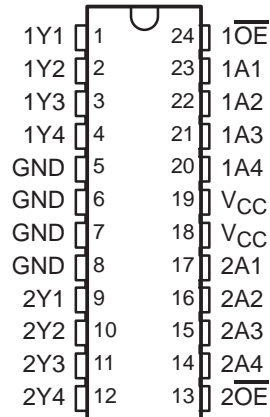


74ACT11240 OCTAL BUFFER/LINE DRIVER WITH 3-STATE OUTPUTS

SCAS210A – MAY 1987 – REVISED APRIL 1996

- Inputs Are TTL-Voltage Compatible
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1- μ m Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic Small-Outline (DW) and Shrink Small-Outline (DB) Packages, and Standard Plastic 300-mil DIPs (NT)

DB, DW, OR NT PACKAGE
(TOP VIEW)



description

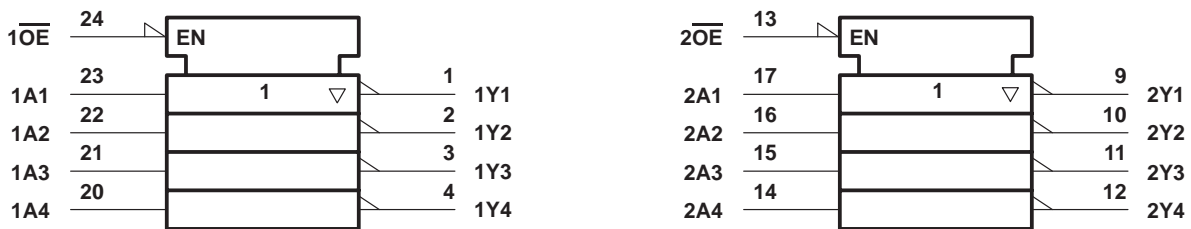
This octal buffer or line driver is designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. This device provides inverting outputs and symmetrical active-low output-enable (\overline{OE}) inputs. This device features high fan-out and improved fan-in.

The 74ACT11240 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE
(each buffer)

| INPUTS | | OUTPUT |
|-----------------|---|--------|
| \overline{OE} | A | Y |
| L | H | L |
| L | L | H |
| H | X | Z |

logic symbol†



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



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INSTRUMENTS**

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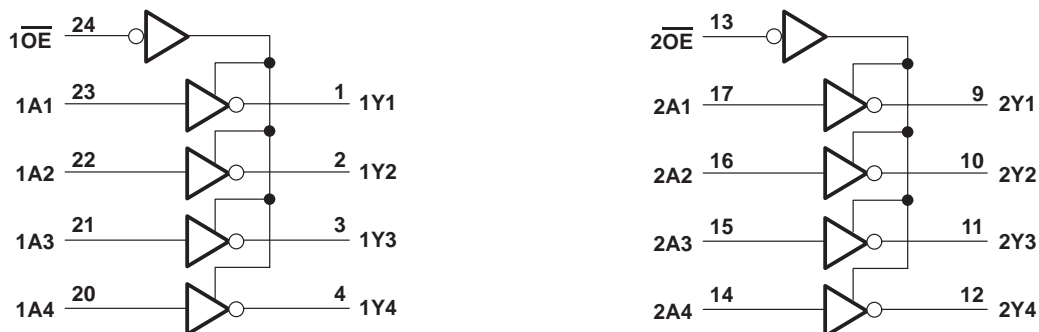
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74ACT11240

OCTAL BUFFER/LINE DRIVER WITH 3-STATE OUTPUTS

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logic diagram (positive logic)



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

| | |
|--|--|
| Supply voltage range, V_{CC} | -0.5 V to 6 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 | ± 200 mA |
| Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): | |
| DB package | 0.65 W |
| DW package | 1.7 W |
| NT package | 1.3 W |
| Storage temperature range, T_{stg} | -65°C to 150°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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the NT package, which has a trace length of zero.

