

SN54154, SN74154 4-LINE TO 16-LINE DECODERS/DEMULTIPLEXERS

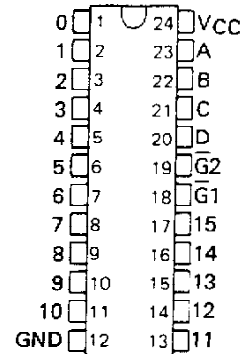
SDLS056

DECEMBER 1972 — REVISED MARCH 88

- '154 is Ideal for High-Performance Memory Decoding
- Decodes 4 Binary-Coded Inputs into One of 16 Mutually Exclusive Outputs
- Performs the Demultiplexing Function by Distributing Data From One Input Line to Any One of 16 Outputs
- Input Clamping Diodes Simplify System Design
- High Fan-Out, Low-Impedance, Totem-Pole Outputs
- Fully Compatible with Most TTL and MSI Circuits

SN54154 . . . J OR W PACKAGE
SN74154 . . . N PACKAGE

(TOP VIEW)



| TYPICAL AVERAGE PROPAGATION DELAY 3 LEVELS OF LOGIC | | TYPICAL POWER DISSIPATION |
|---|-----------------|------------------------------|
| 23 ns | STROBE 19 ns | 170 mW |

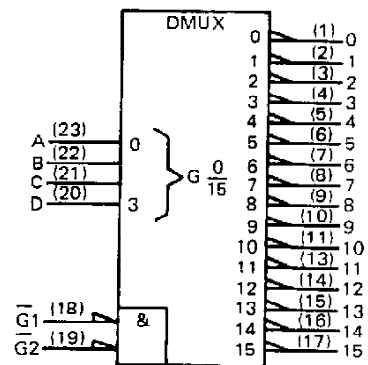
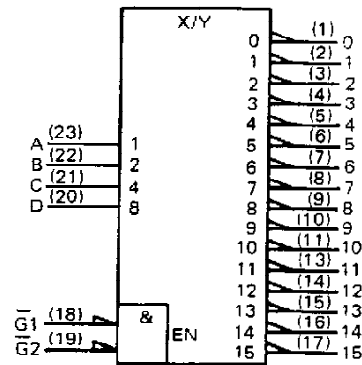
logic symbols (alternatives)[†]

description

Each of these monolithic, 4-line-to-16-line decoders utilizes TTL circuitry to decode four binary-coded inputs into one of sixteen mutually exclusive outputs when both the strobe inputs, $\overline{G1}$ and $\overline{G2}$, are low. The demultiplexing function is performed by using the 4 input lines to address the output line, passing data from one of the strobe inputs with the other strobe input low. When either strobe input is high, all outputs are high. These demultiplexers are ideally suited for implementing high-performance memory decoders. For ultra-high speed systems, SN54S138/SN74S138 and SN54S139/SN74S139 are recommended.

These circuits are fully compatible for use with most other TTL circuits. All inputs are buffered and input clamping diodes are provided to minimize transmission-line effects and thereby simplify system design.

The SN54154 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74154 is characterized for operation from 0°C to 70°C .



