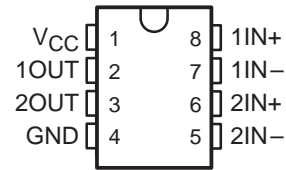


# uA9637AC DUAL DIFFERENTIAL LINE RECEIVER

SLLS111B – SEPTEMBER 1980 – REVISED MAY 1995

- Meets or Exceeds the Requirements of ANSI Standards EIA/TIA-422-B and EIA/TIA-423-B and ITU Recommendations V.10 and V.11
- Operates From Single 5-V Power Supply
- Wide Common-Mode Voltage Range
- High Input Impedance
- TTL-Compatible Outputs
- High-Speed Schottky Circuitry
- 8-Pin Dual-in-Line and Small-Outline Packages
- Designed to Be Interchangeable With National DS9637A

uA9637AC . . . D OR P PACKAGE  
(TOP VIEW)

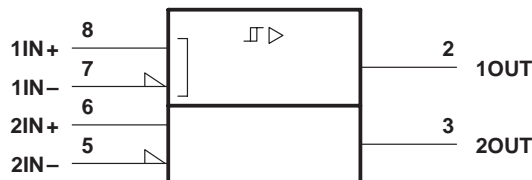


## description

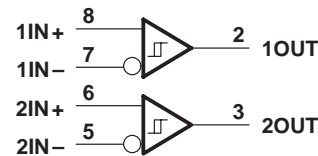
The uA9637AC is a dual differential line receiver designed to meet ANSI Standards EIA/TIA-422-B and EIA/TIA-423-B and ITU Recommendations V.10 and V.11. The line receiver utilizes Schottky circuitry and has TTL-compatible outputs. The inputs are compatible with either a single-ended or a differential-line system. This device operates from a single 5-V power supply and is supplied in an 8-pin dual-in-line package or small-outline package.

The uA9637AC is characterized for operation from 0°C to 70°C.

## logic symbol†



## logic diagram



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.



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 **TEXAS  
INSTRUMENTS**

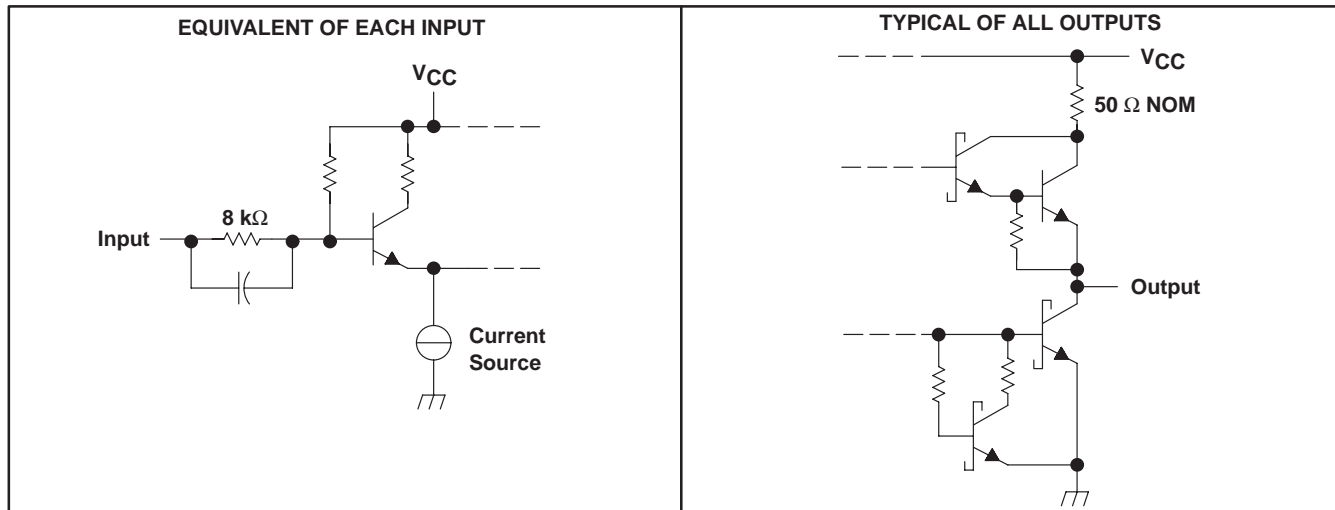
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# uA9637AC DUAL DIFFERENTIAL LINE RECEIVER

