

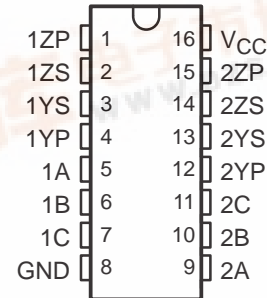
- Choice of Open-Collector, Open-Emitter, or Totem-Pole Outputs
- Single-Ended or Differential AND/NAND Outputs
- Single 5-V Supply
- Dual-Channel Operation
- TTL Compatible
- Short-Circuit Protection
- High-Current Outputs
- Triple inputs
- Clamp Diodes at Inputs and Outputs
- Designed for Use With SN55115 and SN75115 Differential Line Receivers
- Designed to Be Interchangeable With National DS9614 Line Driver

description

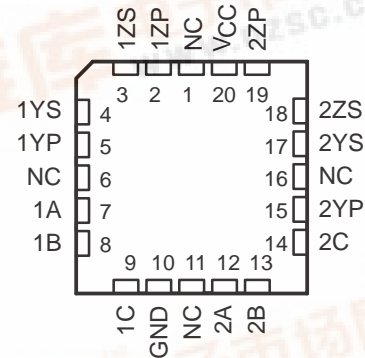
The SN55114 and SN75114 dual differential line drivers are designed to provide differential output signals with the high-current capability for driving balanced lines, such as twisted pair, at normal line impedances without high power dissipation. The output stages are similar to TTL totem-pole outputs, but with the sink outputs, YS and ZS, and the corresponding active pullup terminals, YP and ZP, available on adjacent package pins. Since the output stages provide TTL-compatible output levels, these devices can also be used as TTL expanders or phase splitters.

The SN55114 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN75114 is characterized for operation from 0°C to 70°C .

SN55114 . . . J OR W PACKAGE
 SN75114 . . . D OR N PACKAGE
 (TOP VIEW)



SN55114 . . . FK PACKAGE
 (TOP VIEW)



NC – No internal connection

FUNCTION TABLE

| INPUTS | | | OUTPUTS | |
|------------------------------|---|---|---------|---|
| A | B | C | Y | Z |
| H | H | H | H | L |
| All other input combinations | | | L | H |

H = high level, L = low level

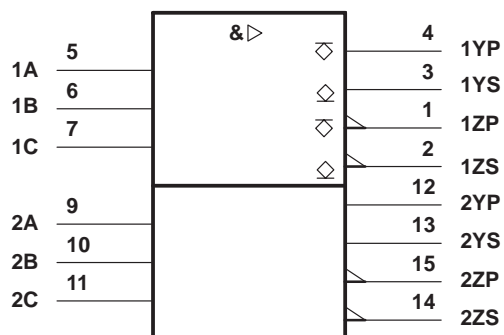
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

