

SN54ALS804A, SN54AS804B, SN74ALS804A, SN74AS804B HEX 2-INPUT NAND DRIVERS

SDAS022C – DECEMBER 1982 – REVISED JANUARY 1995

- High Capacitive-Drive Capability
- 'ALS804A Has Typical Delay Time of 4 ns ($C_L = 50$ pF) and Typical Power Dissipation of 3.4 mW Per Gate
- 'AS804B Has Typical Delay Time of 2.6 ns ($C_L = 50$ pF) and Typical Power Dissipation of Less Than 9 mW Per Gate
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

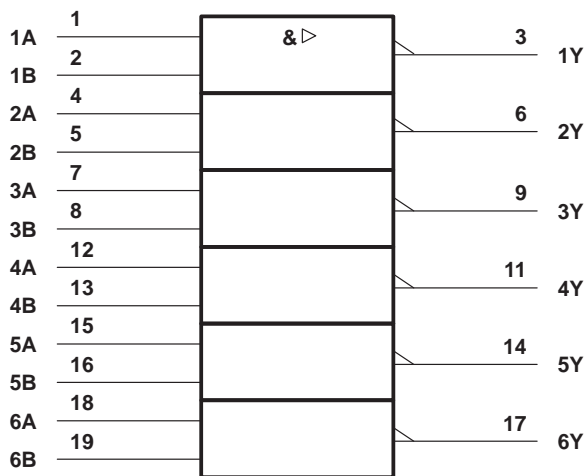
These devices contain six independent 2-input NAND drivers. They perform the Boolean functions $Y = A \cdot B$ or $Y = \overline{A + B}$ in positive logic.

The SN54ALS804A and SN54AS804B are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS804A and SN74AS804B are characterized for operation from 0°C to 70°C .

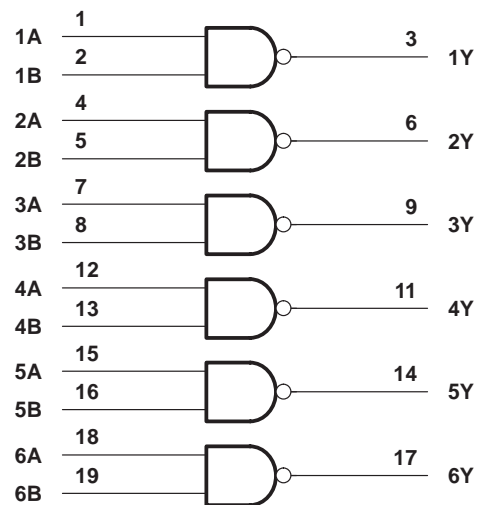
FUNCTION TABLE
(each driver)

| INPUTS | | OUTPUT |
|--------|---|--------|
| A | B | Y |
| H | H | L |
| L | X | H |
| X | L | H |

logic symbol†

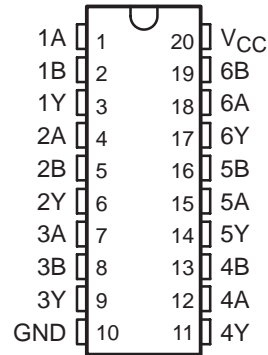


logic diagram (positive logic)

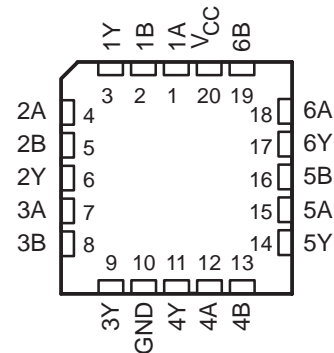


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

SN54ALS804A, SN54AS804B . . . J PACKAGE
SN74ALS804A, SN74AS804B . . . DW OR N PACKAGE
(TOP VIEW)



SN54ALS804A, SN54AS804B . . . FK PACKAGE
(TOP VIEW)



SN54ALS804A, SN54AS804B, SN74ALS804A, SN74AS804B HEX 2-INPUT NAND DRIVERS

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

| | |
|---|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage, V_I | 7 V |
| Operating free-air temperature range, T_A : SN54ALS804A | -55°C to 125°C |
| SN74ALS804A | 0°C to 70°C |
| Storage temperature range | -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.