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## schematics of inputs and outputs



### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

|  |       |                              |
|--|-------|------------------------------|
| Supply voltage range, $V_{CC}$ (see Note 1)                  | ..... | -0.5 V to 7 V                |
| Input voltage, $V_I$   | ..... | $\pm 15$ V                   |
| Differential input voltage, $V_{ID}$ (see Note 2)            | ..... | $\pm 15$ V                   |
| Output voltage range, $V_O$ (see Note 1)                     | ..... | -0.5 V to 5.5 V              |
| Low-level output current, $I_{OL}$                           | ..... | 50 mA                        |
| Continuous total dissipation                                 | ..... | See Dissipation Rating Table |
| Operating free-air temperature range, $T_A$                  | ..... | 0°C to 70°C                  |
| Storage temperature range, $T_{stg}$                         | ..... | -65°C to 150°C               |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds | ..... | 260°C                        |

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All voltage values, except differential input voltage, are with respect to the network ground terminal.  
 2. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$ | OPERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$ | $T_A = 125^\circ\text{C}$ |
|---------|-----------------------------|--|--------------------------|---------------------------|
|         | POWER RATING                |  | POWER RATING             | POWER RATING              |
| D       | 725 mW                      | 5.8 mW/°C  | 464 mW                   | —                         |
| P       | 1000 mW                     | 8.0 mW/°C  | 640 mW                   | —                         |

**recommended operating conditions**

|                                       | MIN  | NOM | MAX     | UNIT               |
|---------------------------------------|------|-----|---------|--------------------|
| Supply voltage, $V_{CC}$              | 4.75 | 5   | 5.25    | V                  |
| Common-mode input voltage, $V_{IC}$   |      |     | $\pm 7$ | V                  |
| Operating free-air temperature, $T_A$ | 0    |     | 70      | $^{\circ}\text{C}$ |

**electrical characteristics over recommended ranges of supply voltage, common-mode input voltage, and operating free-air temperature (unless otherwise noted)**

| PARAMETER |  | TEST CONDITIONS                                     | MIN  | TYP <sup>†</sup>                            | MAX               | UNIT          |    |
|-----------|--|---|------|---|-------------------|---------------|----|
| $V_{IT+}$ | Positive-going input threshold voltage     | See Note 3  |      |   | 0.2<br>0.4        | V             |    |
| $V_{IT-}$ | Negative-going input threshold voltage     | See Note 3  | -0.2 |   | -0.4 <sup>‡</sup> | V             |    |
| $V_{hys}$ | Hysteresis voltage ( $V_{IT+} - V_{IT-}$ ) |   |      | 70  |                   | mV            |    |
| $V_{OH}$  | High-level output voltage                  | $V_{ID} = 0.2\text{ V}$ ,<br>$I_O = -1\text{ mA}$   | 2.5  | 3.5   |                   | V             |    |
| $V_{OL}$  | Low-level output voltage                   | $V_{ID} = -0.2\text{ V}$ ,<br>$I_O = 20\text{ mA}$  |      | 0.35  | 0.5               | V             |    |
| $I_I$     | Input current                              | $V_{CC} = 0\text{ to }5.5\text{ V}$ ,<br>See Note 4 |      | $V_I = 10\text{ V}$<br>$V_I = -10\text{ V}$ | 1.1<br>-1.6       | 3.25<br>-3.25 | mA |
| $I_{OS}$  | Short-circuit output current <sup>§</sup>  | $V_O = 0$ ,<br>$V_{ID} = 0.2\text{ V}$              | -40  | -75   | -100              | mA            |    |
| $I_{CC}$  | Supply current                             | $V_{ID} = -0.5\text{ V}$ ,<br>No load               |      | 35  | 50                | mA            |    |

<sup>†</sup> All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

<sup>‡</sup> The algebraic convention, in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for threshold levels only.

<sup>§</sup> Only one output should be shorted at a time, and duration of the short circuit should not exceed one second.

NOTES: 3. The expanded threshold parameter is tested with a 500- $\Omega$  resistor in series with each input.