SN55114, SN75114

DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

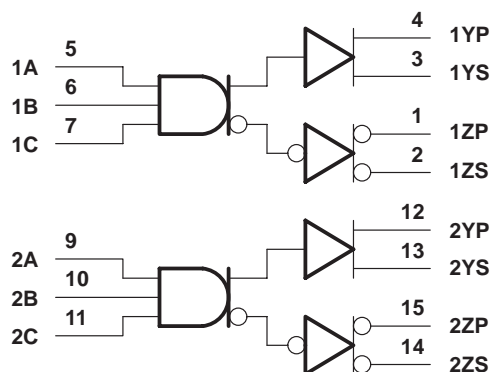
logic symbol†



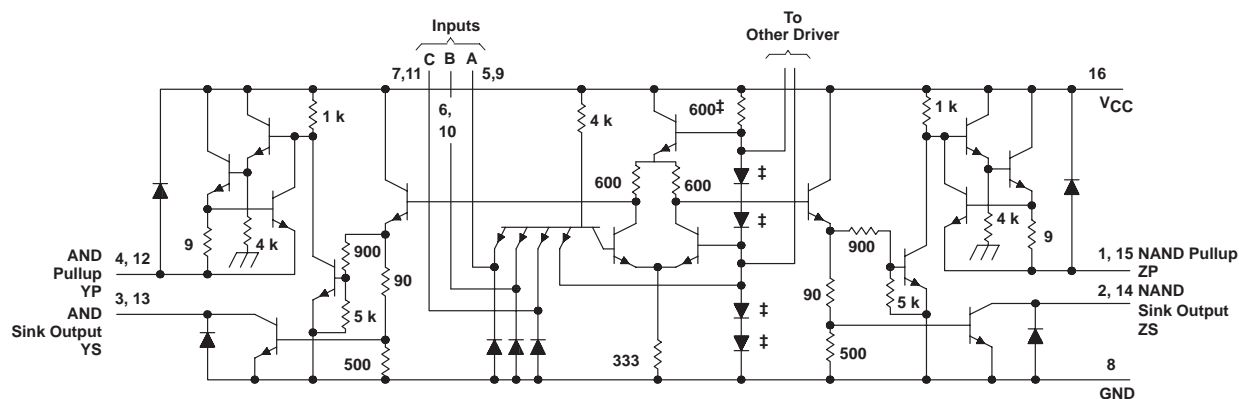
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for the D, J, N, and W packages.

logic diagram (positive logic)



schematic (each driver)



‡ These components are common to both drivers. Resistor values shown are nominal and in ohms. Pin numbers shown are for the D, J, N, and W packages.

SN55114, SN75114 DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

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

| | |
|--|------------------------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage, V_I | 5.5 V |
| Off-state voltage applied to open-collector outputs | 12 V |
| Continuous total power dissipation | See Dissipation Rating Table |
| Storage temperature range, T_{stg} | –65°C to 150°C |
| Case temperature for 60 seconds, T_C : FK package | 260°C |
| Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W 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.

NOTES: 1. All voltage values are with respect to the network ground terminal.

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 | — |
| W [‡] | 1000 mW | 8.0 mW/°C | 640 mW | 200 mW |

[‡] In the FK, J, and W packages, SN55114 chips are either silver glass or alloy mounted.

recommended operating conditions (unless otherwise noted)

| | SN55114 | | | SN75114 | | | UNIT |
|---------------------------------------|---------|-----|-----|---------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| Supply voltage, V_{CC} | 4.5 | 5 | 5.5 | 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} | | | –40 | | | –40 | mA |
| Low-level output current, I_{OL} | | | 40 | | | 40 | mA |
| Operating free-air temperature, T_A | –55 | | 125 | 0 | | 70 | °C |

SN55114, SN75114

DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

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

| PARAMETER | TEST CONDITIONS† | SN55114 | | | SN75114 | | | UNIT |
|---|--|---------------------------|---------------------------|------|---------|------|------|---------------|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V_{IK} Input clamp voltage | $V_{CC} = \text{MIN}$, $I_I = -12 \text{ mA}$ | -0.9 | -1.5 | | -0.9 | -1.5 | | V |
| V_{OH} High-level output voltage | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OH} = -10 \text{ mA}$ | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| | $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -40 \text{ mA}$ | 2 | 3 | | 2 | 3 | | |
| V_{OL} Low-level output voltage | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$, $I_{OL} = 40 \text{ mA}$ | 0.2 | 0.4 | | 0.2 | 0.45 | | V |
| V_{OK} Output clamp voltage | $V_{CC} = 5 \text{ V}$, $I_O = 40 \text{ mA}$, $T_A = 25^\circ\text{C}$ | 6.1 | 6.5 | | 6.1 | 6.5 | | V |
| | $V_{CC} = \text{MAX}$, $I_O = -40 \text{ mA}$, $T_A = 25^\circ\text{C}$ | -1.1 | -1.5 | | -1.1 | -1.5 | | |
| $I_{O(\text{off})}$ Off-state open collector output current | $V_{CC} = \text{MAX}$ | $V_{OH} = 12 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 100 | | | μA |
| | | | $T_A = 125^\circ\text{C}$ | | 200 | | | |
| | | $V_{OH} = 5.25 \text{ V}$ | $T_A = 25^\circ\text{C}$ | | | 1 | 100 | |
| | | | $T_A = 70^\circ\text{C}$ | | | | 200 | |
| 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 | μA |
| I_{IL} Low-level input current | $V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$ | -1.1 | -1.6 | | -1.1 | -1.6 | | mA |
| I_{OS} Short-circuit output current§ | $V_{CC} = \text{MAX}$, $V_O = 0$, $T_A = 25^\circ\text{C}$ | -40 | -90 | -120 | -40 | -90 | -120 | mA |
| I_{CC} Supply current (both drivers) | All inputs at 0 V, No load, $T_A = 25^\circ\text{C}$ | $V_{CC} = \text{MAX}$ | | 37 | 50 | 37 | 50 | mA |
| | | $V_{CC} = 7 \text{ V}$ | | 47 | 65 | 47 | 70 | |

