

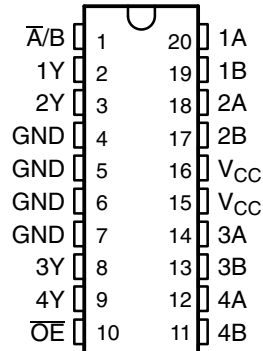
# 74AC11257

## QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

SCAS049C – MARCH 1989 – REVISED MAY 2004

- 3-State Outputs Interface Directly With System Bus
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin  $V_{CC}$  and GND Configurations Minimize High-Speed Switching Noise
- 500-mA Typical Latch-Up Immunity at 125°C
- Provides Bus Interface From Multiple Sources in High-Performance Systems

DB, DW, N, OR PW PACKAGE  
(TOP VIEW)



### description/ordering information

This device is designed to multiplex signals from 4-bit data sources to four output data lines in bus-organized systems. The 3-state outputs do not load the data lines when the output-enable ( $\overline{OE}$ ) input is at a high logic level.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

### ORDERING INFORMATION

| $T_A$         | PACKAGE†   |               | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---------------|------------|---------------|-----------------------|------------------|
| –40°C to 85°C | PDIP – N   | Tube          | 74AC11257N            | 74AC11257N       |
|               | SOIC – DW  | Tube          | 74AC11257DW           | AC11257          |
|               |            | Tape and reel | 74AC11257DWR          |                  |
|               | SSOP – DB  | Tape and reel | 74AC11257DBR          | AE257            |
|               | TSSOP – PW | Tube          | 74AC11257PW           | AE257            |
|               |            | Tape and reel | 74AC11257PWR          |                  |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

### FUNCTION TABLE

| INPUTS |               |      |   | OUTPUT<br>Y |
|--------|---------------|------|---|-------------|
| OE     | SELECT<br>A/B | DATA |   |             |
|        |               | A    | B |             |
| H      | X             | X    | X | Z           |
| L      | L             | L    | X | L           |
| L      | L             | H    | X | H           |
| L      | H             | X    | L | L           |
| L      | H             | X    | H | H           |



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

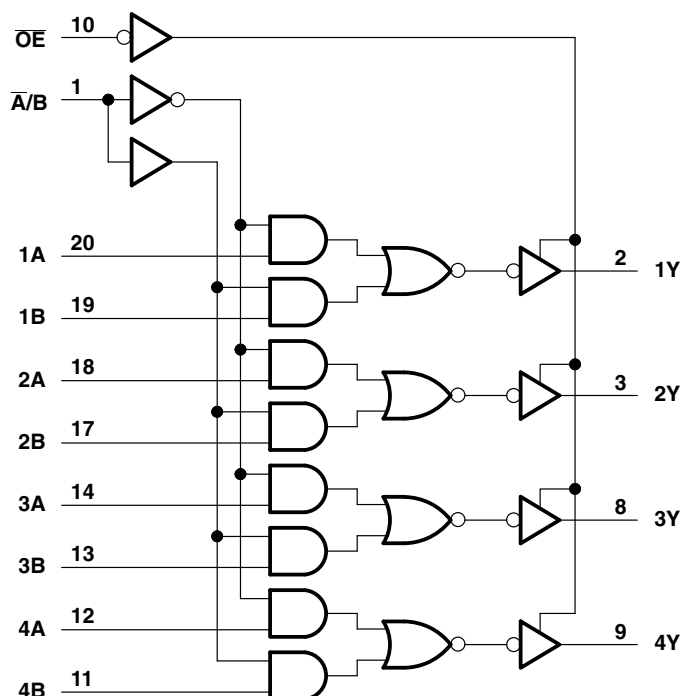
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# QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

