 25°C | | 0.4 | | | 0.4 | | µs |
| | | | To 1mV | | | 1.5 | | | 1.5 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $µV_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = 3$V_{RMS}$, G=1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $φ_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 57° | | | 57° | | |

## 6.20 TLE2084C Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ±5V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2084C | | | TLE2084AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | –1.6 | 7 | | –0.5 | 4 | mV |
| | | | | Full range | | | 9.1 | | | 6.1 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 10.1 | 30 | | 10.1 | 30 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 15 | 100 | | 15 | 100 | pA |
| | | | | Full range | | | 1.4 | | | 1.4 | nA |
| $I_{IB}$ | Input bias current | | | 25°C | | 20 | 175 | | 20 | 175 | pA |
| | | | | Full range | | | 5 | | | 5 | nA |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 5 to –1 | 5 to –1.9 | | 5 to –1 | 5 to –1.9 | | V |
| | | | | Full range | 5 to –0.9 | | | 5 to –0.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 3.8 | 4.985 | | 3.8 | 4.985 | | V |
| | | $I_O$ = – 2mA | | 25°C | 3.5 | 4.925 | | 3.5 | 4.925 | | |
| | | $I_O$ = – 20mA | | 25°C | 1.5 | 4.5 | | 1.5 | 4.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –3.5 | –4.985 | | –3.5 | –4.985 | | V |
| | | $I_o$ = 2mA | | 25°C | –3.7 | –4.925 | | –3.7 | –4.925 | | |
| | | $I_O$ = 20mA | | 25°C | –1.5 | –4.5 | | –1.5 | –4.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 91 | | 80 | 91 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 100 | | 90 | 100 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 106 | | 95 | 106 | | |
| | | | | Full range | 94 | | | 94 | | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | 70 | 89 | | 70 | 89 | | dB |
| | | | | Full range | 68 | | | 68 | | | |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{io}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 80 | | | 80 | | | |
| $I_{CC}$ | Supply current (Per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.4 | 2.8 | | 2.4 | 2.8 | mA |
| $a_x$ | Crosstalk attenuation | $V_{IC}$ = 0 | $R_L$ = 2kΩ | 25°C | | 120 | | | 120 | | dB |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

(1) Full range is 0°C to 70°C.

## 6.21 TLE2084C Operating Characteristics

at specified free-air temperature, $V_{CC\pm}$ =± 5V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2084C | | | TLE2084AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 2.3V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $A_{VD}$ = – 1, 2V step | To 10mV | 25°C | | 0.25 | | | 0.25 | | µs |
| | | | To 1mV | | | 0.4 | | | 0.4 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $\mu V_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = 3$V_{RMS}$, G = 1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $\varphi_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 56° | | | 56° | | |

## 6.22 TLE2084C Electrical Characteristics

at specified free-air temperature, $V_{CC\pm}$ = ±15V (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | $T_A$ (1) | TLE2084C | | | TLE2084AC | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_{IO}$ | Input offset voltage | $V_{IC}$ = 0, $R_S$ = 50Ω | $V_O$ = 0 | 25°C | | –1.6 | 7 | | –0.5 | 4 | mV |
| | | | | Full range | | | 9.1 | | | 6.1 | |
| $a_{VIO}$ | Temperature coefficient of input offset voltage | | | Full range | | 10.1 | 30 | | 10.1 | 30 | µV/°C |
| $I_{IO}$ | Input offset current | $V_{IC}$ = 0 | $V_O$ = 0 | 25°C | | 15 | 100 | | 15 | 100 | pA |
| | | | | Full range | | | 1.4 | | | 1.4 | nA |
| $I_{IB}$ | Input bias current | | | 25°C | | 25 | 175 | | 25 | 175 | pA |
| | | | | Full range | | | 5 | | | 5 | nA |
| $V_{ICR}$ | Common-mode input voltage range | $R_S$ = 50Ω | | 25°C | 15 to – 11 | 15 to – 11.9 | | 15 to – 11 | 15 to – 11.9 | | V |
| | | | | Full range | 15 to –10.9 | | | 15 to –10.9 | | | |
| $V_{OM+}$ | Maximum positive peak output voltage swing | $I_O$ = – 200µA | | 25°C | 13.8 | 14.985 | | 13.8 | 14.985 | | V |
| | | $I_O$ = –2mA | | 25°C | 13.5 | 14.925 | | 13.5 | 14.925 | | |
| | | $I_O$ = –20mA | | 25°C | 11.5 | 14.5 | | 11.5 | 14.5 | | |
| $V_{OM–}$ | Maximum negative peak output voltage swing | $I_O$ = 200µA | | 25°C | –13.8 | – 14.985 | | –13.8 | – 14.985 | | V |
| | | $I_O$ = 2mA | | 25°C | –13.5 | – 14.925 | | –13.5 | – 14.925 | | |
| | | IO= 20mA | | 25°C | –11.5 | –14.5 | | –11.5 | –14.5 | | |
| $A_{VD}$ | Large-signal differential voltage amplification | | $R_L$ = 600Ω | 25°C | 80 | 96 | | 80 | 96 | | dB |
| | | | $R_L$ = 2kΩ | 25°C | 90 | 109 | | 90 | 109 | | |
| | | | $R_L$ = 10kΩ | 25°C | 95 | 118 | | 95 | 118 | | |
| $r_i$ | Input resistance | $V_{IC}$ = 0 | Common mode | 25°C | | 100 | | | 100 | | MΩ |
| | | | Differential | | | 6 | | | 6 | | TΩ |
| $c_i$ | Input capacitance | $V_{IC}$ = 0 | Common mode | 25°C | | 1 | | | 1 | | pF |
| | | | Differential | 25°C | | 9 | | | 9 | | |
| $z_o$ | Open-loop output impedance | $I_O$ = 0A | | 25°C | See Figure 6-17 | | | See Figure 6-17 | | | Ω |
| CMRR | Common-mode rejection ratio | $V_{IC}$ = $V_{ICRmin}$, $V_O$ = 0 | $R_S$ = 50Ω | 25°C | 80 | 98 | | 80 | 98 | | dB |
| | | | | Full range | 79 | | | 79 | | | |
| $k_{SVR}$ | Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$) | $V_{CC\pm}$ = ± 5V to ± 15V | | 25°C | 82 | 99 | | 82 | 99 | | dB |
| | | $V_O$ = 0 | $R_S$ = 50Ω | Full range | 81 | | | 81 | | | |
| $I_{CC}$ | Supply current (Per amplifier) | $V_O$ = 0 | No load | 25°C | | 2.4 | 2.8 | | 2.4 | 2.8 | mA |
| $a_x$ | Crosstalk attenuation | $V_{IC}$ = 0 | $R_L$ = 2kΩ | 25°C | | 120 | | | 120 | | dB |
| $I_{SC}$ | Short-circuit output current | | | 25°C | | ±65 | | | ±65 | | mA |

(1) Full range is 0°C to 70°C..