recommended operating conditions

| | | SN54ALS804A | | | SN74ALS804A | | | UNIT |
|----------|--------------------------------|-------------|-----|-----|-------------|-----|-----|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.7 | | | 0.8 | V |
| I_{OH} | High-level output current | | | -12 | | | -15 | mA |
| I_{OL} | Low-level output current | | | 12 | | | 24 | mA |
| T_A | Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | SN54ALS804A | | | SN74ALS804A | | | UNIT |
|--------------|---|-------------------|------|--------------|-------------|------|------|------|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V_{IK} | $V_{CC} = 4.5$ V, $I_I = -18$ mA | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA | $V_{CC} - 2$ | | $V_{CC} - 2$ | | | | V |
| | $V_{CC} = 4.5$ V | $I_{OH} = -3$ mA | 2.4 | 3.2 | 2.4 | 3.2 | | |
| | | $I_{OH} = -12$ mA | 2 | | 2 | | | |
| V_{OL} | $V_{CC} = 4.5$ V | $I_{OL} = 12$ mA | 0.25 | 0.4 | 0.25 | 0.4 | | V |
| | | $I_{OL} = 24$ mA | | | 0.35 | 0.5 | | |
| I_I | $V_{CC} = 5.5$ V, $V_I = 7$ V | | | 0.1 | | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5$ V, $V_I = 2.7$ V | | | 20 | | | 20 | μA |
| I_{IL} | $V_{CC} = 5.5$ V, $V_I = 0.4$ V | | | -0.1 | | | -0.1 | mA |
| I_{O}^{\S} | $V_{CC} = 5.5$ V, $V_O = 2.25$ V | -20 | | -112 | -30 | | -112 | mA |
| I_{CCH} | $V_{CC} = 5.5$ V, $V_I = 0$ | | 0.9 | 2.5 | 0.9 | 2.5 | | mA |
| I_{CCL} | $V_{CC} = 5.5$ V, $V_I = 4.5$ V | | 7 | 12 | 7 | 12 | | mA |

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

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .



SN54ALS804A, SN54AS804B, SN74ALS804A, SN74AS804B HEX 2-INPUT NAND DRIVERS

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switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX† | | | | UNIT |
|------------------|-----------------|----------------|---|-----|-------------|-----|------|
| | | | SN54ALS804A | | SN74ALS804A | | |
| | | | MIN | MAX | MIN | MAX | |
| t _{PLH} | A or B | Y | 2 | 9 | 2 | 7 | ns |
| t _{PHL} | | | 2 | 9 | 2 | 8 | |

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

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

| | |
|---|----------------|
| Supply voltage, V _{CC} | 7 V |
| Input voltage, V _I | 7 V |
| Operating free-air temperature range, T _A : SN54AS804B | –55°C to 125°C |
| SN74AS804B | 0°C to 70°C |
| Storage temperature range | –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.

recommended operating conditions§

| | SN54AS804B | | | SN74AS804B | | | UNIT |
|---|------------|-----|-----|------------|-----|-----|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V _{IH} High-level input voltage | 2 | | | 2 | | | V |
| V _{IL} Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I _{OH} High-level output current | | | –40 | | | –48 | mA |
| I _{OL} Low-level output current | | | 40 | | | 48 | mA |
| T _A Operating free-air temperature | –55 | | 125 | 0 | | 70 | °C |

§ These high sink- or source-current devices are not recommended for use above 40 MHz.



