

- Designed for Digital Data Transmission Over 50-Ω to 500-Ω Coaxial Cable, Strip Line, or Twisted Pair
- High Speed
 $t_{pd} = 20$ ns Maximum at $C_L = 15$ pF
- TTL Compatible With Single 5-V Supply
- 2.4-V Output at $I_{OH} = -75$ mA
- Uncommitted Emitter-Follower Output Structure for Party-Line Operation
- Short-Circuit Protection
- AND-OR Logic Configuration
- Designed for Use With Triple Line Receivers SN55122, SN75122
- Designed to Be Interchangeable With Signetics N8T13

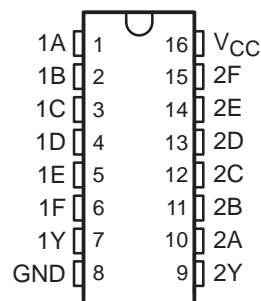
description

The SN55121 and SN75121 dual line drivers are designed for digital data transmission over lines having impedances from 50 to 500 Ω. They are also compatible with standard TTL logic and supply-voltage levels.

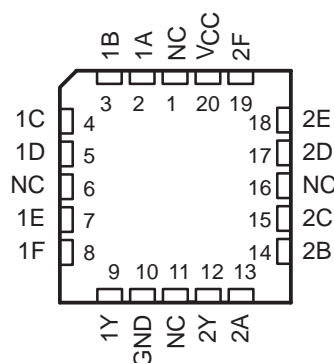
The low-impedance emitter-follower outputs of the SN55121 and SN75121 can drive terminated lines such as coaxial cable or twisted pair. Having the outputs uncommitted allows wired-OR logic to be performed in party-line applications. Output short-circuit protection is provided by an internal clamping network that turns on when the output voltage drops below approximately 1.5 V. All of the inputs are in conventional TTL configuration and the gating can be used during power-up and power-down sequences to ensure that no noise is introduced to the line.

The SN55121 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN75121 is characterized for operation from 0°C to 70°C.

SN55121 . . . J PACKAGE
SN75121 . . . D OR N PACKAGE
(TOP VIEW)



SN55121 . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

**THE SN75121 IS NOT
RECOMMENDED FOR NEW DESIGNS**



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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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SN55121, SN75121
DUAL LINE DRIVERS

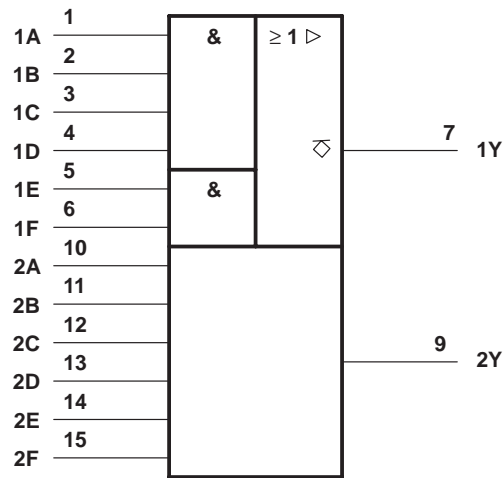
SLLS074C – SEPTEMBER 1973 – REVISED MAY 1998

FUNCTION TABLE

| INPUTS | | | | | | OUTPUT Y |
|------------------------------|---|---|---|---|---|-------------|
| A | B | C | D | E | F | |
| H | H | H | H | X | X | H |
| X | X | X | X | H | H | H |
| All other input combinations | | | | | | L |

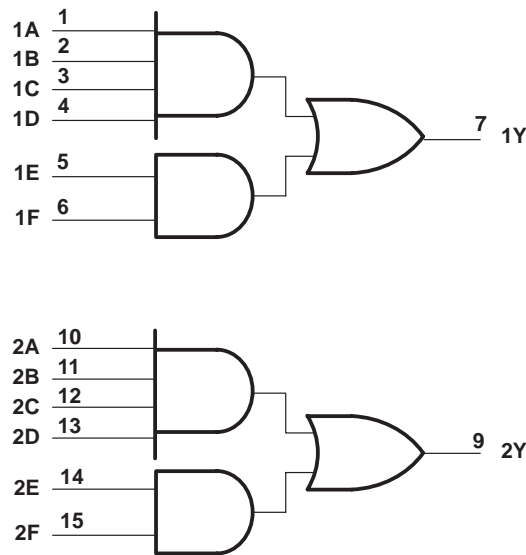
H = high level, L = low level, X = irrelevant