## 6.23 TLE2084C Operating Characteristics

at specified free-air temperature, $V_{CC\pm}$ =± 15V

| PARAMETER | | TEST CONDITIONS | | $T_A$ | TLE2082I | | | TLE2082AI | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| SR | Slew rate | $V_{O(PP)}$ = ± 10V, $A_{VD}$ = – 1, $C_L$ = 20pF $R_L$ = 2kΩ | | 25°C | | 32 | | | 32 | | V/µs |
| $t_s$ | Settling time | $R_L$ = 1kΩ, $C_L$ = 100pF | To 10mV | 25°C | | 0.4 | | | 0.4 | | µs |
| | | | To 1mV | | | 1.5 | | | 1.5 | | |
| $V_n$ | Equivalent input noise voltage | $R_S$ = 20Ω | f = 1kHz | 25°C | | 28 | | | 28 | | nV/√Hz |
| | | | f = 10kHz | | | 11.6 | | | 11.6 | | |
| $E_N$ | Peak-to-peak equivalent input noise voltage | | f = 0.1Hz to 10Hz | 25°C | | 2.77 | | | 2.77 | | $\mu V_{PP}$ |
| $I_n$ | Equivalent input noise current | $V_{IC}$ = 0 | f = 1kHz | 25°C | | 60 | | | 60 | | fA/√Hz |
| THD + N | Total harmonic distortion plus noise | $V_O$ = 3$V_{RMS}$, G=1, f = 1kHz, $R_L$ = 10kΩ | | 25°C | | 0.0032 | | | 0.0032 | | % |
| | | | | | | 90 | | | 90 | | dB |
| $B_1$ | Unity-gain bandwidth | | | 25°C | | 10.6 | | | 10.6 | | MHz |
| $B_{OM}$ | Maximum output-swing bandwidth | | $A_{VD}$ = – 1, $C_L$ = 25pF | 25°C | | 300 | | | 300 | | kHz |
| $\varphi_m$ | Phase margin at unity gain | $V_I$ = 10mV, $C_L$ = 25pF | $R_L$ = 2kΩ | 25°C | | 57° | | | 57° | | |