4. The input not under test is grounded.

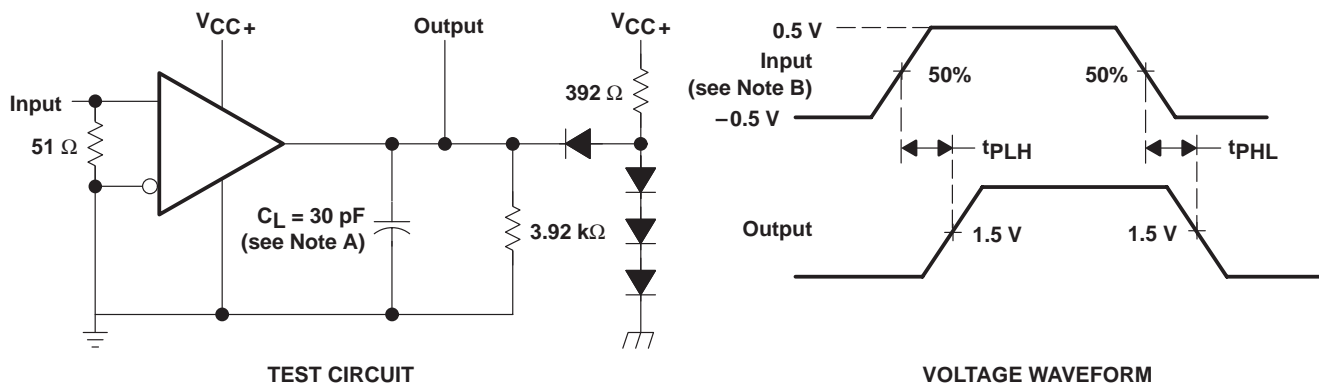
**switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^{\circ}\text{C}$**

| PARAMETER |   | TEST CONDITIONS                     | MIN | TYP | MAX | UNIT |
|-----------|---|-------------------------------------|-----|-----|-----|------|
| $t_{PLH}$ | Propagation delay time, low- to high-level output | $C_L = 30\text{ pF}$ , See Figure 1 |     | 15  | 25  | ns   |
| $t_{PHL}$ | Propagation delay time, high- to low-level output |                                     |     | 13  | 25  | ns   |

# uA9637AC DUAL DIFFERENTIAL LINE RECEIVER

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## PARAMETER MEASUREMENT INFORMATION



NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. The input pulse is supplied by a generator having the following characteristics:  $t_r \leq 5$  ns,  $t_f \leq 5$  ns,  $PRR \leq 5$  MHz, duty cycle = 50%.