SCAS049C – MARCH 1989 – REVISED MAY 2004

## logic diagram (positive logic)



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

|                                                                |                            |
|----------------------------------------------------------------|----------------------------|
| Supply voltage range, $V_{CC}$                                 | –0.5 V to 7 V              |
| Input voltage range, $V_I$ (see Note 1)                        | –0.5 V to $V_{CC} + 0.5$ V |
| Output voltage range, $V_O$ (see Note 1)                       | –0.5 V to $V_{CC} + 0.5$ V |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ )  | ±20 mA                     |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) | ±50 mA                     |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )     | ±50 mA                     |
| Continuous current through $V_{CC}$ or GND                     | ±100 mA                    |
| Package thermal impedance, $\theta_{JA}$ (see Note 2):         |                            |
| DB package                                                     | 70°C/W                     |
| DW package                                                     | 58°C/W                     |
| N package                                                      | 60°C/W                     |
| PW package                                                     | 83°C/W                     |

Storage temperature range,  $T_{stg}$  ..... –65°C to 150°C

<sup>†</sup> 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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
2. The package thermal impedance is calculated in accordance with JESD 51-7.

**74AC11257**  
**QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER**  
**WITH 3-STATE OUTPUTS**

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**recommended operating conditions (see Note 3)**

|                     |                                    | MIN                     | NOM  | MAX      | UNIT |
|---------------------|------------------------------------|-------------------------|------|----------|------|
| $V_{CC}$            | Supply voltage                     | 3                       | 5    | 5.5      | V    |
| $V_{IH}$            | High-level input voltage           | $V_{CC} = 3\text{ V}$   | 2.1  |          | V    |
|                     |                                    | $V_{CC} = 4.5\text{ V}$ | 3.15 |          |      |
|                     |                                    | $V_{CC} = 5.5\text{ V}$ | 3.85 |          |      |
| $V_{IL}$            | Low-level input voltage            | $V_{CC} = 3\text{ V}$   |      | 0.9      | V    |
|                     |                                    | $V_{CC} = 4.5\text{ V}$ |      | 1.35     |      |
|                     |                                    | $V_{CC} = 5.5\text{ V}$ |      | 1.65     |      |
| $V_I$               | Input voltage                      | 0                       |      | $V_{CC}$ | V    |
| $V_O$               | Output voltage                     | 0                       |      | $V_{CC}$ | V    |
| $I_{OH}$            | High-level output current          | $V_{CC} = 3\text{ V}$   |      | –4       | mA   |
|                     |                                    | $V_{CC} = 4.5\text{ V}$ |      | –24      |      |
|                     |                                    | $V_{CC} = 5.5\text{ V}$ |      | –24      |      |
| $I_{OL}$            | Low-level output current           | $V_{CC} = 3\text{ V}$   |      | 12       | mA   |
|                     |                                    | $V_{CC} = 4.5\text{ V}$ |      | 24       |      |
|                     |                                    | $V_{CC} = 5.5\text{ V}$ |      | 24       |      |
| $\Delta t/\Delta v$ | Input transition rise or fall rate |                         |      | 10       | ns/V |
| $T_A$               | Operating free-air temperature     | –40                     |      | 85       | °C   |