## 6.24 Typical Characteristics

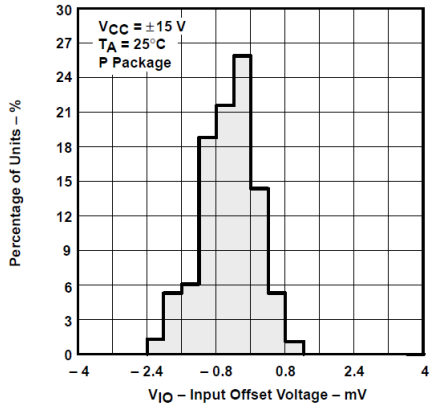



Figure 6-1. Distribution of TLE2081 Input Offset Voltage

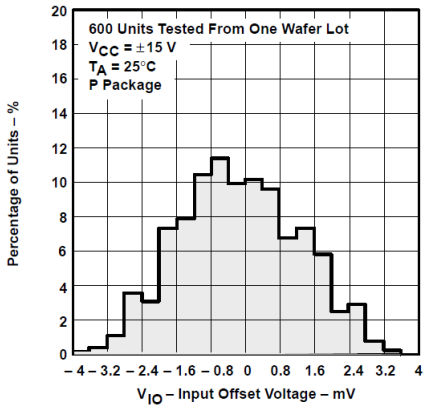



Figure 6-2. Distribution of TLE2082 Input Offset Voltage

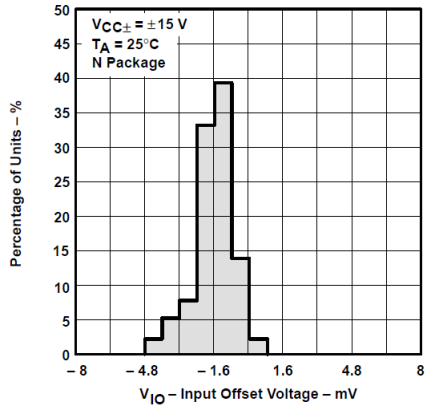



Figure 6-3. Distribution of TLE2084 Input Offset Voltage

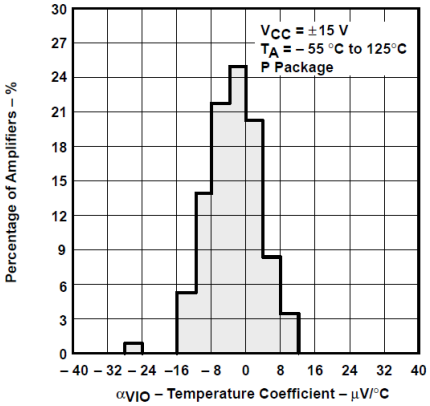



Figure 6-4. Distribution of TLE2081 Input Offset Voltage Temperature Coefficient

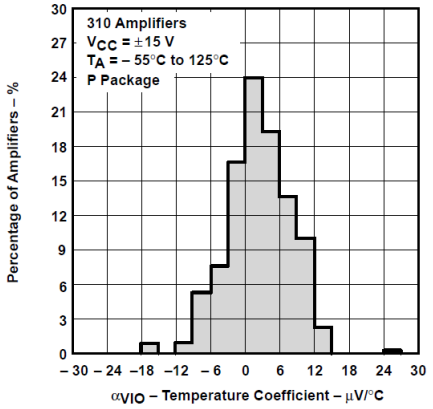



Figure 6-5. Distribution of TLE2082 Input Offset Voltage Temperature Coefficient

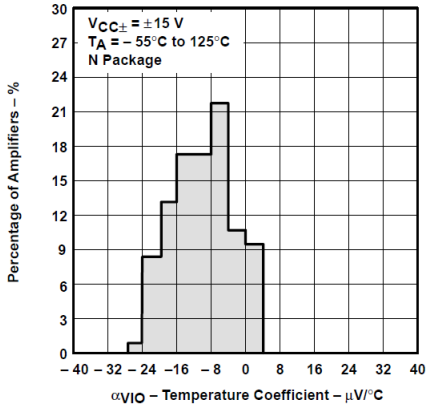



Figure 6-6. Distribution of TLE2084 Input Offset Voltage Temperature Coefficient

## 6.24 Typical Characteristics (continued)

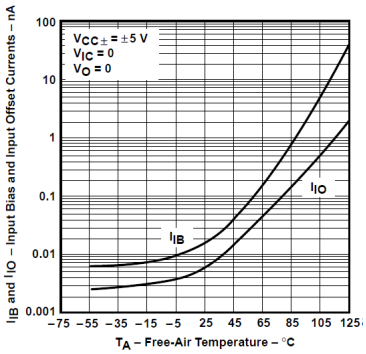



**Figure 6-7. TLE2081 and TLE2082 Input Bias Current and Input Offset Current vs Free-Air Temperature**

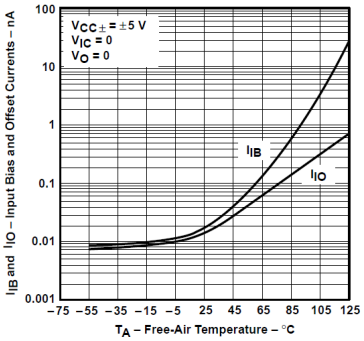



**Figure 6-8. TLE2084 Input Bias Current and Input Offset Current vs Free-Air Temperature**

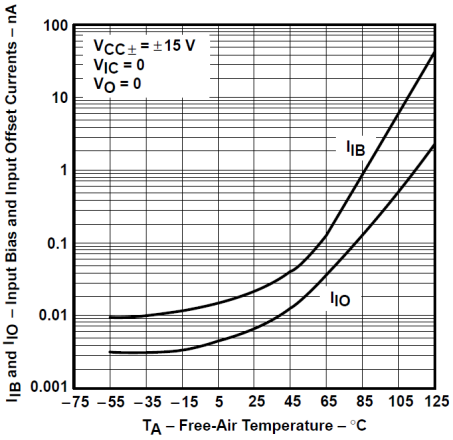



**Figure 6-9. TLE2081 and TLE2082 Input Bias Current and Input Offset Current vs Free-Air Temperature**

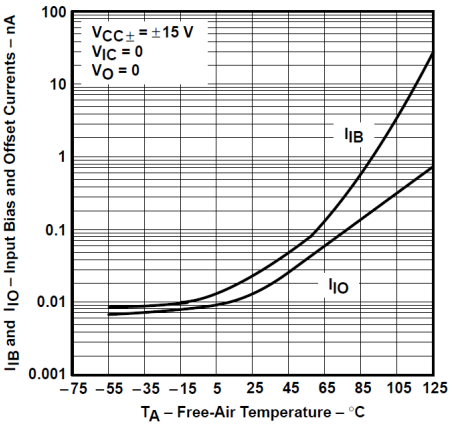



**Figure 6-10. TLE2084 Input Bias Current and Input Offset Current vs Free-Air Temperature**

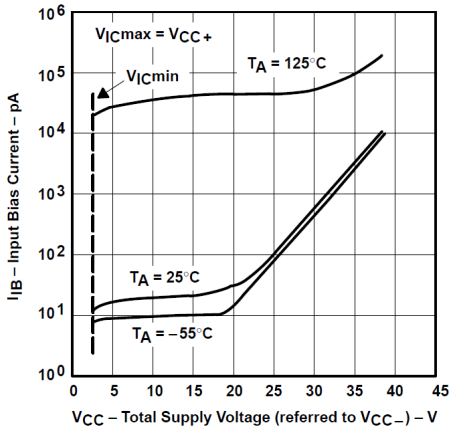



**Figure 6-11. Input Bias Current vs Total Supply Voltage**

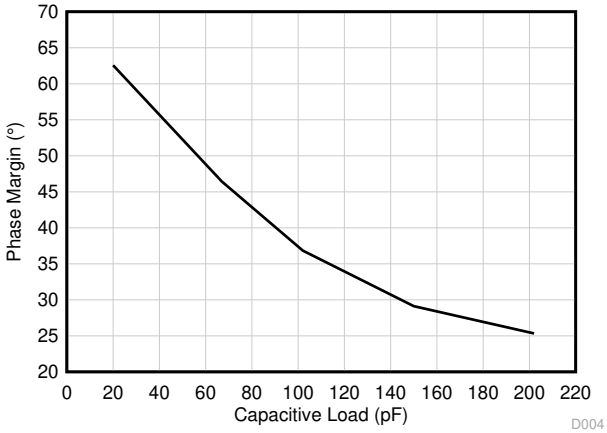



**Figure 6-12. Phase Margin vs Load Capacitance**

## 6.24 Typical Characteristics (continued)

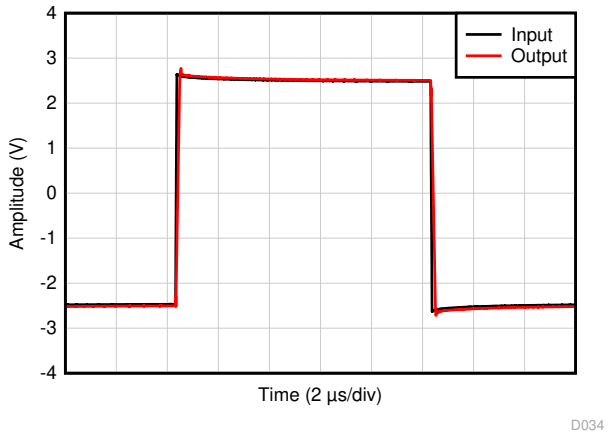



**Figure 6-13. Non-inverting Large-Signal Pulse Response**

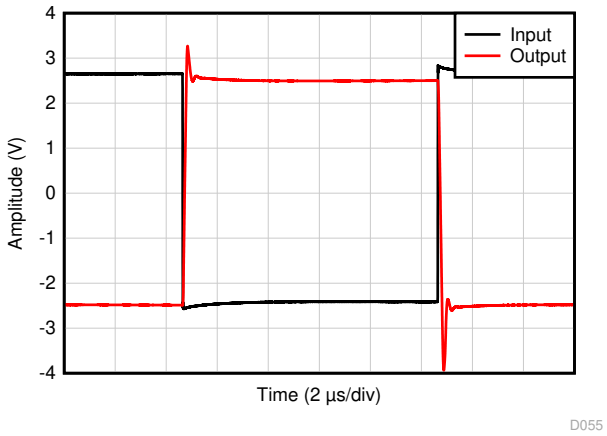



**Figure 6-14. Non-inverting Large-Signal Pulse Response**

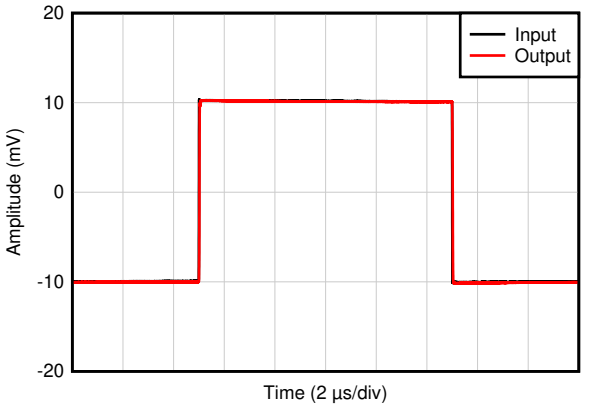



**Figure 6-15. Small-Signal Pulse Response**

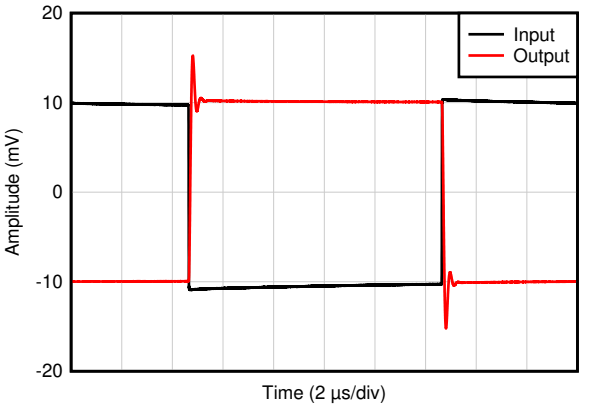



**Figure 6-16. Small-Signal Pulse Response**

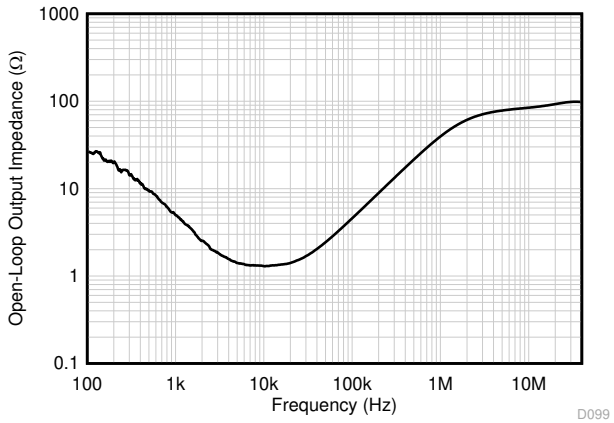



**Figure 6-17. Open-Loop Output Impedance vs Frequency**

# 7 Application and Implementation

**Note**

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

## 7.1 Application Information

### *7.1.1 Input Characteristics*

The TLE208x and TLE208xA are specified with a minimum and a maximum input voltage that, if exceeded at either input, can cause the device to malfunction. Because of the extremely high input impedance and resulting low bias current requirements, the TLE208x and TLE208xA an excellent choice for low-level signal processing. However, leakage currents on printed-circuit boards and sockets can easily exceed bias current requirements and cause degradation in system performance. Including guard rings around inputs (see Figure 7-1) is a good practice. These guards can be driven from a low-impedance source at the same voltage level as the common-mode input.