recommended operating conditions

| | | MIN | NOM | MAX | UNIT |
|---------------------|------------------------------------|-----|----------|-----|------------------|
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.8 | V |
| V_I | Input voltage | 0 | V_{CC} | | V |
| V_O | Output voltage | 0 | V_{CC} | | V |
| I_{OH} | High-level output current | | | -24 | mA |
| I_{OL} | Low-level output current | | | 24 | mA |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | 0 | | 10 | ns/V |
| T_A | Operating free-air temperature | -40 | | 85 | $^\circ\text{C}$ |

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

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | MIN MAX | | UNIT |
|-------------------------------|---|-----------------|-----------------------|-----|-----|---------|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | |
| V _{OH} | I _{OH} = -50 μA | 4.5 V | 4.4 | | | 4.4 | | V |
| | | 5.5 V | 5.4 | | | 5.4 | | |
| | I _{OH} = -24 mA | 4.5 V | 3.94 | | | 3.8 | | |
| | | 5.5 V | 4.94 | | | 4.8 | | |
| | I _{OH} = -75 mA [†] | 4.5 V | | | | 3.85 | | |
| | | 5.5 V | | | | 3.85 | | |
| V _{OL} | I _{OL} = 50 μA | 4.5 V | | | | 0.1 | | V |
| | | 5.5 V | | | | 0.1 | | |
| | I _{OL} = 24 mA | 4.5 V | | | | 0.44 | | |
| | | 5.5 V | | | | 0.44 | | |
| | I _{OL} = 75 mA [†] | 4.5 V | | | | 1.65 | | |
| | | 5.5 V | | | | 1.65 | | |
| I _{OZ} | V _O = V _{CC} or GND | 5.5 V | ±0.5 | | | ±5 | | μA |
| I _I | V _I = V _{CC} or GND | 5.5 V | ±0.1 | | | ±1 | | μA |
| I _{CC} | V _I = V _{CC} or GND, I _O = 0 | 5.5 V | 8 | | | 80 | | μA |
| ΔI _{CC} [‡] | One input at 3.4 V, Other inputs at GND or V _{CC} | 5.5 V | 0.9 | | | 1 | | mA |
| C _i | V _I = V _{CC} or GND | 5 V | 4 | | | | | pF |
| C _o | V _I = V _{CC} or GND | 5 V | 10 | | | | | pF |

[†] Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

[‡] This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | T _A = 25°C | | | MIN MAX | | UNIT |
|------------------|------------------------|-------------|-----------------------|-----|------|---------|------|------|
| | | | MIN | TYP | MAX | MIN | MAX | |
| t _{PLH} | A | Y | 1.5 | 6.5 | 9.9 | 1.5 | 10.6 | ns |
| t _{PHL} | | | 1.5 | 6 | 8 | 1.5 | 8.7 | |
| t _{PZH} | $\overline{\text{OE}}$ | Y | 1.5 | 7.5 | 11.7 | 1.5 | 12.5 | ns |
| t _{PZL} | | | 1.5 | 7.3 | 11.5 | 1.5 | 12.3 | |
| t _{PHZ} | $\overline{\text{OE}}$ | Y | 1.5 | 7.3 | 9.4 | 1.5 | 10 | ns |
| t _{PLZ} | | | 1.5 | 7.9 | 10.3 | 1.5 | 10.8 | |

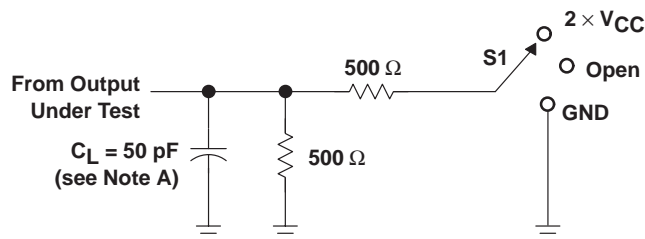
operating characteristics, V_{CC} = 5 V, T_A = 25°C

| PARAMETER | | TEST CONDITIONS | TYP | UNIT |
|-----------------|--|------------------|-----|------|
| C _{pd} | Power dissipation capacitance per buffer | Outputs enabled | 47 | pF |
| | | Outputs disabled | 13 | |