NOTE 3: All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

| PARAMETER | TEST CONDITIONS                   | $V_{CC}$ | $T_A = 25^\circ\text{C}$ |     |           | MIN  | MAX     | UNIT          |
|-----------|-----------------------------------|----------|--------------------------|-----|-----------|------|---------|---------------|
|           |                                   |          | MIN                      | TYP | MAX       |      |         |               |
| $V_{OH}$  | $I_{OH} = -50\text{ }\mu\text{A}$ | 3 V      | 2.9                      |     |           | 2.9  |         | V             |
|           |                                   | 4.5 V    | 4.4                      |     |           | 4.4  |         |               |
|           |                                   | 5.5 V    | 5.4                      |     |           | 5.4  |         |               |
|           | $I_{OH} = -4\text{ mA}$           | 3 V      | 2.58                     |     |           | 2.48 |         |               |
|           |                                   | 4.5 V    | 3.94                     |     |           | 3.8  |         |               |
|           |                                   | 5.5 V    | 4.94                     |     |           | 4.8  |         |               |
|           | $I_{OH} = -75\text{ mA}^\dagger$  | 5.5 V    |                          |     |           | 3.85 |         |               |
| $V_{OL}$  | $I_{OL} = 50\text{ }\mu\text{A}$  | 3 V      |                          |     | 0.1       |      | 0.1     | V             |
|           |                                   | 4.5 V    |                          |     | 0.1       |      | 0.1     |               |
|           |                                   | 5.5 V    |                          |     | 0.1       |      | 0.1     |               |
|           | $I_{OL} = 12\text{ mA}$           | 3 V      |                          |     | 0.36      |      | 0.44    |               |
|           |                                   | 4.5 V    |                          |     | 0.36      |      | 0.44    |               |
|           |                                   | 5.5 V    |                          |     | 0.36      |      | 0.44    |               |
|           | $I_{OL} = 75\text{ mA}^\dagger$   | 5.5 V    |                          |     |           |      | 1.65    |               |
| $I_{OZ}$  | $V_O = V_{CC}$ or GND             | 5.5 V    |                          |     | $\pm 0.5$ |      | $\pm 5$ | $\mu\text{A}$ |
| $I_I$     | $V_I = V_{CC}$ or GND             | 5.5 V    |                          |     | $\pm 0.1$ |      | $\pm 1$ | $\mu\text{A}$ |
| $I_{CC}$  | $V_I = V_{CC}$ or GND, $I_O = 0$  | 5.5 V    |                          |     | 8         |      | 80      | $\mu\text{A}$ |
| $C_i$     | $V_I = V_{CC}$ or GND             | 5 V      |                          | 3.5 |           |      |         | pF            |
| $C_o$     | $V_O = V_{CC}$ or GND             | 5.5 V    |                          | 8   |           |      |         | pF            |

<sup>†</sup> Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



# QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $T_A = 25^\circ\text{C}$ |     |      | MIN | MAX  | UNIT |
|-----------|-----------------|----------------|--------------------------|-----|------|-----|------|------|
|           |                 |                | MIN                      | TYP | MAX  |     |      |      |
| $t_{PLH}$ | A or B          | Y              | 1.5                      | 5.6 | 8.1  | 1.5 | 8.9  | ns   |
| $t_{PHL}$ |                 |                | 1.5                      | 6.2 | 9    | 1.5 | 10.1 |      |
| $t_{PLH}$ | $\bar{A}/B$     | Any Y          | 1.5                      | 6.1 | 9.2  | 1.5 | 10.2 | ns   |
| $t_{PHL}$ |                 |                | 1.5                      | 6.6 | 10   | 1.5 | 11.2 |      |
| $t_{PZH}$ | $\bar{OE}$      | Any Y          | 1.5                      | 5.6 | 8.2  | 1.5 | 9.1  | ns   |
| $t_{PZL}$ |                 |                | 1.5                      | 7.5 | 10.4 | 1.5 | 11.8 |      |
| $t_{PHZ}$ | $\bar{OE}$      | Any Y          | 1.5                      | 5.6 | 7.6  | 1.5 | 8.3  | ns   |
| $t_{PLZ}$ |                 |                | 1.5                      | 6.2 | 8.8  | 1.5 | 9.6  |      |

switching characteristics, over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $T_A = 25^\circ\text{C}$ |     |     | MIN | MAX | UNIT |
|-----------|-----------------|----------------|--------------------------|-----|-----|-----|-----|------|
|           |                 |                | MIN                      | TYP | MAX |     |     |      |
| $t_{PLH}$ | A or B          | Y              | 1.5                      | 3.6 | 5.8 | 1.5 | 6.4 | ns   |
| $t_{PHL}$ |                 |                | 1.5                      | 4.1 | 6.5 | 1.5 | 7.2 |      |
| $t_{PLH}$ | $\bar{A}/B$     | Any Y          | 1.5                      | 4   | 6.5 | 1.5 | 7.2 | ns   |
| $t_{PHL}$ |                 |                | 1.5                      | 4.4 | 7.1 | 1.5 | 7.9 |      |
| $t_{PZH}$ | $\bar{OE}$      | Any Y          | 1.5                      | 3.8 | 5.9 | 1.5 | 6.5 | ns   |
| $t_{PZL}$ |                 |                | 1.5                      | 5   | 7.6 | 1.5 | 8.6 |      |
| $t_{PHZ}$ | $\bar{OE}$      | Any Y          | 1.5                      | 4.5 | 6.4 | 1.5 | 7.6 | ns   |
| $t_{PLZ}$ |                 |                | 1.5                      | 4.8 | 6.9 | 1.5 | 7.6 |      |