SN54ALS804A, SN54AS804B, SN74ALS804A, SN74AS804B HEX 2-INPUT NAND DRIVERS

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

| PARAMETER | TEST CONDITIONS | | SN54AS804B | | SN74AS804B | | UNIT | |
|-----------------|---|--------------------------|--------------|------|--------------|-----|-------|---------------|
| | | | MIN | TYP† | MAX | MIN | | TYP† |
| V_{IK} | $V_{CC} = 4.5\text{ V}$, | $I_I = -18\text{ mA}$ | | | -1.2 | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$, | $I_{OH} = -2\text{ mA}$ | $V_{CC} - 2$ | | $V_{CC} - 2$ | | V | |
| | $V_{CC} = 4.5\text{ V}$ | $I_{OH} = -3\text{ mA}$ | 2.4 | 3.2 | 2.4 | 3.2 | | |
| | | $I_{OH} = -40\text{ mA}$ | 2 | | 2 | | | |
| V_{OL} | $V_{CC} = 4.5\text{ V}$ | $I_{OL} = 40\text{ mA}$ | 0.25 0.5 | | | | V | |
| | | $I_{OL} = 48\text{ mA}$ | | | 0.35 | 0.5 | | |
| I_I | $V_{CC} = 5.5\text{ V}$, | $V_I = 7\text{ V}$ | | | 0.1 | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5\text{ V}$, | $V_I = 2.7\text{ V}$ | | | 20 | | 20 | μA |
| I_{IL} | $V_{CC} = 5.5\text{ V}$, | $V_I = 0.4\text{ V}$ | | | -0.5 | | -0.5 | mA |
| $I_{O\ddagger}$ | $V_{CC} = 5.5\text{ V}$, | $V_O = 2.25\text{ V}$ | -50 | | -200 | -50 | -200 | mA |
| I_{CCH} | $V_{CC} = 5.5\text{ V}$, | $V_I = 0$ | | | 3.5 | 5 | 3.5 5 | mA |
| I_{CCL} | $V_{CC} = 5.5\text{ V}$, | $V_I = 4.5\text{ V}$ | | | 16 | 27 | 16 27 | mA |

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

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

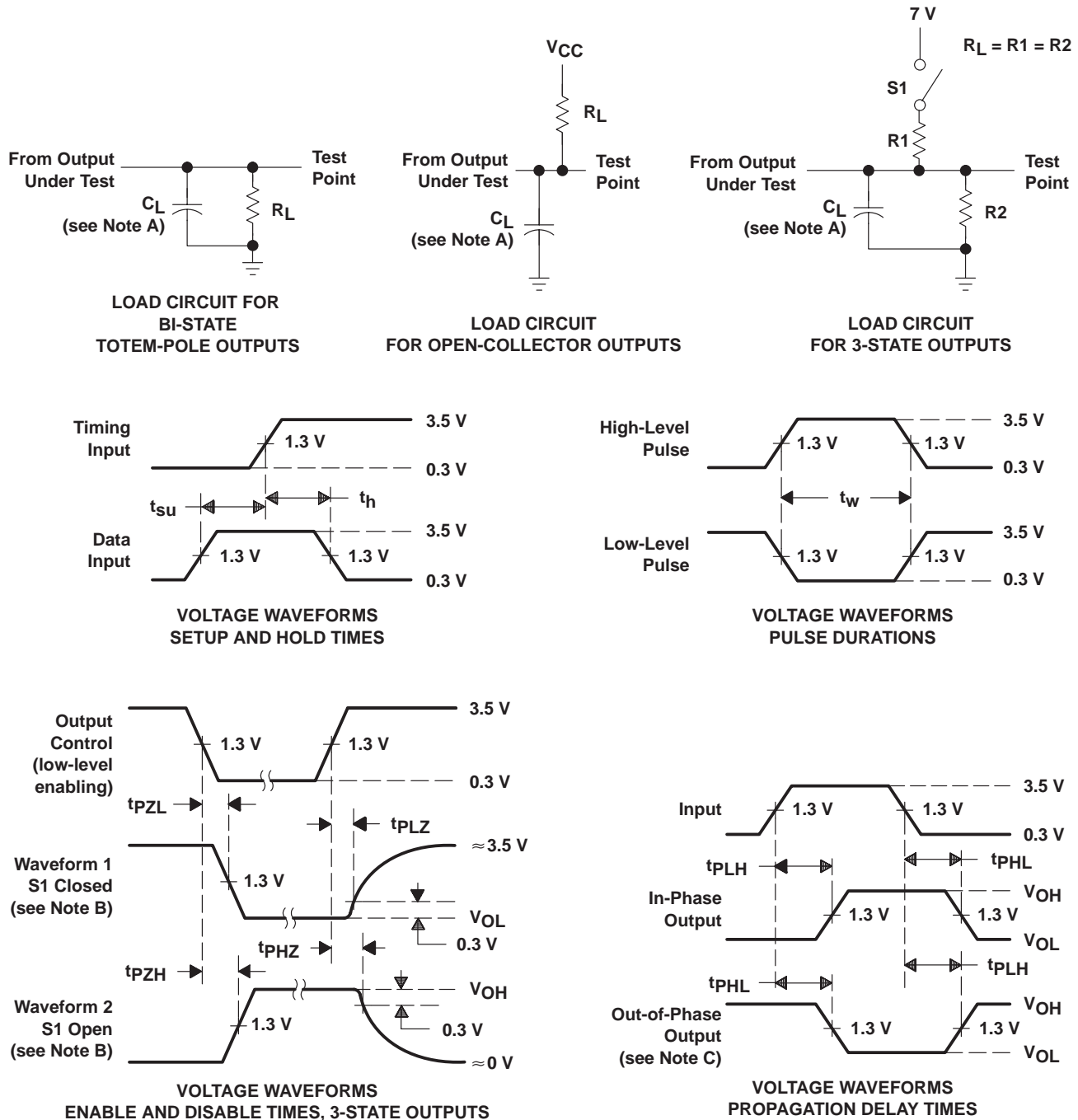
switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = \text{MIN to MAX}^{\S}$ | | | | UNIT |
|-----------|--------------|-------------|--|-----|------------|-----|------|
| | | | SN54AS804B | | SN74AS804B | | |
| | | | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | Y | 1 | 5 | 1 | 4 | ns |
| t_{PHL} | | | 1 | 5 | 1 | 4 | |