[†]These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

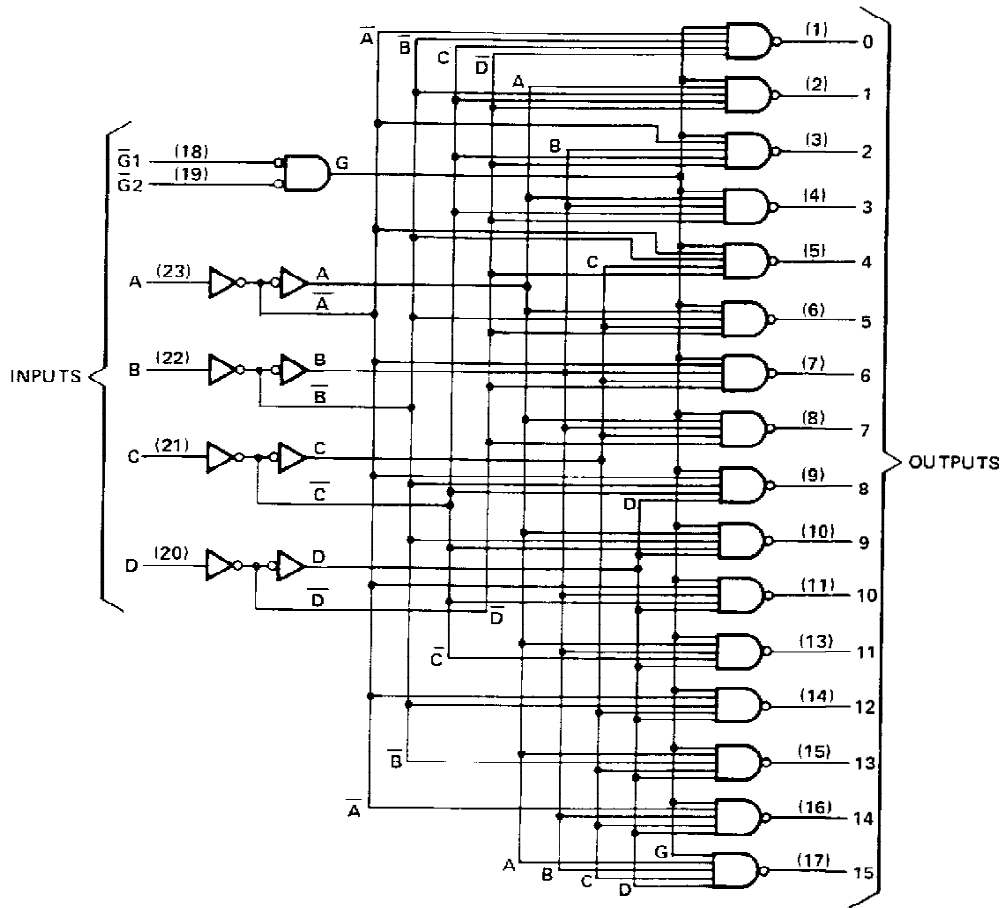
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**TEXAS
INSTRUMENTS**

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SN54154, SN74154
4-LINE TO 16-LINE DECODERS/DEMULTEPLEXERS

logic diagram (positive logic)



TEXAS
INSTRUMENTS

POST OFFICE BOX 6550 • DALLAS, TEXAS 75268

SN54154, SN74154

4-LINE TO 16-LINE DECODERS/DEMULTIPLEXERS

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

| | |
|--|----------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage | 5.5 V |
| Operating free-air temperature range: SN54154 Circuits | -55°C to 125°C |
| SN74154 Circuits | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

| | SN54154 | | | SN74154 | | | UNIT |
|---------------------------------------|---------|-----|------|---------|-----|------|---------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| Supply voltage, V_{CC} | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| High-level output current, I_{OH} | | | -800 | | | -800 | μ A |
| Low-level output current, I_{OL} | | | 16 | | | 16 | mA |
| Operating free-air temperature, T_A | -55 | | 125 | 0 | | 70 | C |

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

| PARAMETER | TEST CONDITIONS† | SN54154 | | | SN74154 | | | UNIT |
|--|--|---------|-----|------|---------|------|------|---------|
| | | MIN | TYP | MAX | MIN | TYP‡ | MAX | |
| V_{IH} High-level input voltage | | 2 | | | 2 | | | V |
| V_{IL} Low-level input voltage | | | | 0.8 | | | 0.8 | V |
| V_{IK} Input clamp voltage | $V_{CC} = \text{MIN}, I_I = -12 \text{ mA}$ | | | -1.5 | | | -1.5 | V |
| V_{OH} High-level output voltage | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -800 \mu\text{A}$ | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| V_{OL} Low-level output voltage | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 16 \text{ mA}$ | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I_I Input current at maximum input voltage | $V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$ | | | 1 | | | 1 | mA |
| I_{IH} High-level input current | $V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$ | | | 40 | | | 40 | μ A |
| I_{IL} Low-level input current | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$ | | | -1.6 | | | -1.6 | mA |
| I_{OS} Short-circuit output current‡ | $V_{CC} = \text{MAX}$ | -20 | | -55 | -18 | | -57 | mA |
| I_{CC} Supply current | $V_{CC} = \text{MAX}$, See Note 2 | | 34 | 49 | | 34 | 56 | mA |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.

‡ All typical values are at $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$.

§ Not more than one output should be shorted at a time.

NOTE 2: I_{CC} is measured with all inputs grounded and all outputs open.