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

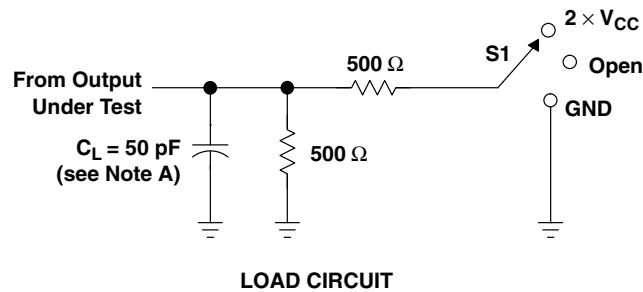
| PARAMETER |                               | TEST CONDITIONS  |                                           | TYP | UNIT |
|-----------|-------------------------------|------------------|-------------------------------------------|-----|------|
| $C_{pd}$  | Power dissipation capacitance | Outputs enabled  | $C_L = 50\text{ pF}$ , $f = 1\text{ MHz}$ | 37  | pF   |
|           |                               | Outputs disabled |                                           | 11  |      |

74AC11257

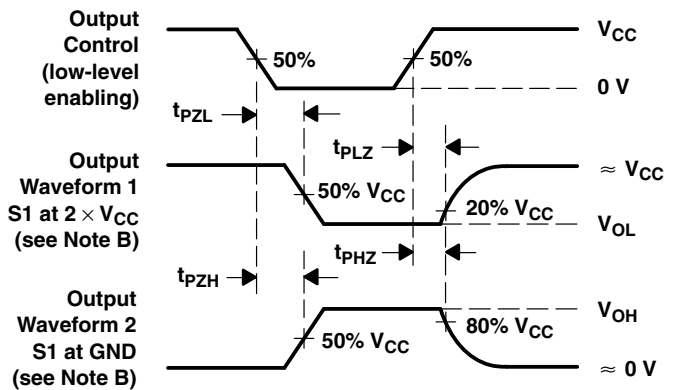
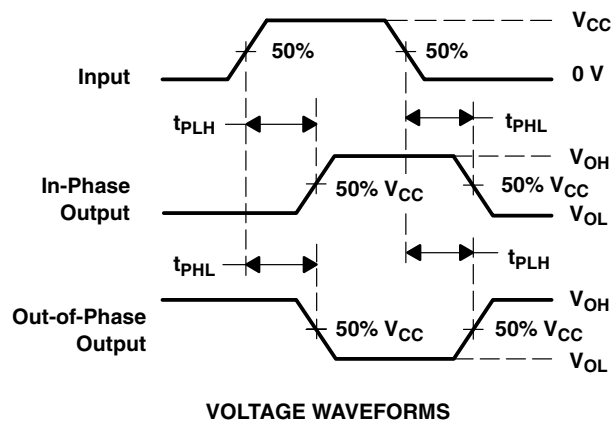
# QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

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## PARAMETER MEASUREMENT INFORMATION



| TEST              | S1                |
|-------------------|-------------------|
| $t_{PLH}/t_{PHL}$ | Open              |
| $t_{PLZ}/t_{PZL}$ | $2 \times V_{CC}$ |
| $t_{PHZ}/t_{PZH}$ | GND               |



- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
  - C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ .
  - D. The outputs are measured one at a time, with one input transition per measurement.

**Figure 1. Load Circuit and Voltage Waveforms**

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| 74AC11257DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | AC11257                 | <a href="#">Samples</a> |
| 74AC11257DWR     | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | AC11257                 | <a href="#">Samples</a> |
| 74AC11257N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | -40 to 85    | 74AC11257N              | <a href="#">Samples</a> |
| 74AC11257PW      | ACTIVE        | TSSOP        | PW                 | 20   | 70             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | AE257                   | <a href="#">Samples</a> |
| 74AC11257PWE4    | ACTIVE        | TSSOP        | PW                 | 20   | 70             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | AE257                   | <a href="#">Samples</a> |
| 74AC11257PWG4    | ACTIVE        | TSSOP        | PW                 | 20   | 70             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 85    | AE257                   | <a href="#">Samples</a> |

(1) 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.