† All parameters, with the exception of off-state open-collector output current, are measured with the active pullup connected to the sink output. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $T_A = 25^\circ\text{C}$ and $V_{CC} = 5 \text{ V}$, with the exception of I_{CC} at 7 V.

§ Only one output should be shorted at a time, and duration of the short circuit should not exceed one second.

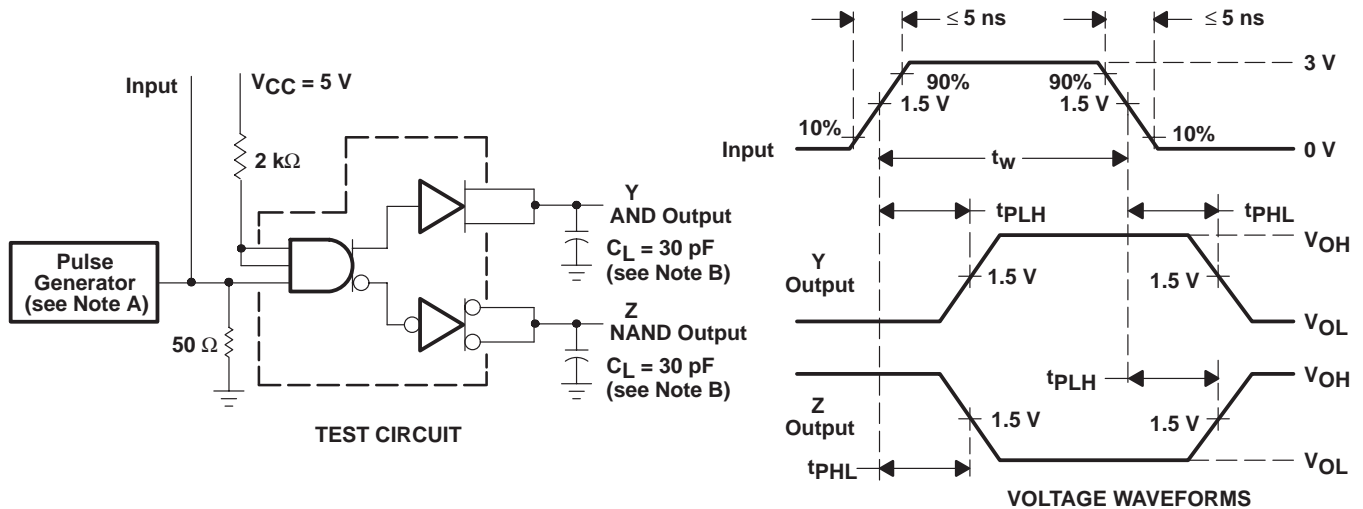
switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | SN55114 | | | SN75114 | | | UNIT |
|---|---|---------|-----|-----|---------|-----|-----|------|
| | | MIN | TYP | MAX | MIN | TYP | MAX | |
| t_{PLH} Propagation delay time, low- to high-level output | $C_L = 30 \text{ pF}$, See Figure 1 | | 15 | 20 | | 15 | 30 | ns |
| t_{PHL} Propagation delay time, high- to low-level output | | | 11 | 20 | | 11 | 30 | ns |

SN55114, SN75114 DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: $Z_O = 500\ \Omega$, $PRR \leq 500\text{ kHz}$, $t_w \leq 100\text{ ns}$.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS†