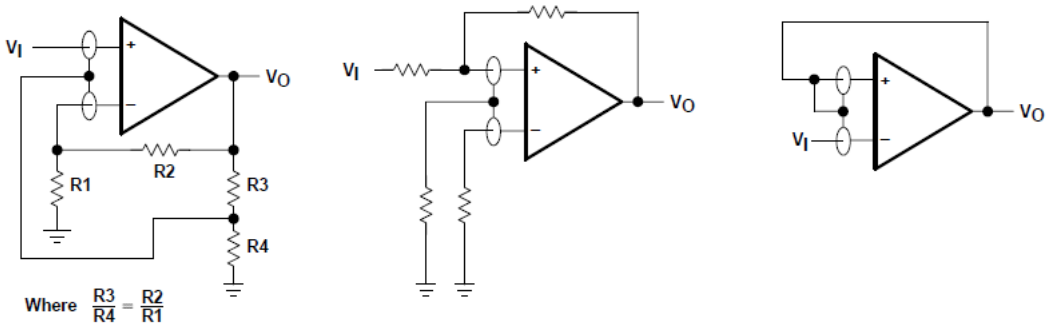



**Figure 7-1. Use of Guard Rings**

# 8 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

## 8.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

## 8.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

## 8.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

## 8.4 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## 8.5 Glossary

| | |
|---|---|
| TI Glossary | This glossary lists and explains terms, acronyms, and definitions. |

# 9 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| Changes from Revision B (June 2001) to Revision C (March 2026) | Page |
|---|---|
| • Updated the numbering format for tables, figures, and cross-references throughout the document | 1 |
| • Deleted BiFET, Slew rate details in Features | 1 |
| • Deleted point "On-chip offset voltage trimming" in Features | 1 |
| • Added Applications section | 1 |
| • Changed Description section | 1 |
| • Added TLE208X and TLE208XA in a Single-Pole, Low-Pass Filter figure | 1 |
| • Added Product Information table | 1 |
| • Deleted CHIP CARRIER (FK), CERAMIC DIP (JG), CHIP FORM (Y) Columns from available options table | 3 |
| • Deleted –55°C to 125°C row values from available options table | 3 |
| • Updated OffestN1 and OffsetN2 pin to NC in TLE2081D, OR P PACKAGE | 4 |
| • Deleted TLE2081 TLE2082 TLE2084 FK package | 4 |
| • Deleted J package from TLE2084 | 4 |
| • Deleted JG package from TLE2081 and TLE2082 | 4 |
| • Added Pin Functions TLE2081D, OR P PACKAGE table | 4 |
| • Added Pin Functions TLE2082D OR P PACKAGE table | 4 |
| • Added Pin Functions TLE2084N PACKAGE table | 4 |
| • Added Pin Functions TLE2084 DW PACKAGE table | 4 |
| • Deleted TLE2081Y, TLE2082Y, and TLE2084Y chip information | 4 |
| • Deleted Equivalent Schematic (Each Channel) figure | 4 |

## 10 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

## PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type (2) | Package \| Pins | Package qty \| Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---|---|---|---|---|---|---|---|---|---|
| TLE2081ACD | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | 0 to 70 | 2081AC |
| TLE2081ACDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 2081AC |
| TLE2081ACDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 2081AC |
| TLE2081ACP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2081AC |
| TLE2081ACP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2081AC |
| TLE2081AID | Active | Production | SOIC (D) \| 8 | 75 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2081AI |
| TLE2081AID.A | Active | Production | SOIC (D) \| 8 | 75 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2081AI |
| TLE2081AIP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2081AI |
| TLE2081AIP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2081AI |
| TLE2081CD | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | 0 to 70 | 2081C |
| TLE2081CDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 2081C |
| TLE2081CDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 2081C |
| TLE2081CP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | TLE2081CP |
| TLE2081CP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | TLE2081CP |
| TLE2081ID | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | -40 to 85 | 2081I |
| TLE2081IDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2081I |
| TLE2081IDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2081I |
| TLE2081IP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | - | TLE2081IP |
| TLE2081IP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2081IP |
| TLE2082ACD | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | 0 to 70 | 2082AC |
| TLE2082ACDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2082AC |
| TLE2082ACDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2082AC |
| TLE2082ACP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | - | TLE2082AC |
| TLE2082ACP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2082AC |
| TLE2082AID | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | -40 to 85 | 2082AI |
| TLE2082AIDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2082AI |
| TLE2082AIDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2082AI |
| TLE2082AIDRG4 | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2082AI |
| TLE2082AIDRG4.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2082AI |

| Orderable part number | Status (1) | Material type (2) | Package \| Pins | Package qty \| Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---|---|---|---|---|---|---|---|---|---|
| TLE2082AIP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | - | TLE2082AI |
| TLE2082AIP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2082AI |
| TLE2082CD | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | 0 to 70 | 2082C |
| TLE2082CDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2082C |
| TLE2082CDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2082C |
| TLE2082CP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | - | TLE2082CP |
| TLE2082CP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2082CP |
| TLE2082CPE4 | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | - | Call TI | Call TI | See TLE2082CP | |
| TLE2082ID | Obsolete | Production | SOIC (D) \| 8 | - | - | Call TI | Call TI | -40 to 85 | 2082I |
| TLE2082IDR | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2082I |
| TLE2082IDR.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2082I |
| TLE2082IDRG4 | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | 2082I |
| TLE2082IDRG4.A | Active | Production | SOIC (D) \| 8 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | 2082I |
| TLE2082IP | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | - | TLE2082IP |
| TLE2082IP.A | Active | Production | PDIP (P) \| 8 | 50 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2082IP |
| TLE2084ACDW | Active | Production | SOIC (DW) \| 16 | 40 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | TLE2084AC |
| TLE2084ACDW.A | Active | Production | SOIC (DW) \| 16 | 40 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | TLE2084AC |
| TLE2084ACN | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | TLE2084ACN |
| TLE2084ACN.A | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | TLE2084ACN |
| TLE2084CDW | Active | Production | SOIC (DW) \| 16 | 40 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | TLE2084C |
| TLE2084CDW.A | Active | Production | SOIC (DW) \| 16 | 40 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | TLE2084C |
| TLE2084CDWR | Active | Production | SOIC (DW) \| 16 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | TLE2084C |
| TLE2084CDWR.A | Active | Production | SOIC (DW) \| 16 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | TLE2084C |
| TLE2084CN | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | - | TLE2084CN |
| TLE2084CN.A | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | TLE2084CN |
| TLE2084IDW | Active | Production | SOIC (DW) \| 16 | 40 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | TLE2084I |
| TLE2084IDW.A | Active | Production | SOIC (DW) \| 16 | 40 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | TLE2084I |

(1) **Status:** For more details on status, see our product life cycle.

**(2) Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

**(3) RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

**(4) Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

**(5) MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

**(6) Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

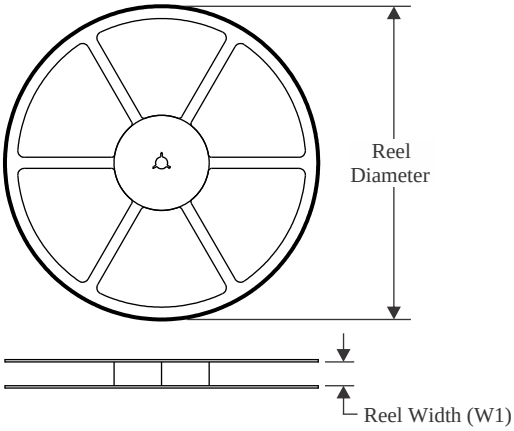
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

**Important Information and Disclaimer:**The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

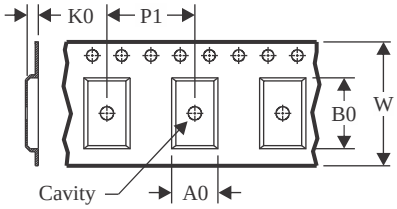
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