(2) 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)

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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**TAPE AND REEL INFORMATION**


\*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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74AC11257DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74AC11257DWR | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |

## N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



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



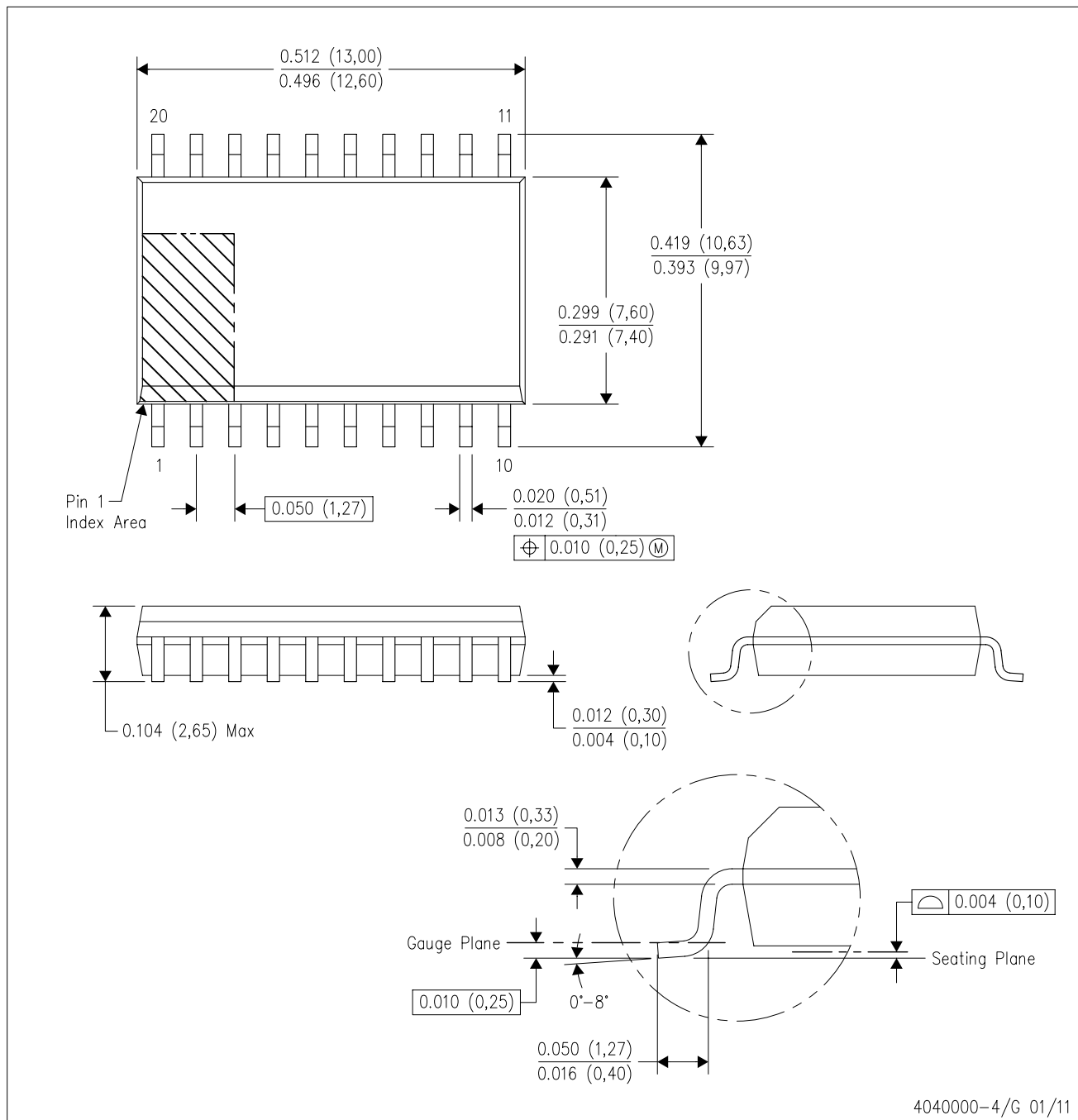
14/18 Pin Only  
20 Pin vendor option

4040049/E 12/2002

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

DW (R-PDSO-G20)