74ACT11240
OCTAL BUFFER/LINE DRIVER
WITH 3-STATE OUTPUTS

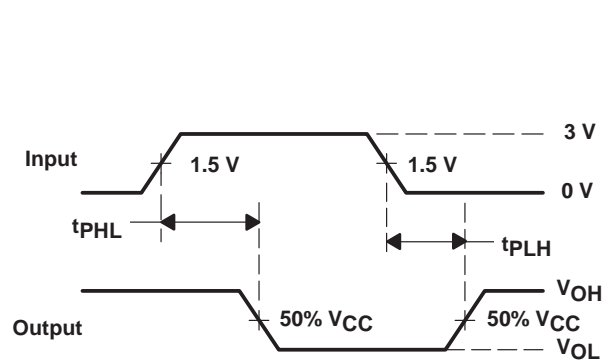
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PARAMETER MEASUREMENT INFORMATION

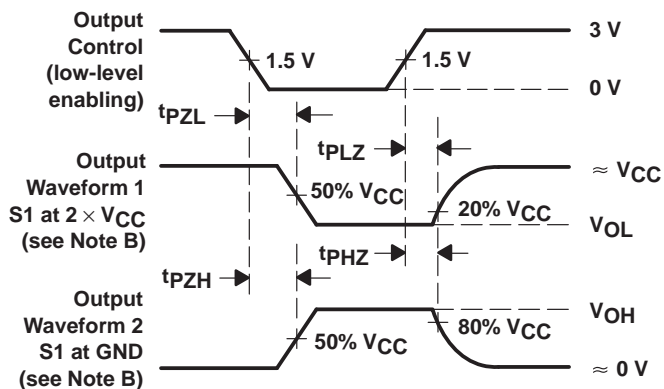


LOAD CIRCUIT

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



VOLTAGE WAVEFORMS



VOLTAGE WAVEFORMS

- 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: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 3$ ns, $t_f = 3$ 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 ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 74ACT11240DBLE | OBSOLETE | SSOP | DB | 24 | | TBD | Call TI | Call TI |
| 74ACT11240DBR | ACTIVE | SSOP | DB | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DBRE4 | ACTIVE | SSOP | DB | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DBRG4 | ACTIVE | SSOP | DB | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DW | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DWE4 | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DWG4 | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DWR | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DWRE4 | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240DWRG4 | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| 74ACT11240NT | ACTIVE | PDIP | NT | 24 | 15 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type |
| 74ACT11240NTE4 | ACTIVE | PDIP | NT | 24 | 15 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type |

⁽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.

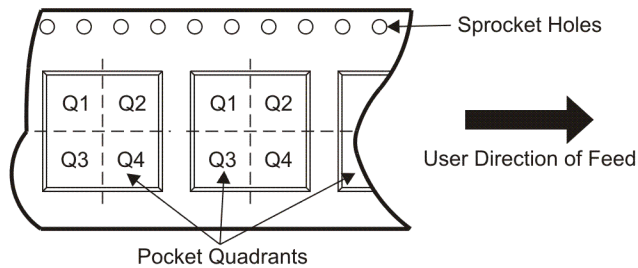
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TAPE AND REEL INFORMATION



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 |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74ACT11240DBR | SSOP | DB | 24 | 2000 | 330.0 | 16.4 | 8.2 | 8.8 | 2.5 | 12.0 | 16.0 | Q1 |
| 74ACT11240DWR | SOIC | DW | 24 | 2000 | 330.0 | 24.4 | 10.75 | 15.7 | 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) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74ACT11240DBR | SSOP | DB | 24 | 2000 | 346.0 | 346.0 | 33.0 |
| 74ACT11240DWR | SOIC | DW | 24 | 2000 | 346.0 | 346.0 | 41.0 |