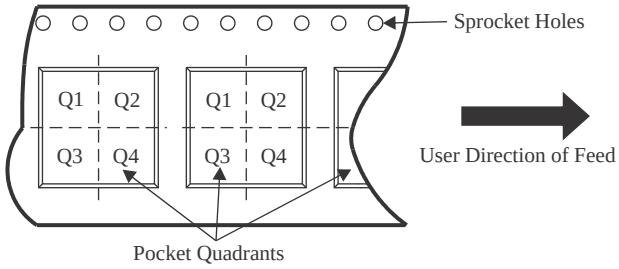



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**

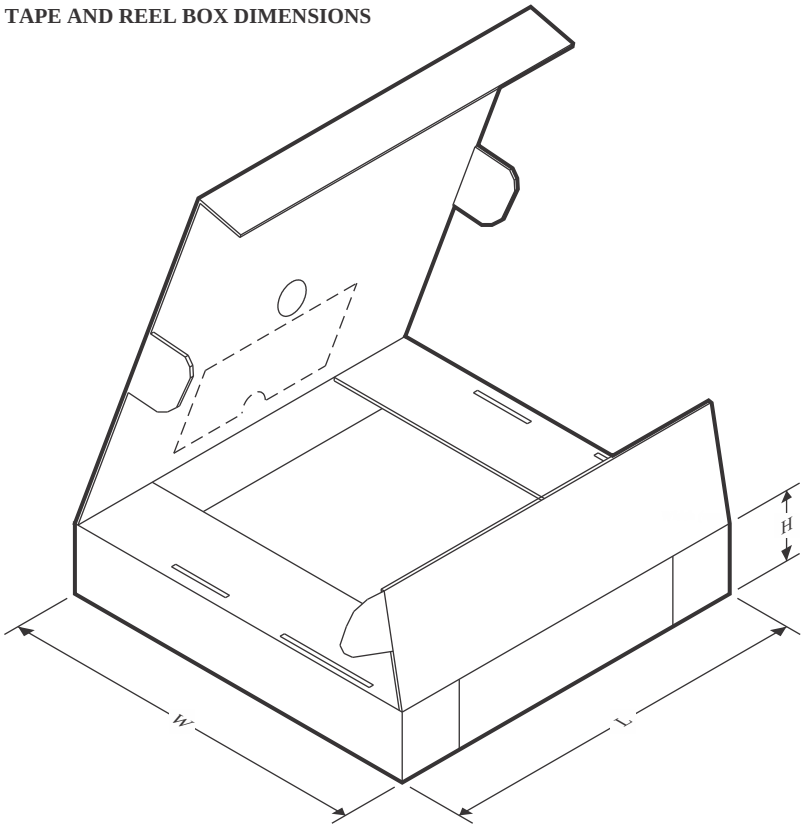



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TLE2081ACDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2081ACDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2081CDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2081CDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2081IDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2081IDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082ACDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082ACDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082AIDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082AIDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082AIDRG4 | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082CDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082CDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082IDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082IDR | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| TLE2082IDRG4 | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TLE2084CDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |

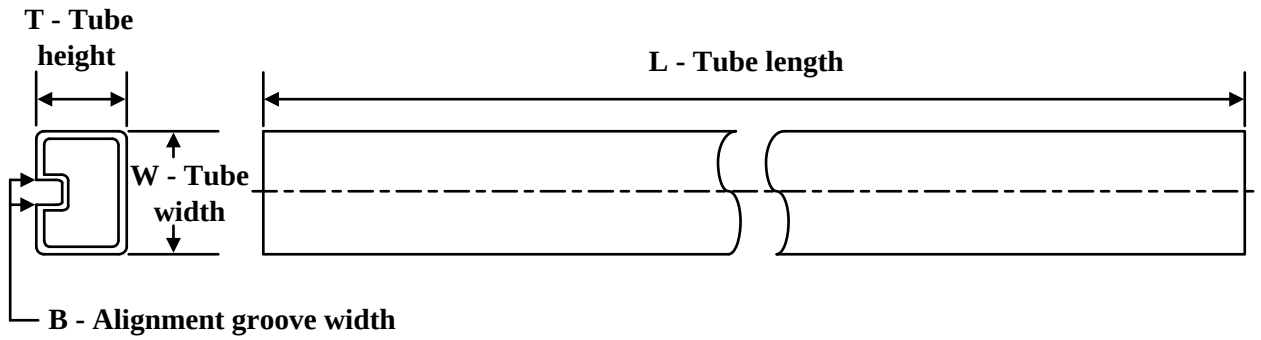
TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| TLE2081ACDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2081ACDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2081CDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2081CDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2081IDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2081IDR | SOIC | D | 8 | 2500 | 340.5 | 338.1 | 20.6 |
| TLE2082ACDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082ACDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082AIDR | SOIC | D | 8 | 2500 | 340.5 | 338.1 | 20.6 |
| TLE2082AIDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082AIDRG4 | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082CDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082CDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082IDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082IDR | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2082IDRG4 | SOIC | D | 8 | 2500 | 353.0 | 353.0 | 32.0 |
| TLE2084CDWR | SOIC | DW | 16 | 2000 | 350.0 | 350.0 | 43.0 |

## TUBE




*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---|---|---|---|---|---|---|---|---|
| TLE2081ACP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081ACP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081AID | D | SOIC | 8 | 75 | 507 | 8 | 3940 | 4.32 |
| TLE2081AID | D | SOIC | 8 | 75 | 505.46 | 6.76 | 3810 | 4 |
| TLE2081AID.A | D | SOIC | 8 | 75 | 505.46 | 6.76 | 3810 | 4 |
| TLE2081AID.A | D | SOIC | 8 | 75 | 507 | 8 | 3940 | 4.32 |
| TLE2081AIP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081AIP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081CP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081CP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081IP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2081IP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082ACP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082ACP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082AIP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082AIP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082CP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082CP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082IP | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2082IP.A | P | PDIP | 8 | 50 | 506 | 13.97 | 11230 | 4.32 |
| TLE2084ACDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| TLE2084ACDW.A | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| TLE2084ACN | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| TLE2084ACN.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| TLE2084CDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| TLE2084CDW.A | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| TLE2084CN | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| TLE2084CN.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| TLE2084IDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---|---|---|---|---|---|---|---|---|
| TLE2084IDW.A | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |

# GENERIC PACKAGE VIEW

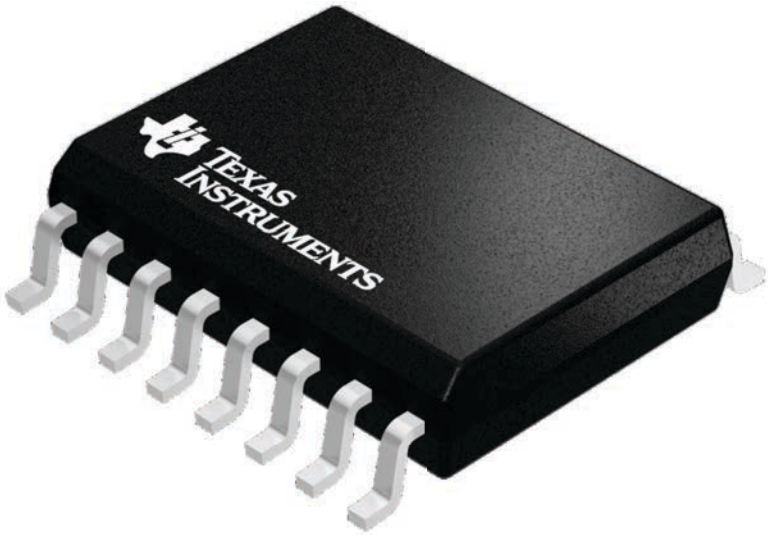
## DW 16

## SOIC - 2.65 mm max height

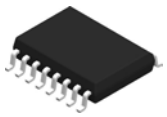
**7.5 x 10.3, 1.27 mm pitch**

SMALL OUTLINE INTEGRATED CIRCUIT

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.