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, from A, B, C, or D inputs through 3 levels of logic | $C_L = 15 \text{ pF}, R_L = 400 \Omega,$ See Note 3 | | 24 | 36 | ns |
| t_{PHL} Propagation delay time, high-to-low-level output, from A, B, C, or D inputs through 3 levels of logic | | | 22 | 33 | ns |
| t_{PLH} Propagation delay time, low-to-high-level output, from either strobe input | | | 20 | 30 | ns |
| t_{PHL} Propagation delay time, high-to-low-level output, from either strobe input | | | 18 | 27 | ns |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

TEXAS
INSTRUMENTS

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PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|-------------------------|----------------------|--------------|----------------------------------|-------------------------|
| 5962-9558101QJA | ACTIVE | CDIP | J | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9558101QJ A SNJ54154J | Samples |
| 5962-9558101QKA | ACTIVE | CFP | W | 24 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9558101QK A SNJ54154W | Samples |
| 5962-9558101QKA | ACTIVE | CFP | W | 24 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9558101QK A SNJ54154W | Samples |
| SN54154J | ACTIVE | CDIP | J | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | SN54154J | Samples |
| SN54154J | ACTIVE | CDIP | J | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | SN54154J | Samples |
| SN74154DW | OBSOLETE | SOIC | DW | 24 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74154DW | OBSOLETE | SOIC | DW | 24 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74154N3 | OBSOLETE | PDIP | N | 24 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74154N3 | OBSOLETE | PDIP | N | 24 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SNJ54154J | ACTIVE | CDIP | J | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9558101QJ A SNJ54154J | Samples |
| SNJ54154J | ACTIVE | CDIP | J | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9558101QJ A SNJ54154J | Samples |
| SNJ54154W | ACTIVE | CFP | W | 24 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9558101QK A SNJ54154W | Samples |
| SNJ54154W | ACTIVE | CFP | W | 24 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9558101QK A SNJ54154W | Samples |

(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.

⁽⁶⁾ 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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OTHER QUALIFIED VERSIONS OF SN54154, SN74154 :

● Catalog: [SN74154](#)

● Military: [SN54154](#)

NOTE: Qualified Version Definitions:

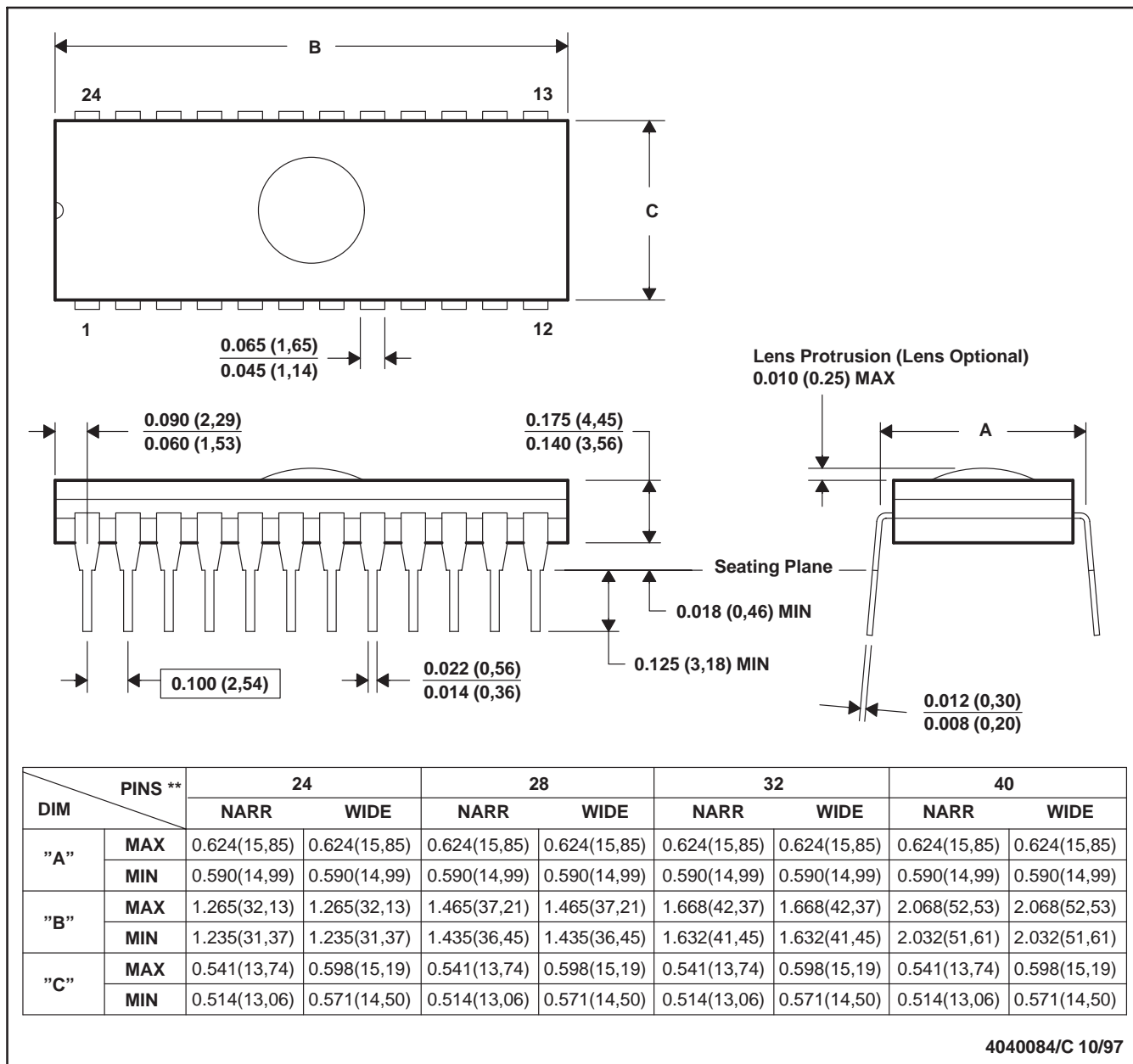
● Catalog - TI's standard catalog product