logic symbol†

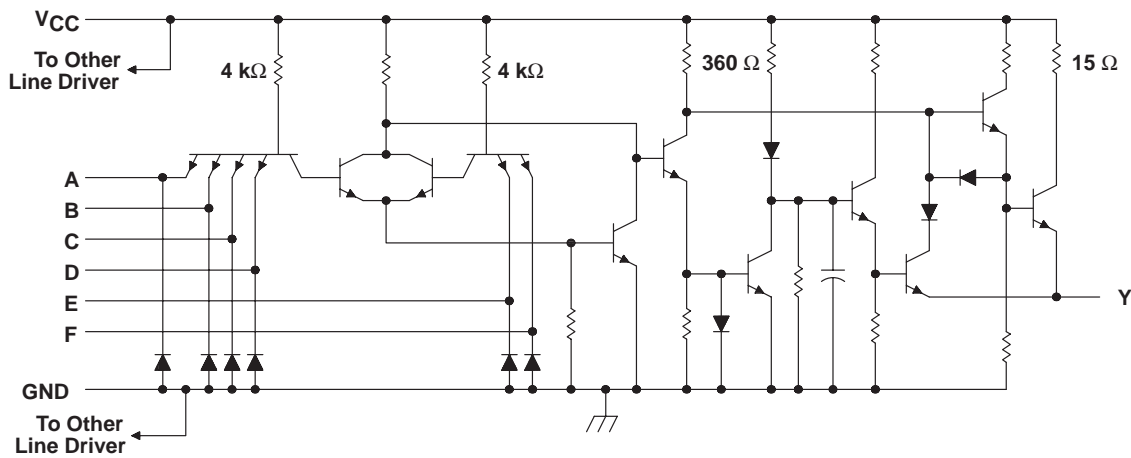


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, J, and N packages.

logic diagram (positive logic)



schematic (each driver)



All resistor values shown are nominal.

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

| | |
|--|------------------------------|
| Supply voltage, V_{CC} (see Note 1) | 6 V |
| Input voltage | 6 V |
| Output voltage | 6 V |
| Continuous total power dissipation | See Dissipation Rating Table |
| Storage temperature range, T_{stg} | –65°C to 150°C |
| Case temperature for 60 seconds: FK package | 260°C |
| Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J package | 300°C |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or N package | 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.

NOTE 1: All voltage values are with respect to both ground terminals connected together.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$ POWER RATING | DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$ POWER RATING | $T_A = 125^\circ\text{C}$ POWER RATING |
|-----------------|---|---|--|---|
| D | 950 mW | 7.6 mW/°C | 608 mW | — |
| FK [‡] | 1375 mW | 11.0 mW/°C | 880 mW | 275 mW |
| J [‡] | 1375 mW | 11.0 mW/°C | 880 mW | 275 mW |
| N | 1150 mW | 9.2 mW/°C | 736 mW | — |

[‡] In the FK and J packages, SN55121 chips are either silver glass or alloy mounted.

recommended operating conditions

| | SN55121 | | | SN75121 | | | UNIT |
|---------------------------------------|---------|-----|------|---------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| Supply voltage, V_{CC} | 4.75 | 5 | 5.25 | 4.75 | 5 | 5.25 | V |
| High-level input voltage, V_{IH} | 2 | | | 2 | | | V |
| Low-level input voltage, V_{IL} | | | 0.8 | | | 0.8 | V |
| High-level output current, I_{OH} | | | –75 | | | –75 | mA |
| Operating free-air temperature, T_A | –55 | | 125 | 0 | | 70 | °C |

SN55121, SN75121
DUAL LINE DRIVERS

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electrical characteristics over recommended ranges of supply voltage and operating free-air temperature range (unless otherwise noted)