4224780/A

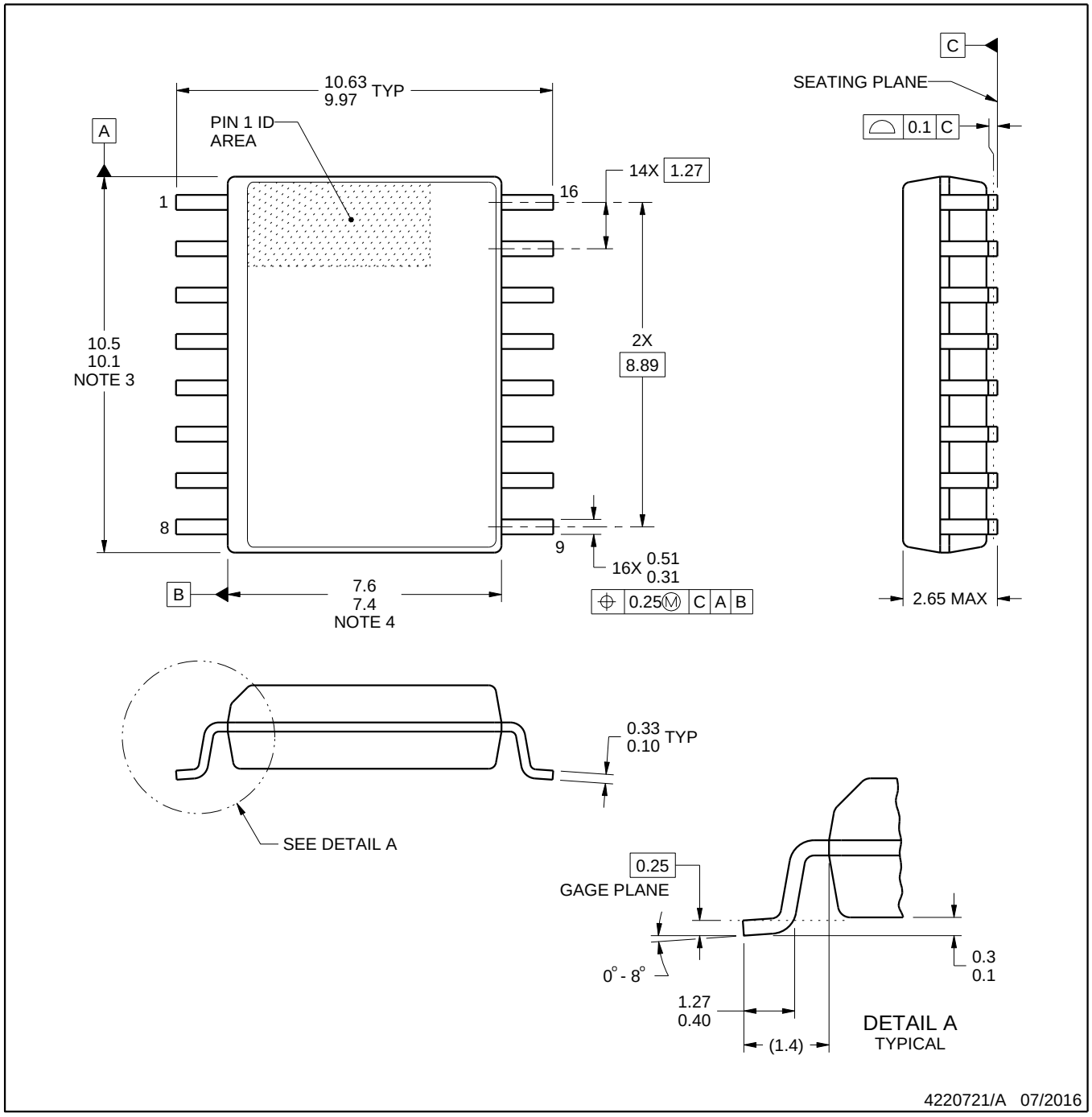


# PACKAGE OUTLINE

## DW0016A

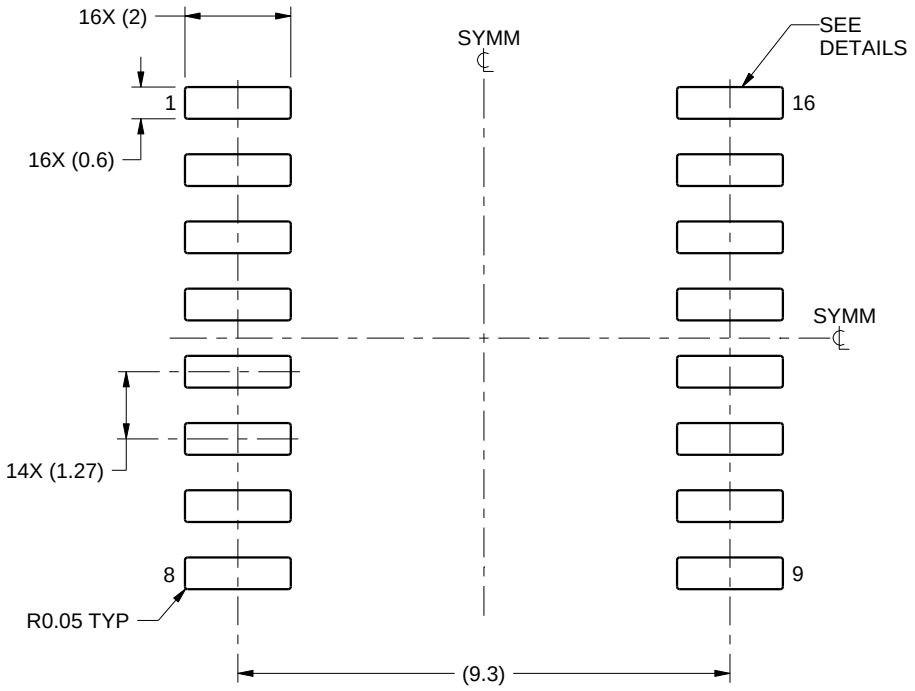
## SOIC - 2.65 mm max height

SOIC

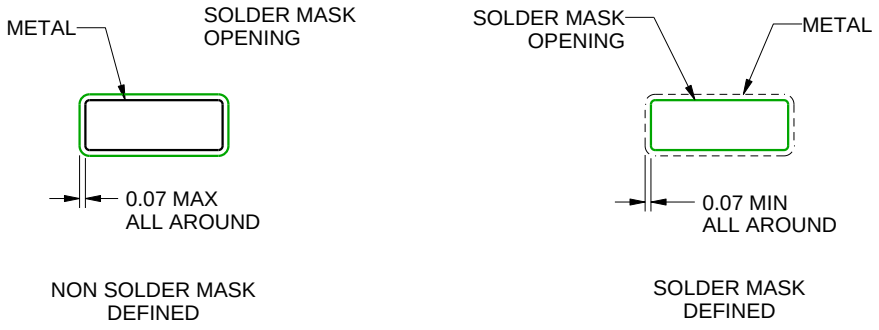



NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
5. Reference JEDEC registration MS-013.