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN

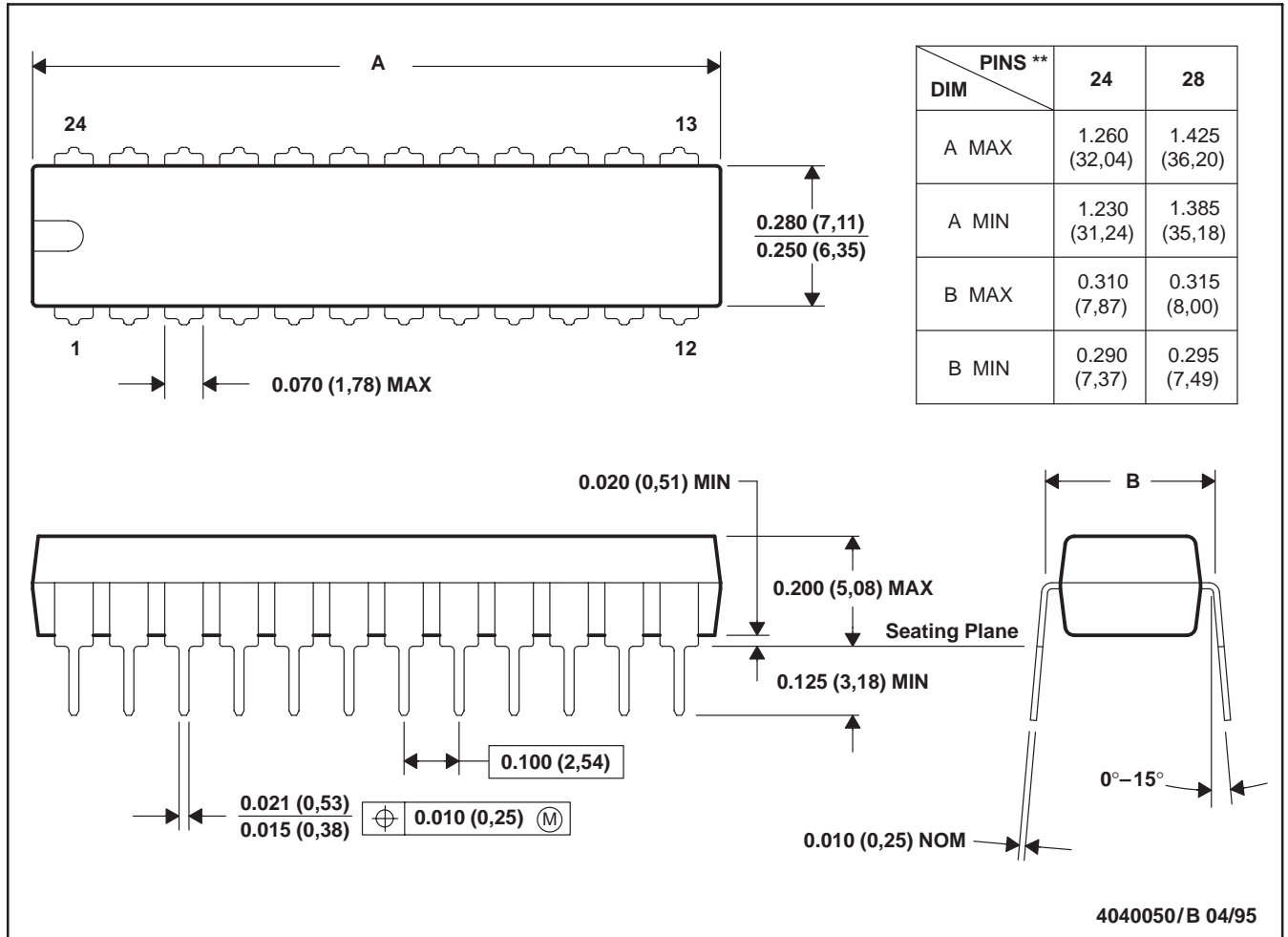


- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

NT (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

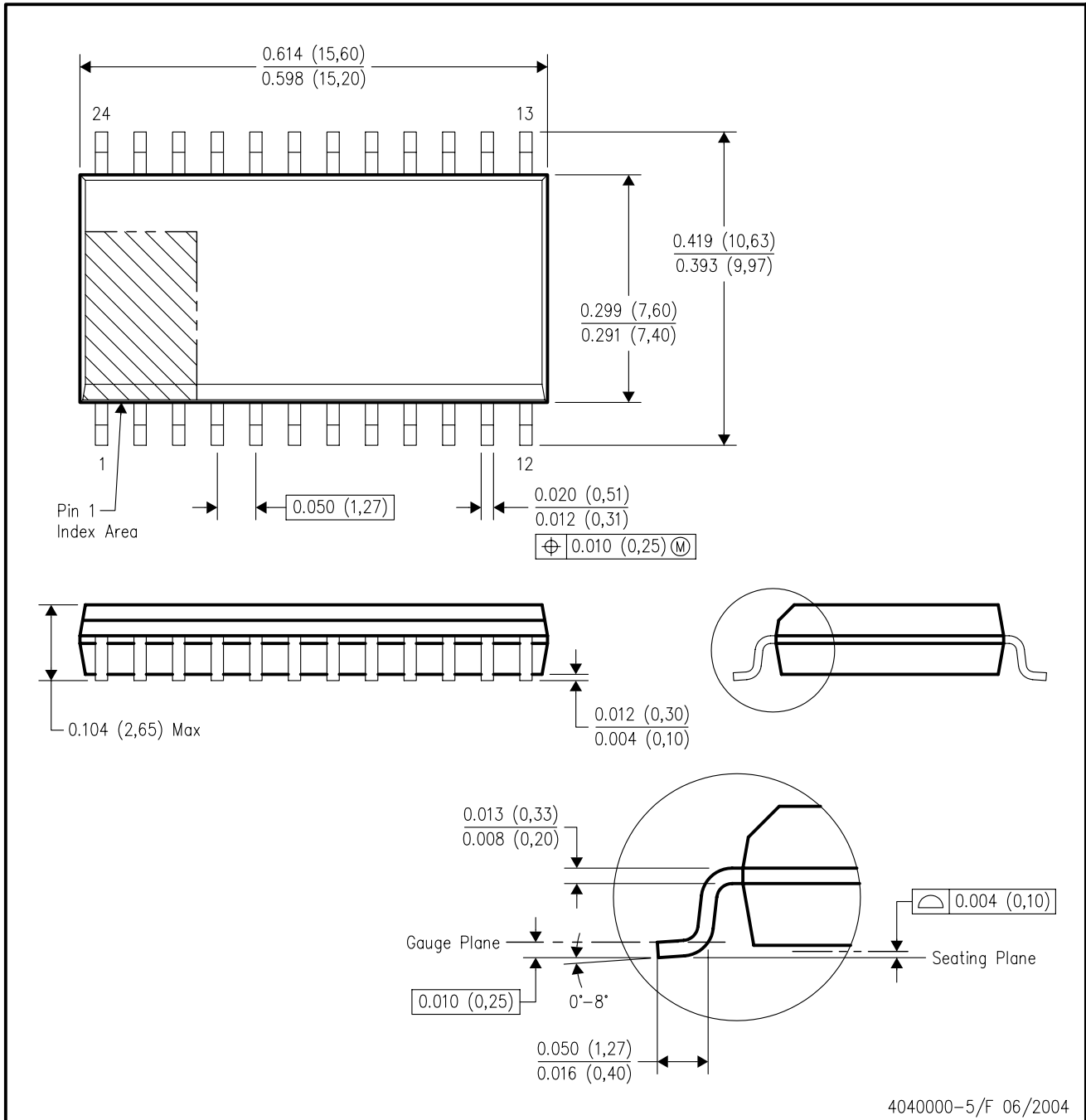
24 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.

DW (R-PDSO-G24)

PLASTIC SMALL-OUTLINE PACKAGE



4040000-5/F 06/2004

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - 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 AD.

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