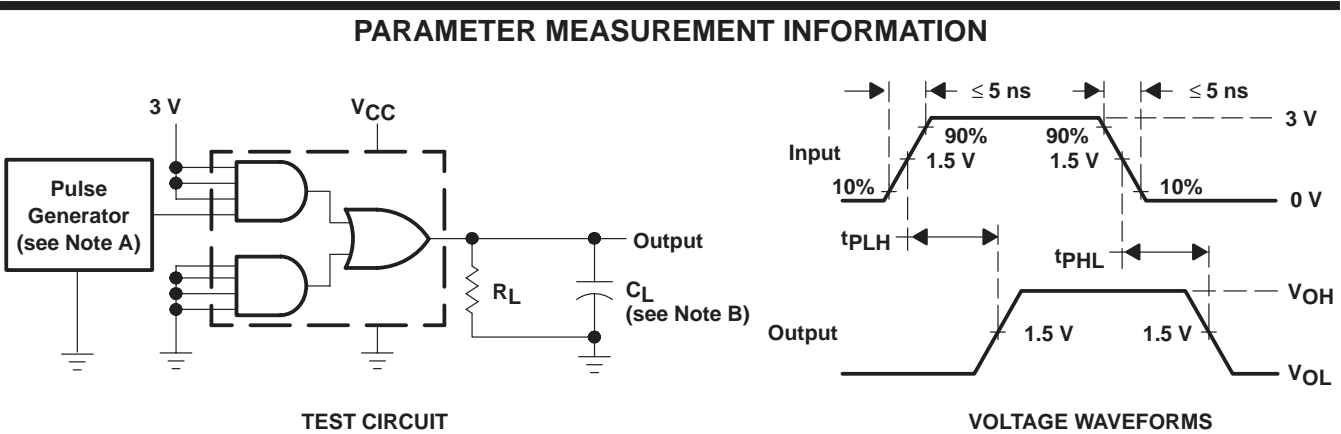
| PARAMETER | TEST CONDITIONS | MIN | MAX | UNIT |
|--|--|------|------|---------------|
| V_{IK} Input clamp voltage | $V_{CC} = 5\text{ V}$, $I_I = -12\text{ mA}$ | | -1.5 | V |
| $V_{(BR)}$ Breakdown voltage | $V_{CC} = 5\text{ V}$, $I_I = 10\text{ mA}$ | 5.5 | | V |
| V_{OH} High-level output voltage | $V_{IH} = 2\text{ V}$, $I_{OH} = -75\text{ mA}$, See Note 2 | 2.4 | | V |
| I_{OH} High-level output current | $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, $V_{IH} = 4.5\text{ V}$, See Note 2, $V_{OH} = 2\text{ V}$ | -100 | -250 | mA |
| I_{OL} Low-level output current | $V_{IL} = 0.8\text{ V}$, $V_{OL} = 0.4\text{ V}$, See Note 2 | -800 | | μA |
| $I_{O(off)}$ Off-state output current | $V_{CC} = 3\text{ V}$, $V_O = 3\text{ V}$ | | 500 | μA |
| I_{IH} High-level output current | $V_I = 4.5\text{ V}$ | | 40 | μA |
| I_{IL} Low-level output current | $V_I = 0.4\text{ V}$ | -0.1 | -1.6 | mA |
| I_{OS} Short-circuit output current† | $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ | | -30 | mA |
| I_{CCH} Supply current, outputs high | $V_{CC} = 5.25\text{ V}$, All inputs at 2 V, Outputs open | | 28 | mA |
| I_{CCL} Supply current, outputs low | $V_{CC} = 5.25\text{ V}$, All inputs at 0.8 V, Outputs open | | 60 | mA |

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

NOTE 2: The output voltage and current limits are valid for any appropriate combination of high and low inputs specified by the function table for the desired output.

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 | $R_L = 37\ \Omega$, $C_L = 15\text{ pF}$, See Figure 1 | | 11 | 20 | ns |
| t_{PHL} Propagation delay time, high-to-low level output | | | 8 | 20 | |
| t_{PLH} Propagation delay time, low-to-high level output | $R_L = 37\ \Omega$, $C_L = 1000\text{ pF}$, See Figure 1 | | 22 | 50 | ns |
| t_{PHL} Propagation delay time, high-to-low level output | | | 20 | 50 | |



NOTES: A. The pulse generator has the following characteristics: $Z_O \approx 50\ \Omega$, $t_w = 200\text{ ns}$, duty cycle $\leq 50\%$, PRR $\leq 500\text{ kHz}$.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