LAND PATTERN EXAMPLE
SCALE:7X

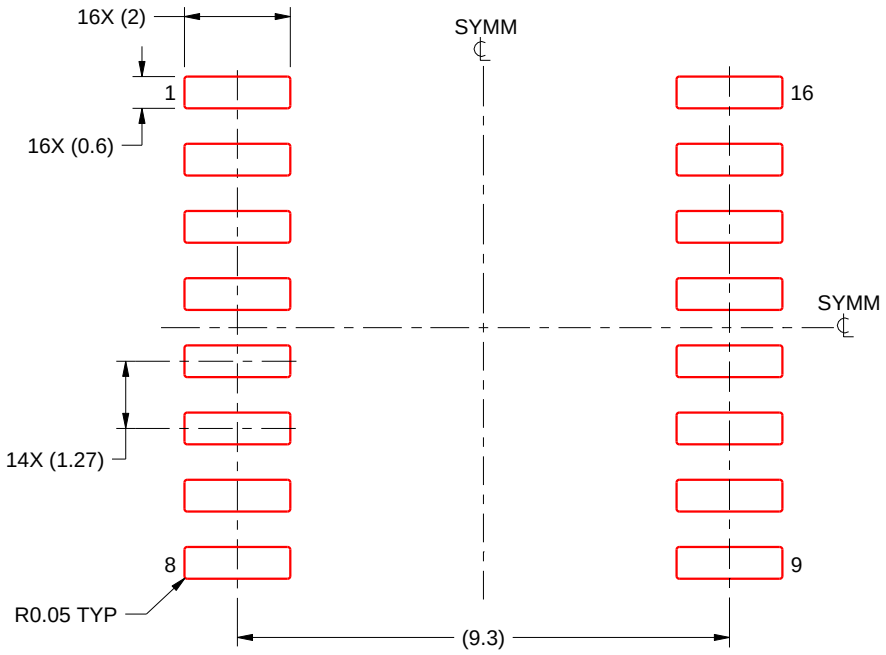



SOLDER MASK DETAILS

4220721/A 07/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

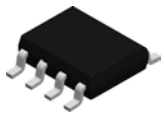



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:7X

4220721/A 07/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

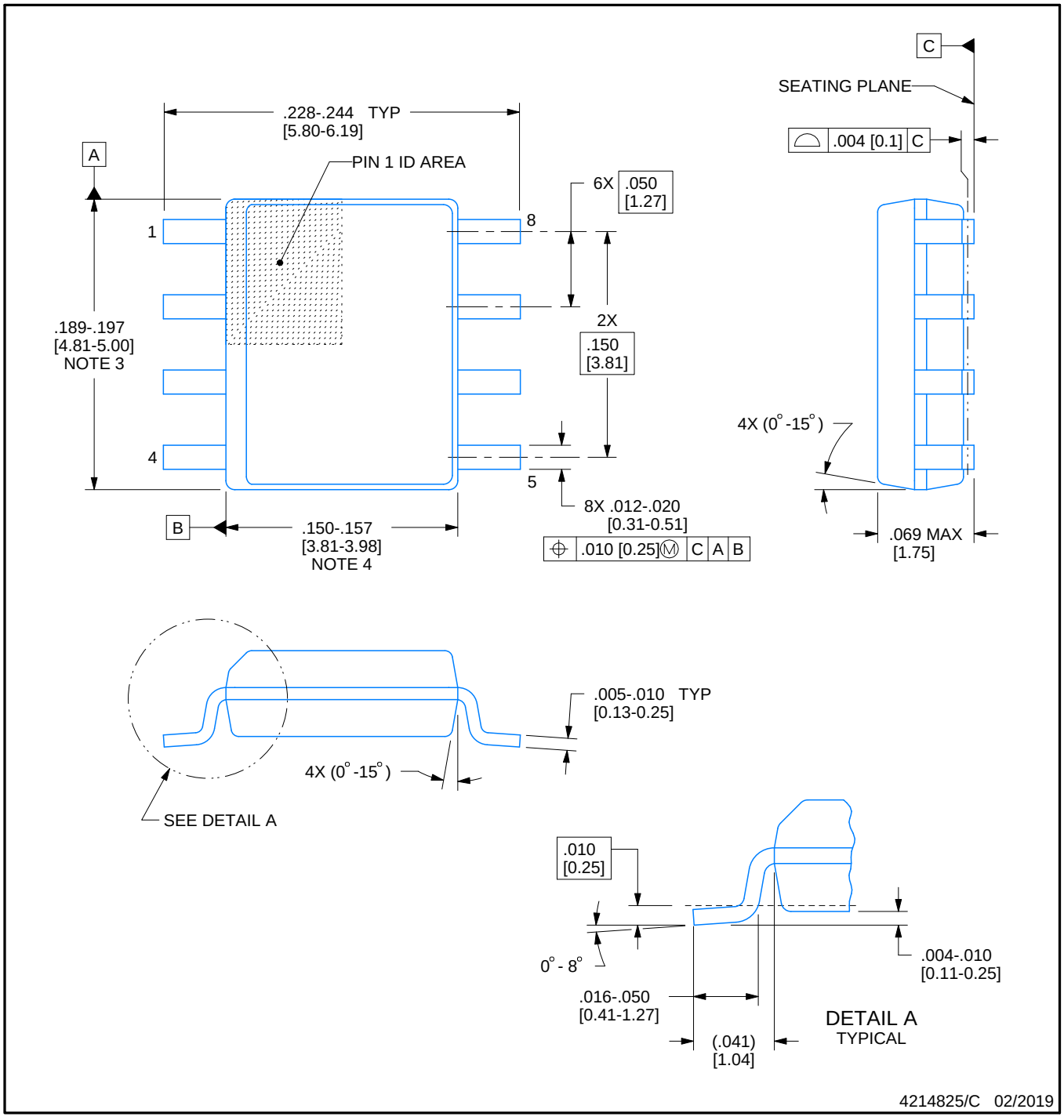


# PACKAGE OUTLINE

## D0008A

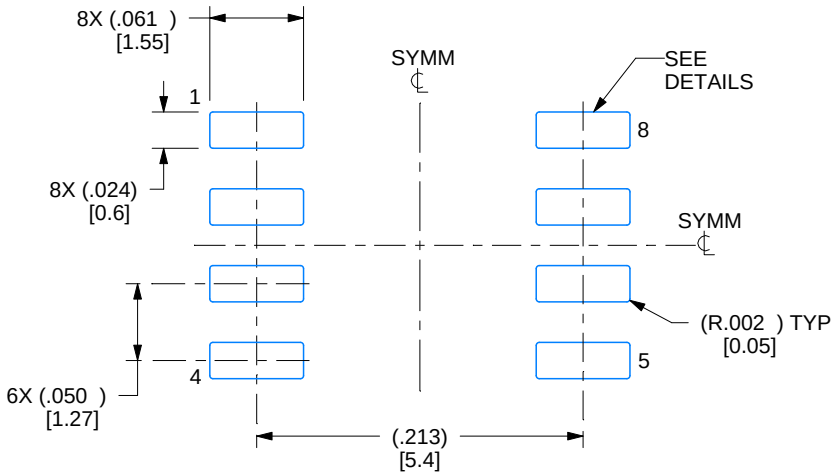
## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

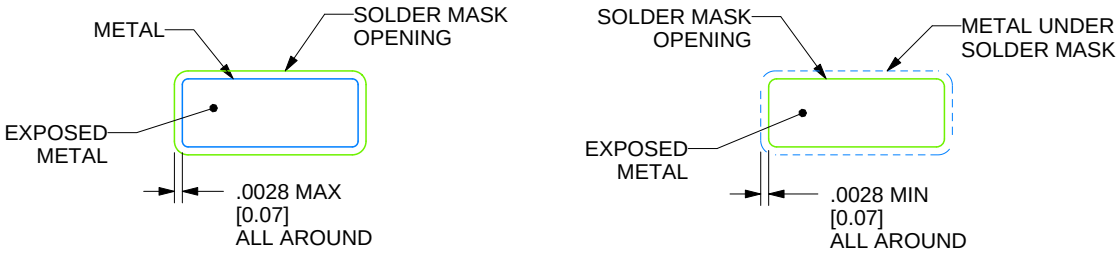



NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X




SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

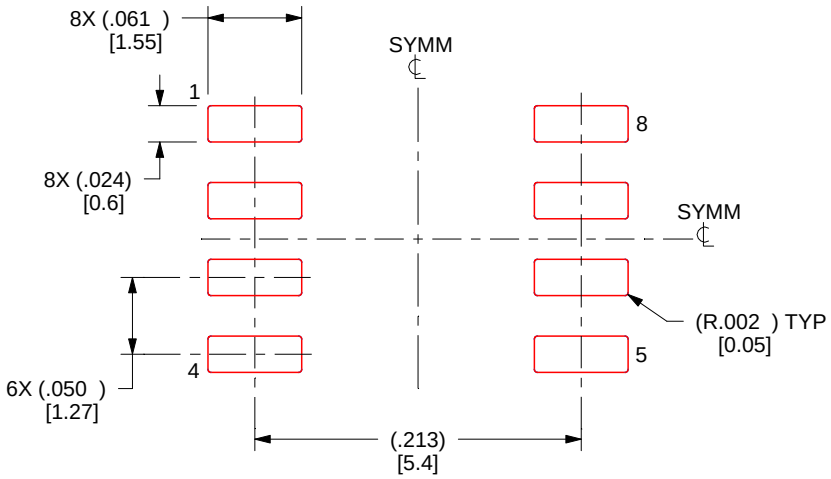
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