Figure 1. Test Circuit and Voltage Waveform

## TYPICAL CHARACTERISTICS

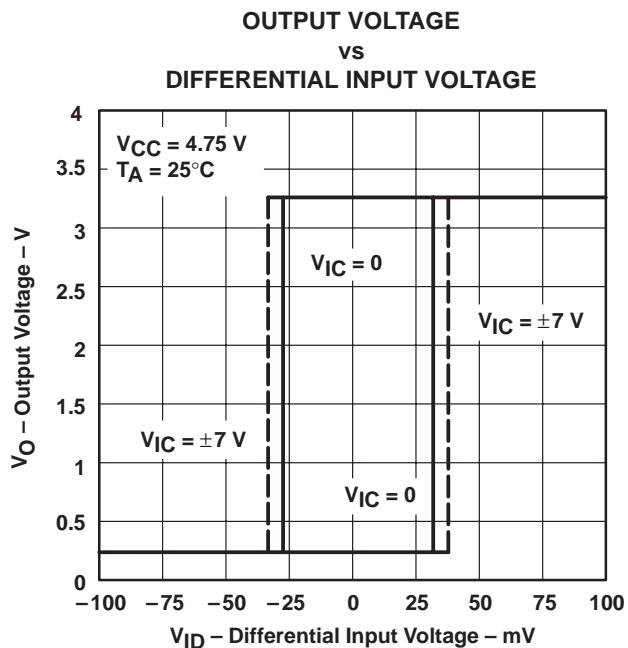


Figure 2

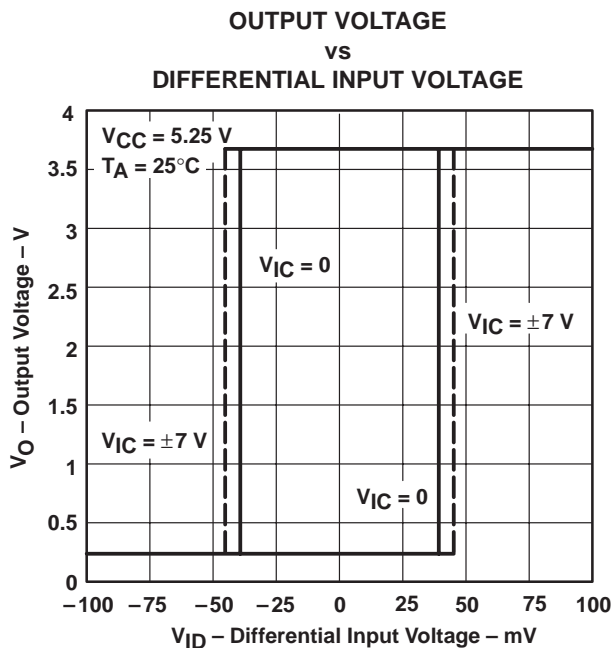


Figure 3

TYPICAL CHARACTERISTICS

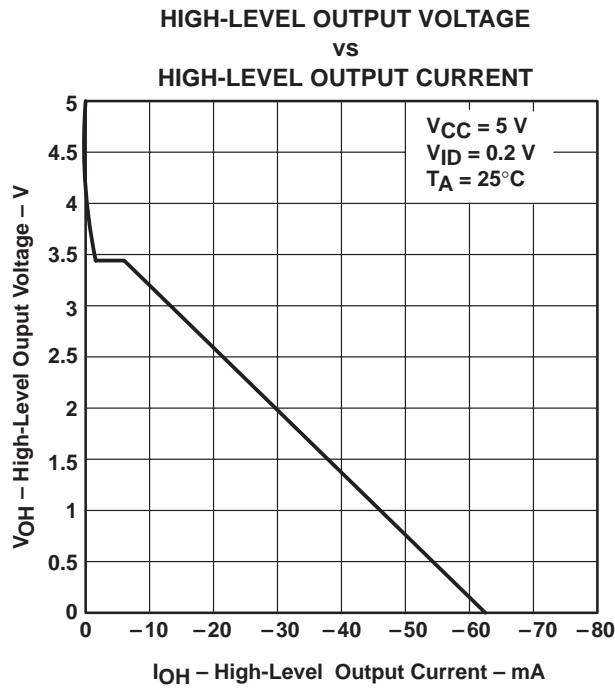


Figure 4

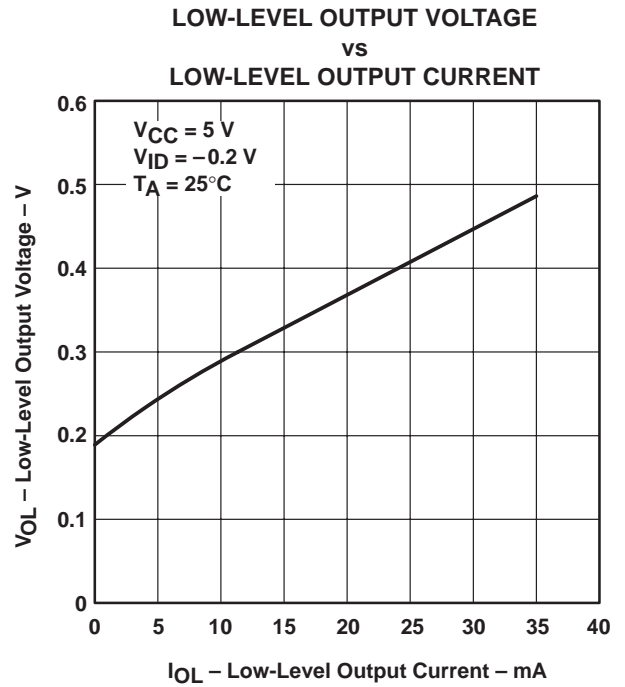


Figure 5

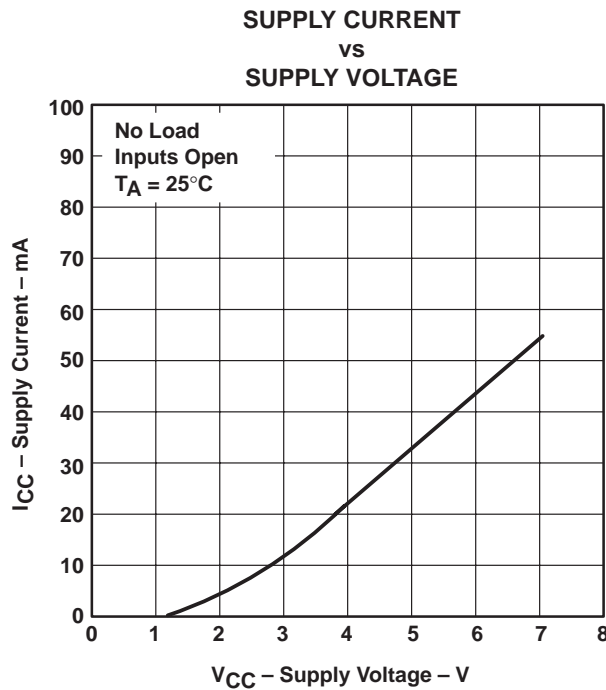


Figure 6

# uA9637AC DUAL DIFFERENTIAL LINE RECEIVER

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## APPLICATION INFORMATION

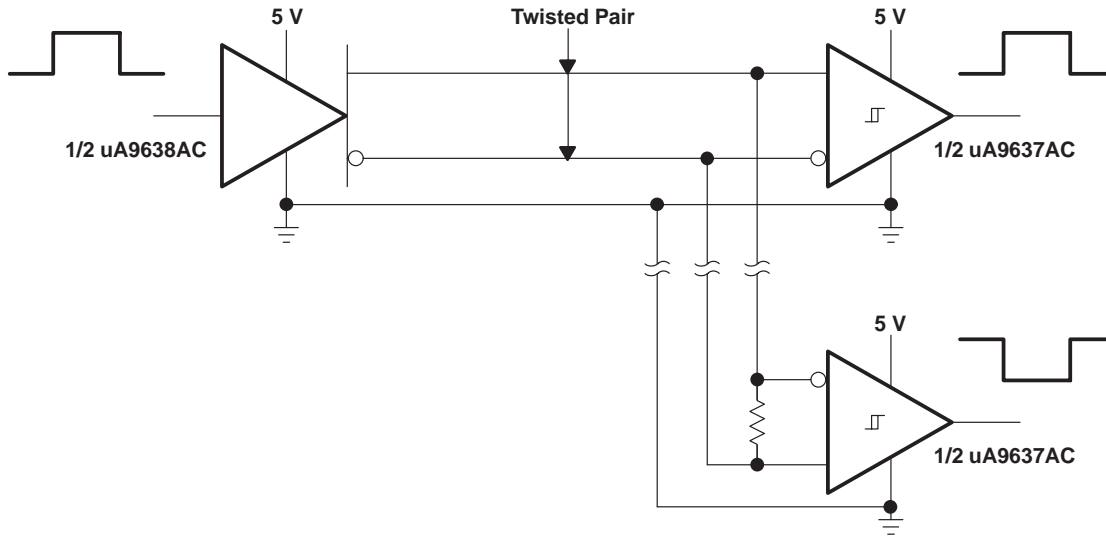


Figure 7. EIA/TIA-422-B System Applications

**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|----------------------|------------------------------|-----------------------------|
| UA9637ACD        | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU            | Level-2-260C-1 YEAR          |                             |
| UA9637ACDE4      | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU            | Level-2-260C-1 YEAR          |                             |
| UA9637ACDG4      | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU            | Level-2-260C-1 YEAR          |                             |
| UA9637ACDR       | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU            | Level-2-260C-1 YEAR          |                             |
| UA9637ACDRE4     | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU            | Level-2-260C-1 YEAR          |                             |
| UA9637ACDRG4     | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU            | Level-2-260C-1 YEAR          |                             |
| UA9637ACJG       | OBSOLETE              | CDIP         | JG              | 8    |             | TBD                     | Call TI              | Call TI                      |                             |
| UA9637ACP        | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU            | N / A for Pkg Type           |                             |
| UA9637ACPE4      | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU            | N / A for Pkg Type           |                             |

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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## TAPE AND REEL INFORMATION



### 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 |
|------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| UA9637ACDR | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |