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



PARAMETER MEASUREMENT INFORMATION
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES








- 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
 D. All input pulses have the following characteristics: $PRR \leq 1$ MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits 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) | Op Temp (°C) | Top-Side Markings (4) | Samples |
|------------------|---------------|--------------|--------------------|------|-------------|----------------------------|------------------|----------------------|--------------|--|-------------------------|
| 5962-87766012A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Call TI | -55 to 125 | 5962- 87766012A SNJ54AS 804BFK | Samples |
| 5962-8776601RA | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Call TI | -55 to 125 | 5962-8776601RA SNJ54AS804BJ | Samples |
| 5962-8776601SA | ACTIVE | CFP | W | 20 | 1 | TBD | Call TI | Call TI | -55 to 125 | 5962-8776601SA SNJ54AS804BW | Samples |
| 5962-88693012A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Call TI | -55 to 125 | 5962- 88693012A SNJ54ALS 804AFK | Samples |
| 5962-8869301RA | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Call TI | -55 to 125 | 5962-8869301RA SNJ54ALS804AJ | Samples |
| SN54ALS804AJ | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SN54ALS804AJ | Samples |
| SN54AS804BJ | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SN54AS804BJ | Samples |
| SN74ALS804ADW | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ALS804A | Samples |
| SN74ALS804ADWE4 | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ALS804A | Samples |
| SN74ALS804ADWG4 | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ALS804A | Samples |
| SN74ALS804AN | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74ALS804AN | Samples |
| SN74ALS804ANE4 | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74ALS804AN | Samples |
| SN74AS804BDW | NRND | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | AS804B | |
| SN74AS804BDWE4 | NRND | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | AS804B | |
| SN74AS804BDWG4 | NRND | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | AS804B | |
| SN74AS804BDWR | OBSOLETE | SOIC | DW | 20 | | TBD | Call TI | Call TI | 0 to 70 | AS804B | |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) | Op Temp (°C) | Top-Side Markings (4) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|------------------|----------------------|--------------|----------------------------------|---|
| SN74AS804BDWRE4 | OBSOLETE | SOIC | DW | 20 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74AS804BDWRG4 | OBSOLETE | SOIC | DW | 20 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74AS804BN | NRND | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74AS804BN | |
| SN74AS804BNE4 | NRND | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74AS804BN | |
| SNJ54ALS804AFK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-88693012A SNJ54ALS804AFK |  |
| SNJ54ALS804AJ | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-8869301RA SNJ54ALS804AJ |  |
| SNJ54AS804BFK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-87766012A SNJ54AS804BFK |  |
| SNJ54AS804BJ | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-8776601RA SNJ54AS804BJ |  |
| SNJ54AS804BW | ACTIVE | CFP | W | 20 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-8776601SA SNJ54AS804BW |  |

(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⁾ Only one of markings shown within the brackets will appear on the physical device.