- Military - QML certified for Military and Defense Applications

J (R-GDIP-T**)

CERAMIC DUAL-IN-LINE PACKAGE

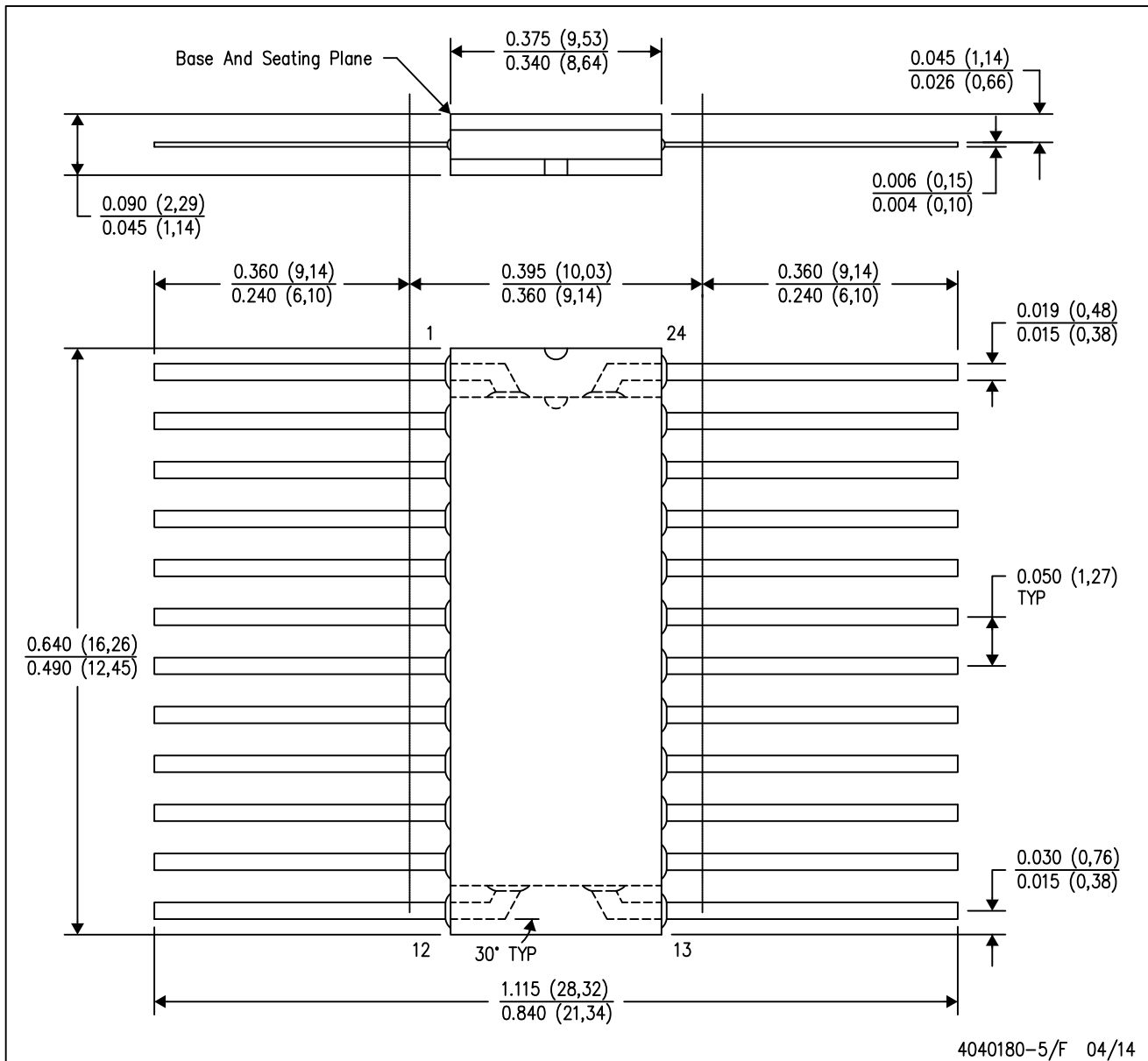
24 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Window (lens) added to this group of packages (24-, 28-, 32-, 40-pin).
 D. This package can be hermetically sealed with a ceramic lid using glass frit.
 E. Index point is provided on cap for terminal identification.