OUTPUT CURRENT vs OUTPUT VOLTAGE

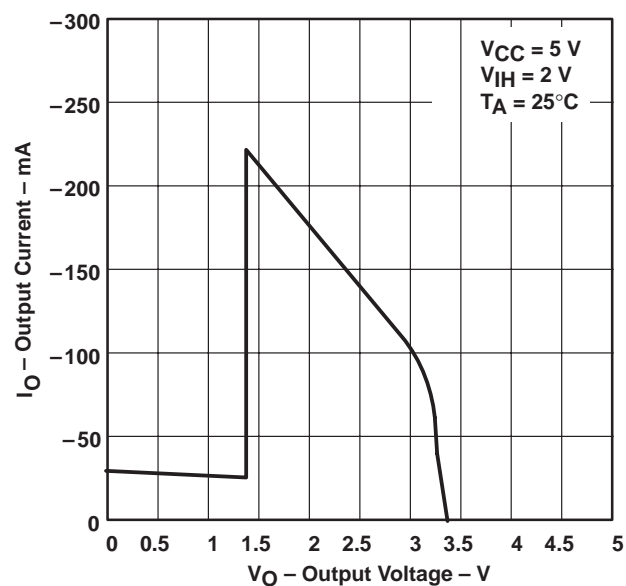


Figure 2

SN55121, SN75121
DUAL LINE DRIVERS

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APPLICATION INFORMATION

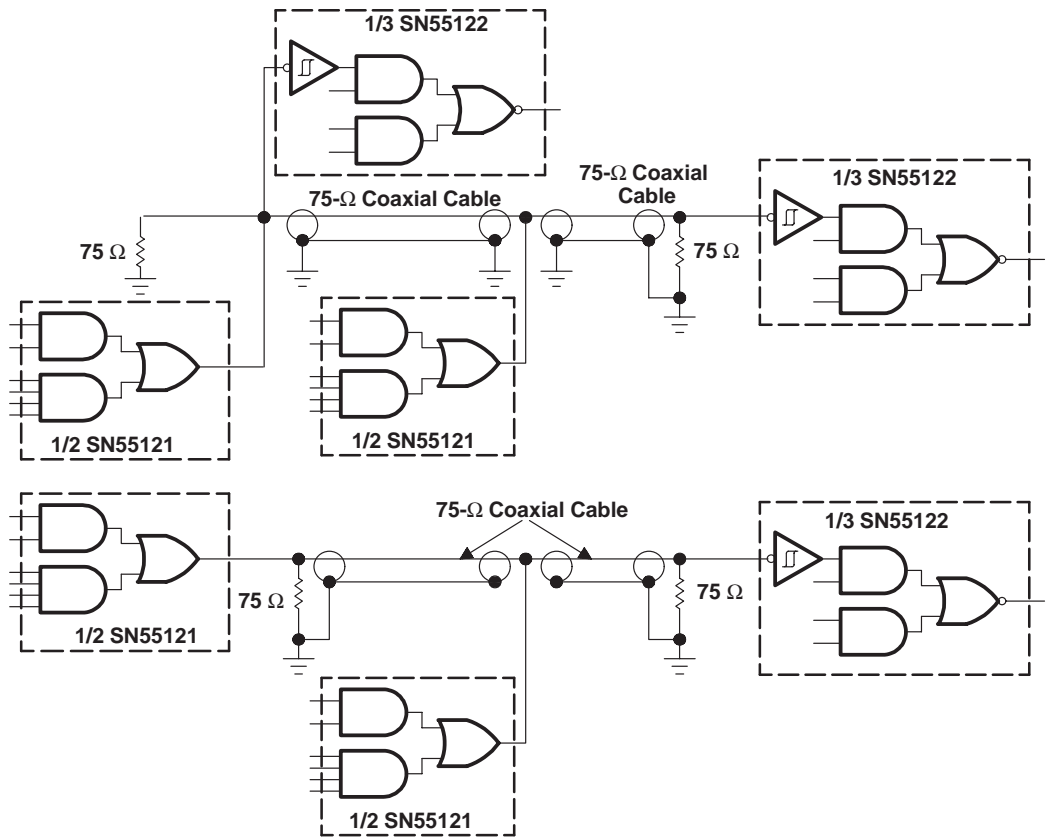


Figure 3. Single-Ended Party-Line Circuits

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 |
|------------------|---------------|--------------|--------------------|------|-------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| SN55121J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI | -55 to 125 | | |
| SN75121D | OBSOLETE | SOIC | D | 16 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN75121N | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN75121N | Samples |
| SN75121NE4 | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN75121N | Samples |
| SN75121NSR | ACTIVE | SO | NS | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | SN75121 | Samples |
| SN75121NSRE4 | ACTIVE | SO | NS | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | SN75121 | Samples |
| SN75121NSRG4 | ACTIVE | SO | NS | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | SN75121 | Samples |
| SNJ55121FK | OBSOLETE | LCCC | FK | 20 | | TBD | Call TI | Call TI | -55 to 125 | | |
| SNJ55121J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI | -55 to 125 | | |

(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 SN55121, SN75121 :

- Catalog: [SN75121](#)
- Military: [SN55121](#)

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



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

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**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



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



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.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - 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 0.006 (0,15) each side.
 - 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 AC.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-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.

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