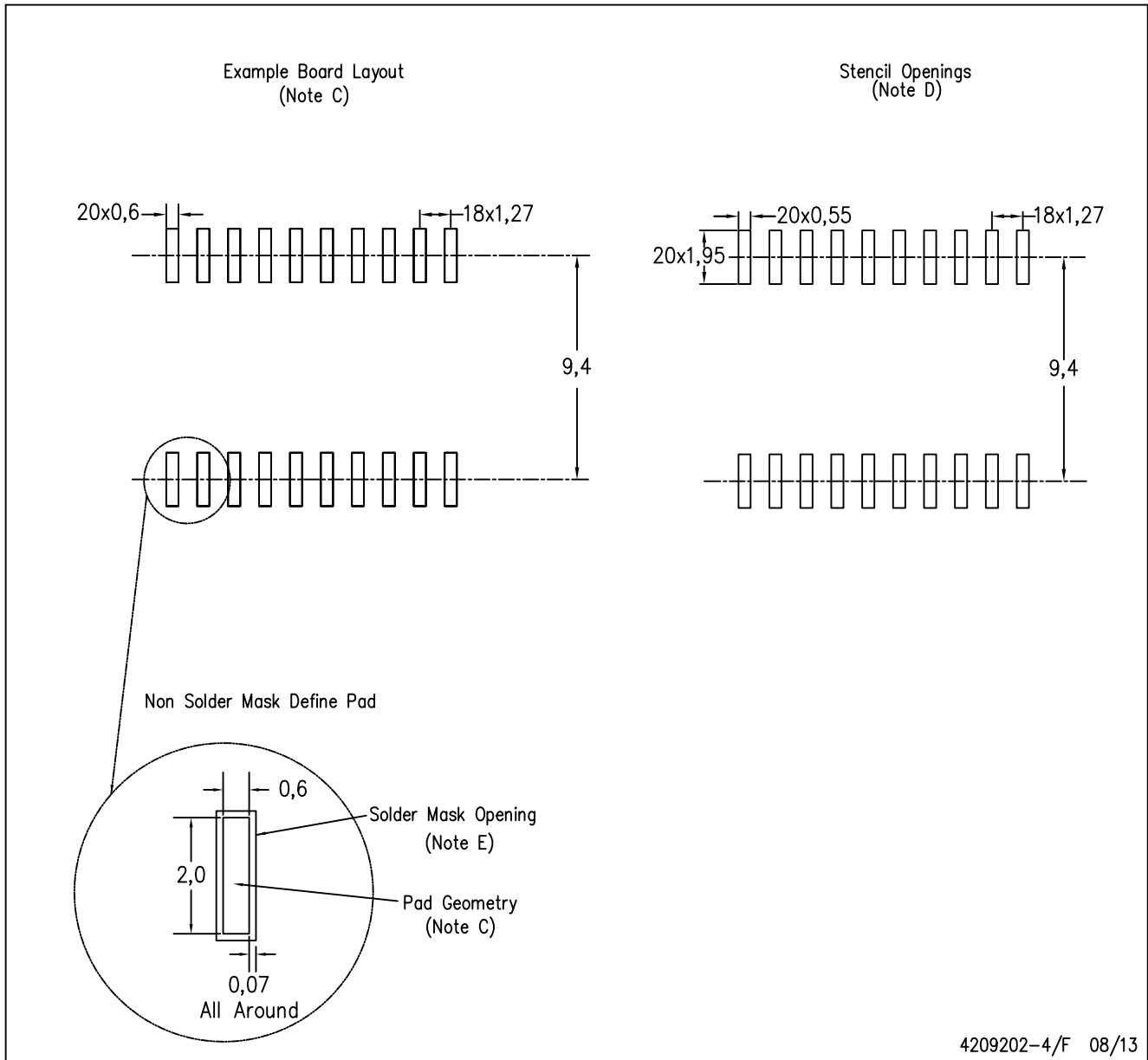
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