W (R-GDFP-F24)

CERAMIC DUAL FLATPACK

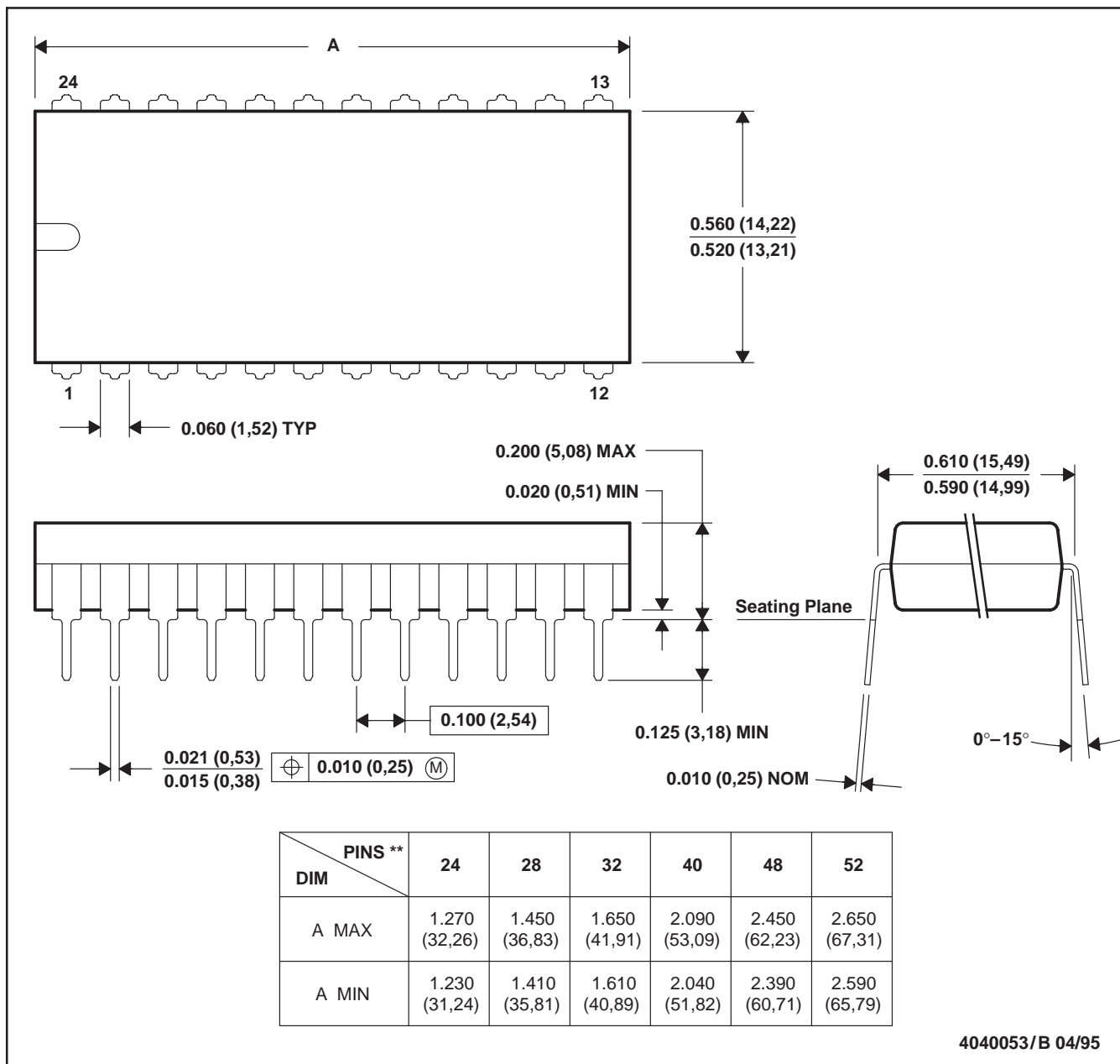


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

24 PIN SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-011
 D. Falls within JEDEC MS-015 (32 pin only)

DW (R-PDSO-G24)

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 AD.

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