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OTHER QUALIFIED VERSIONS OF SN54ALS804A, SN54AS804B, SN74ALS804A, SN74AS804B :

- Catalog: [SN74ALS804A](#), [SN74AS804B](#)
- Military: [SN54ALS804A](#), [SN54AS804B](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |

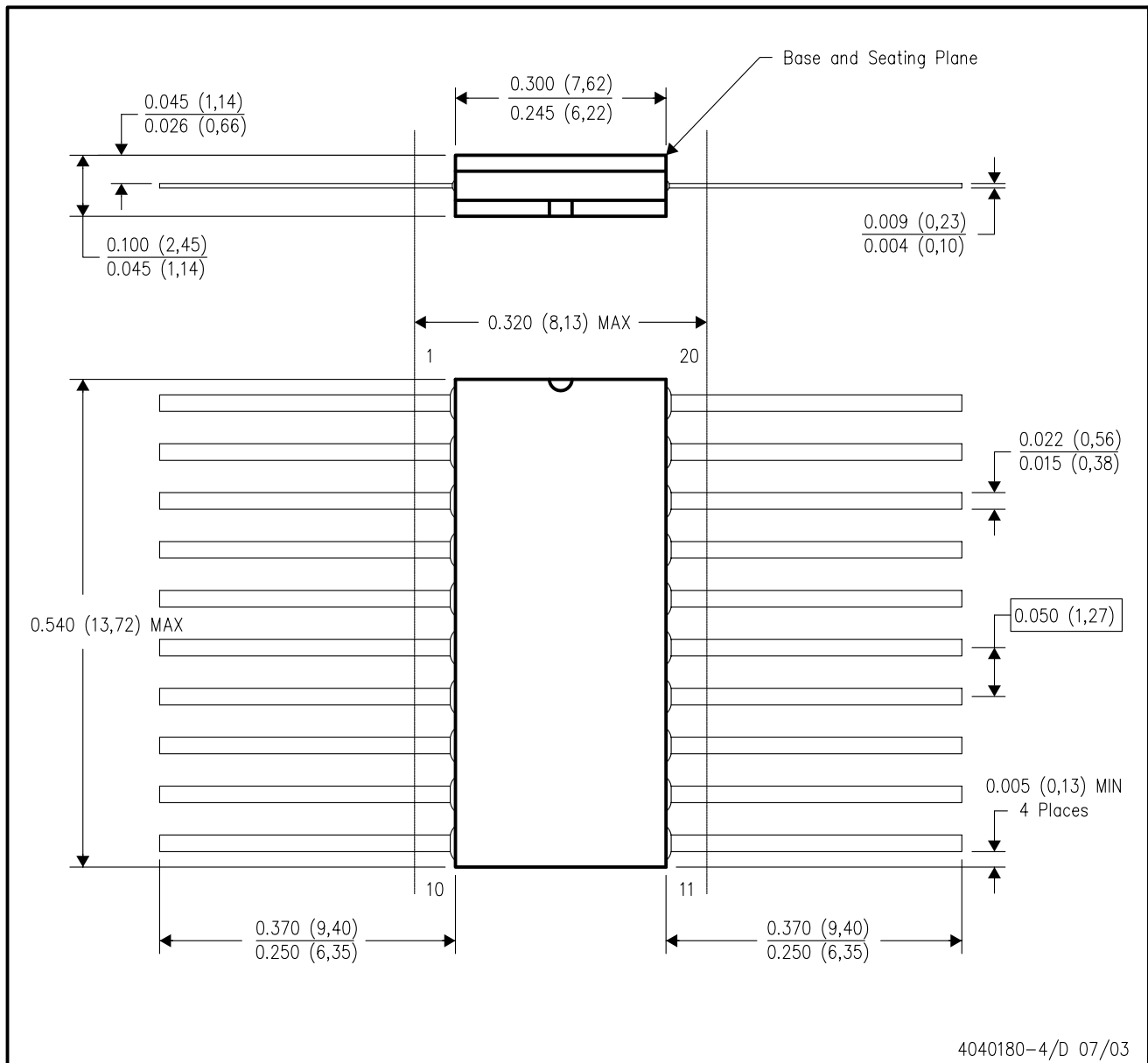


4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F20)

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

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF TERMINALS ** | A | | B | |
|---------------------|------------------|------------------|------------------|------------------|
| | MIN | MAX | MIN | MAX |
| 20 | 0.342 (8,69) | 0.358 (9,09) | 0.307 (7,80) | 0.358 (9,09) |
| 28 | 0.442 (11,23) | 0.458 (11,63) | 0.406 (10,31) | 0.458 (11,63) |
| 44 | 0.640 (16,26) | 0.660 (16,76) | 0.495 (12,58) | 0.560 (14,22) |
| 52 | 0.740 (18,78) | 0.761 (19,32) | 0.495 (12,58) | 0.560 (14,22) |
| 68 | 0.938 (23,83) | 0.962 (24,43) | 0.850 (21,6) | 0.858 (21,8) |
| 84 | 1.141 (28,99) | 1.165 (29,59) | 1.047 (26,6) | 1.063 (27,0) |