4209202-4/F 08/13

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - 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
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



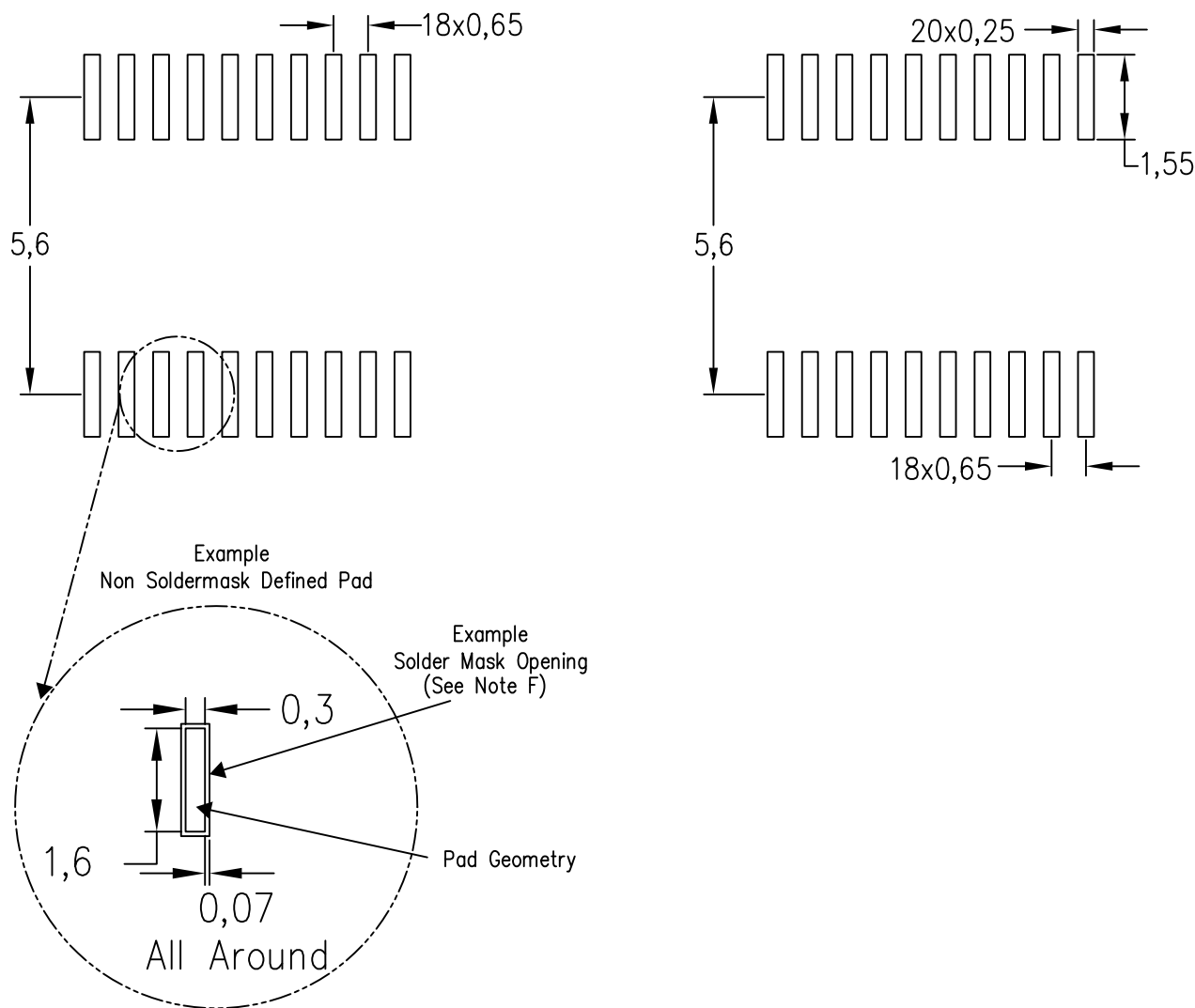
- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

Example Board Layout

Based on a stencil thickness  
of .127mm (.005inch).



4211284-5/F 12/12

- 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 design.
  - 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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