## D0008A

## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



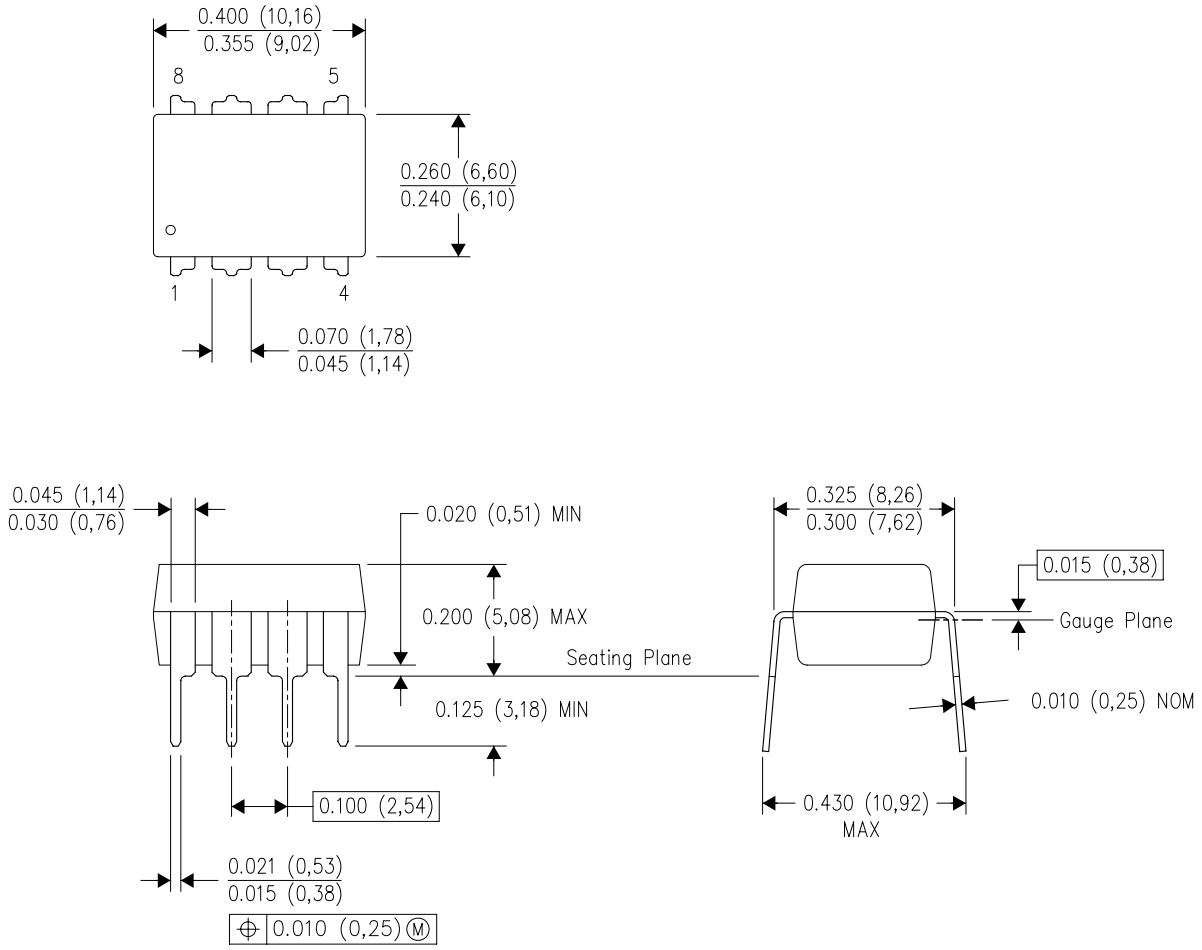

SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

P (R–PDIP–T8) PLASTIC DUAL–IN–LINE PACKAGE

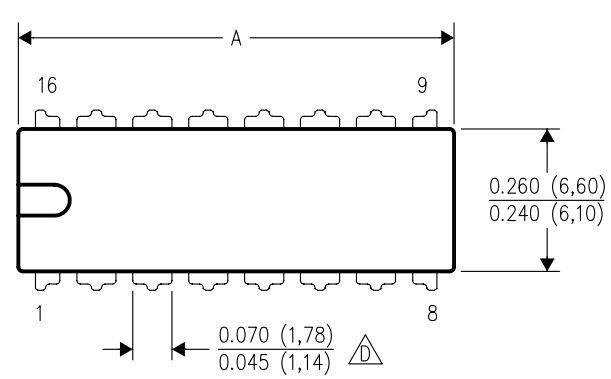



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001 variation BA.

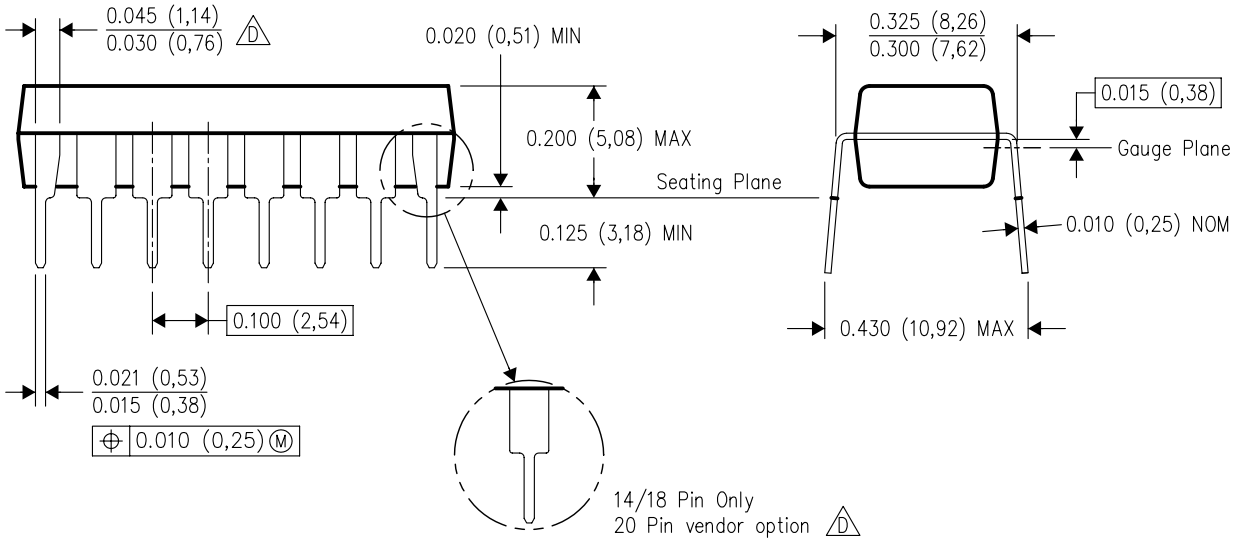
## N (R–PDIP–T**)

## PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN




| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| A MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS–001 VARIATION (C) | AA | BB | AC | AD |




4040049/E 12/2002

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

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