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

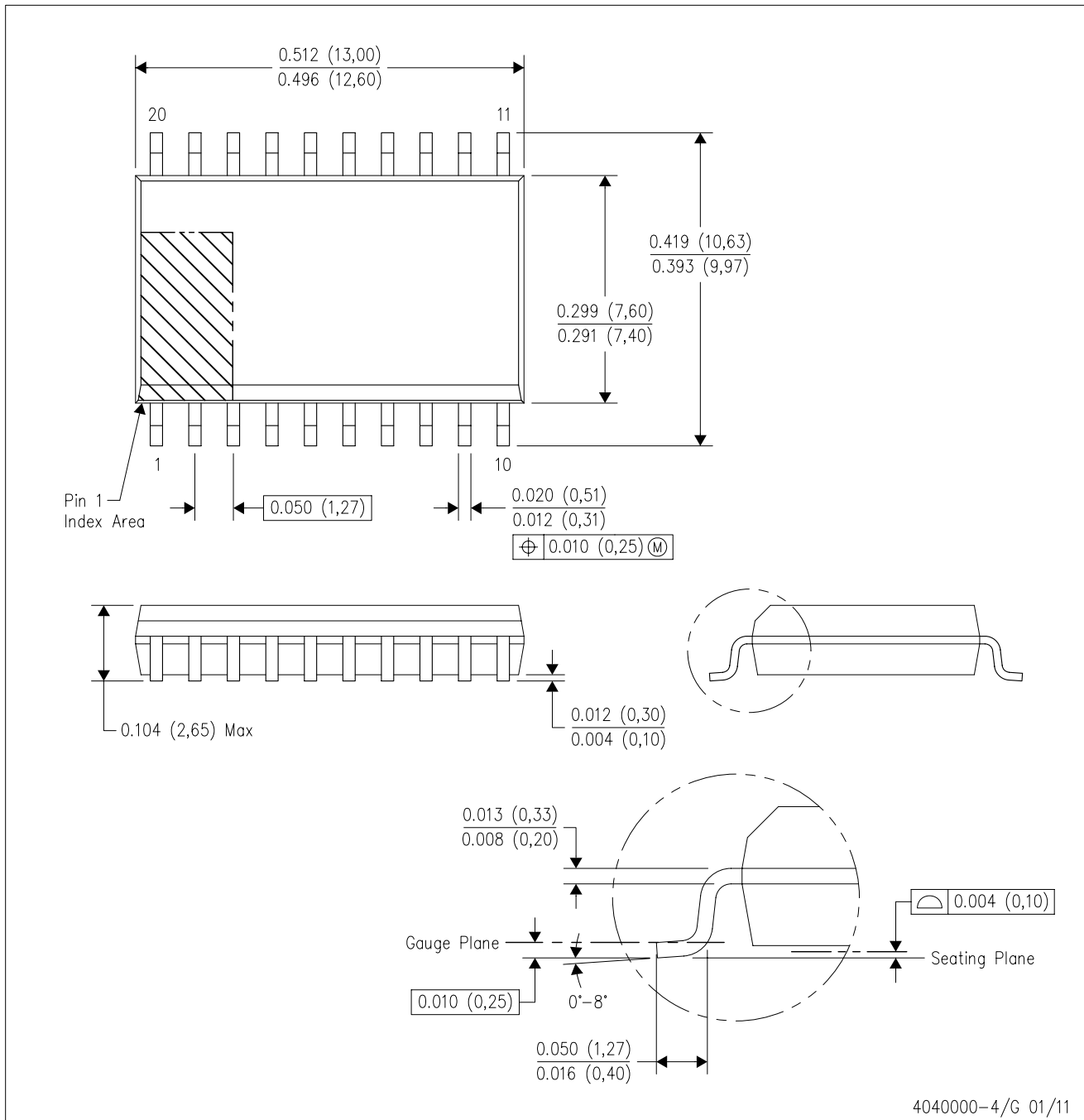
16 PINS SHOWN



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

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



4209202-4/E 07/11

- 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.

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