TAPE AND REEL BOX DIMENSIONS

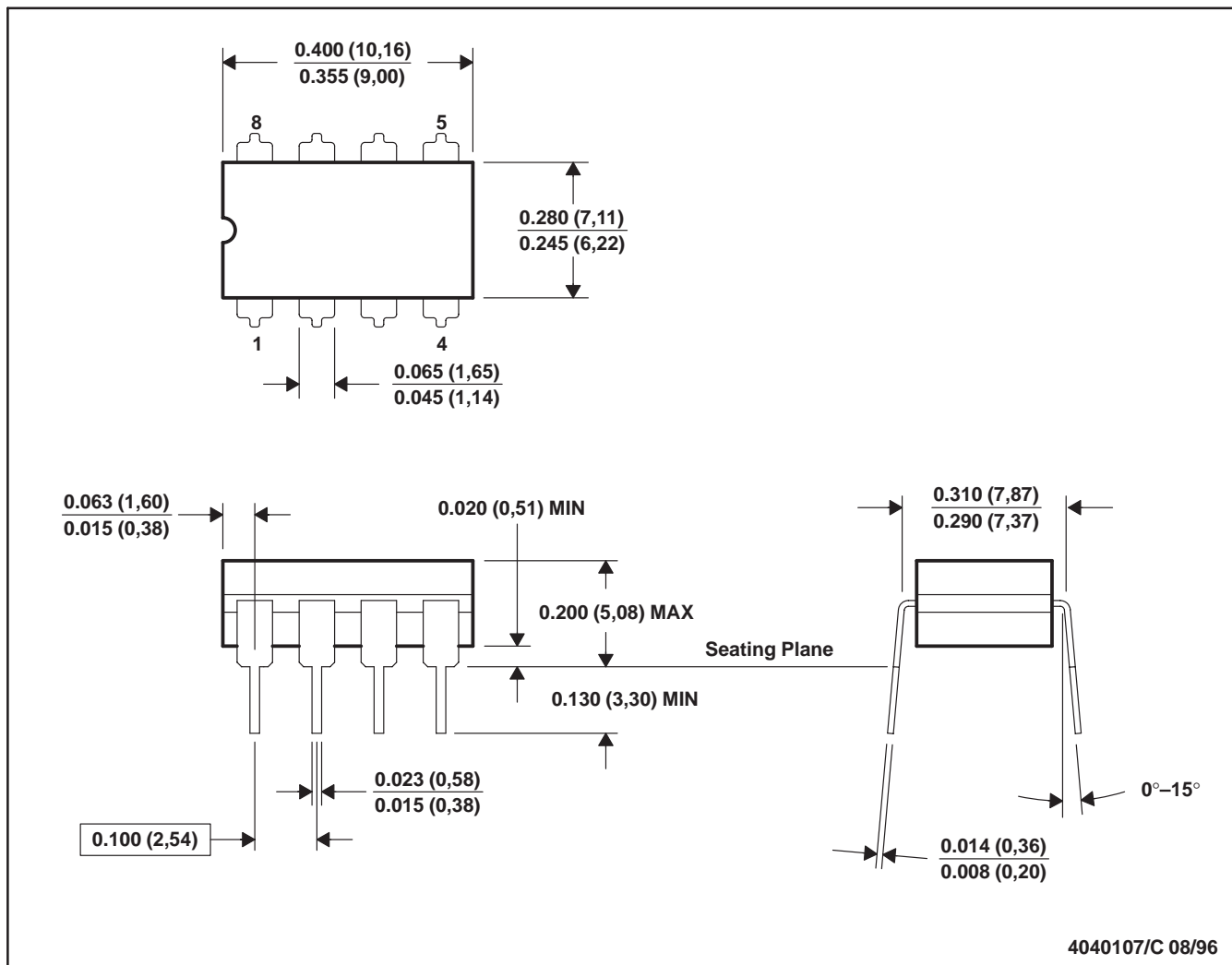


\*All dimensions are nominal

| Device     | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------|--------------|-----------------|------|------|-------------|------------|-------------|
| UA9637ACDR | SOIC         | D               | 8    | 2500 | 340.5       | 338.1      | 20.6        |

JG (R-GDIP-T8)

CERAMIC DUAL-IN-LINE



- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. This package can be hermetically sealed with a ceramic lid using glass frit.  
 D. Index point is provided on cap for terminal identification.  
 E. Falls within MIL STD 1835 GDIP1-T8

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.

D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - $\triangle D$  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AA.

D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



4211283-2/E 08/12

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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|                               |  |
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| Consumer Electronics          | <a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>                   |
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