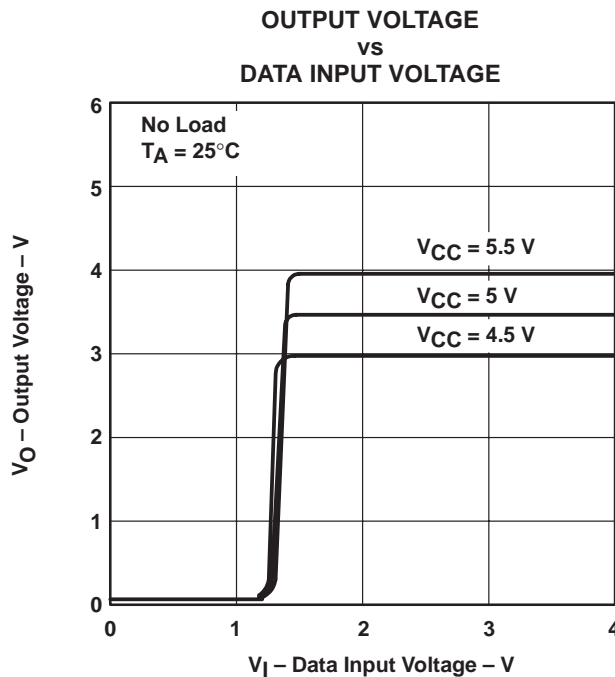


Figure 2

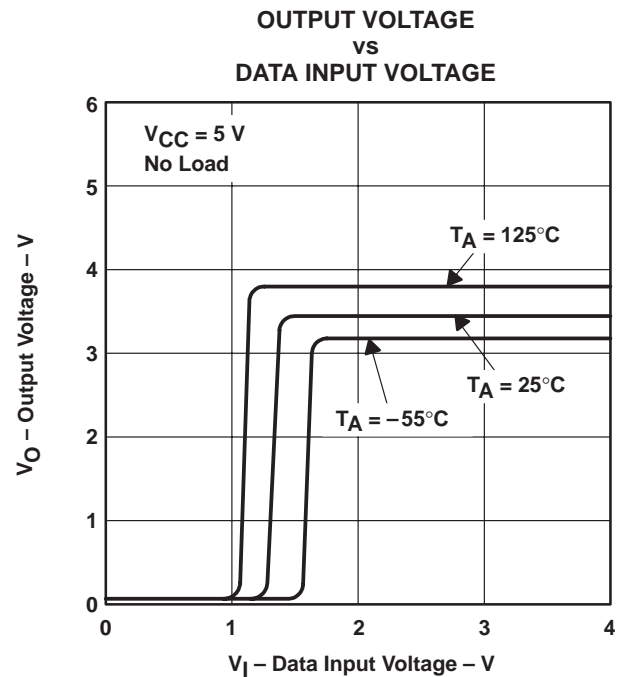


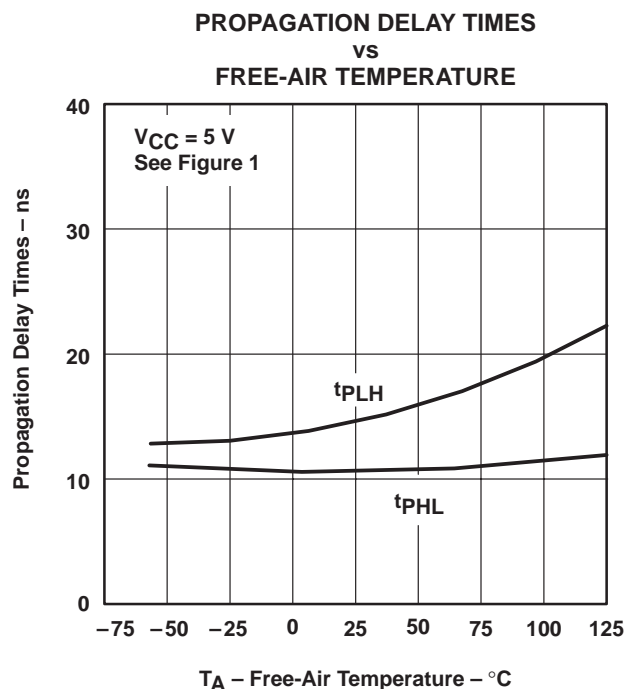
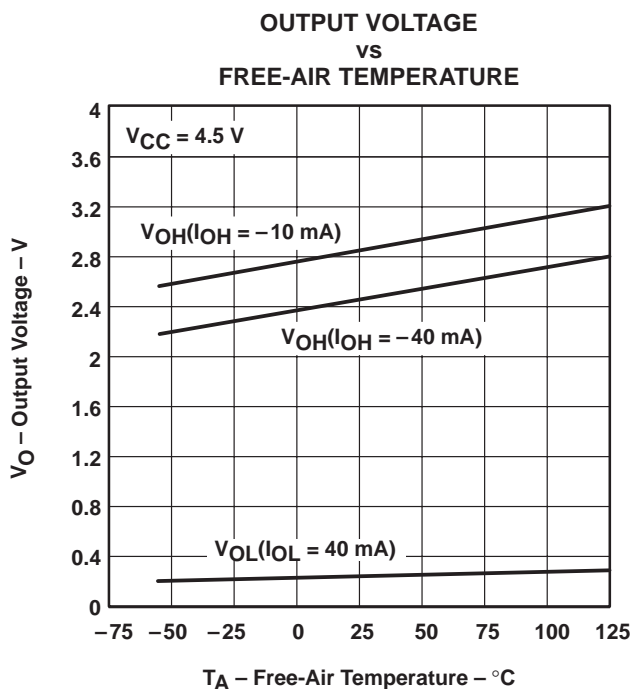
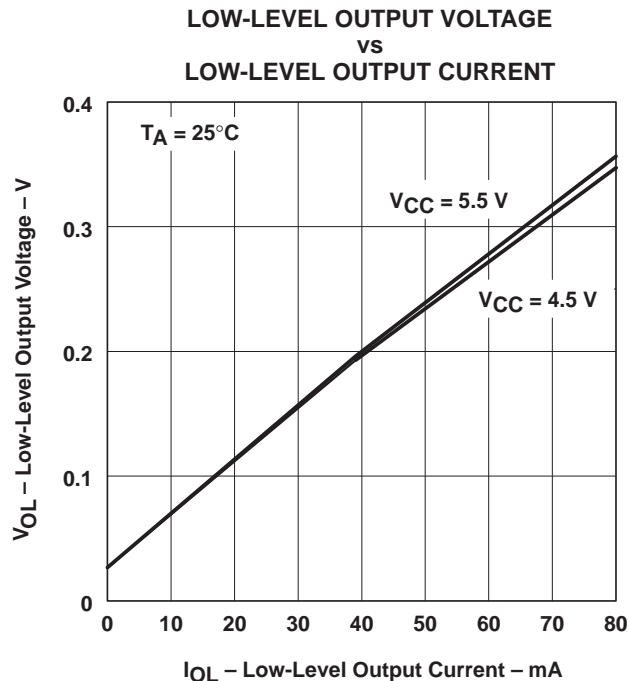
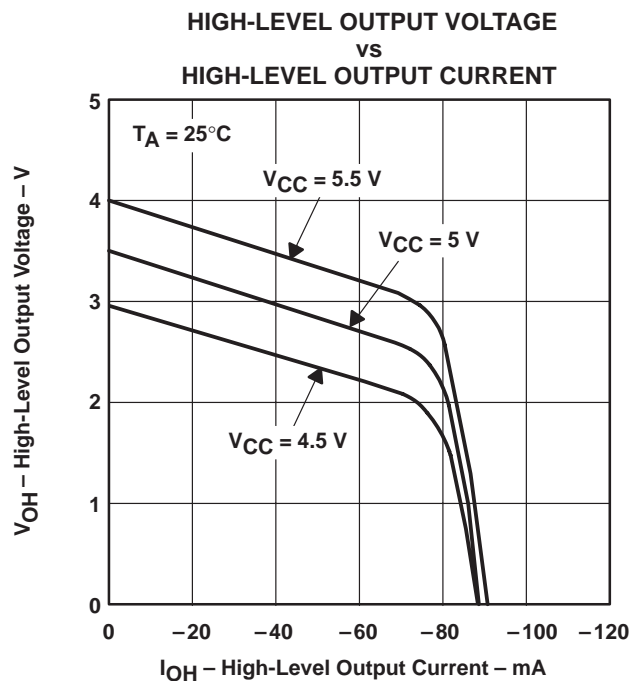
Figure 3

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. These parameters were measured with the active pullup connected to the sink output.

SN55114, SN75114 DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

TYPICAL CHARACTERISTICS†



† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. These parameters were measured with the active pullup connected to the sink output.

SN55114, SN75114 DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

TYPICAL CHARACTERISTICS†

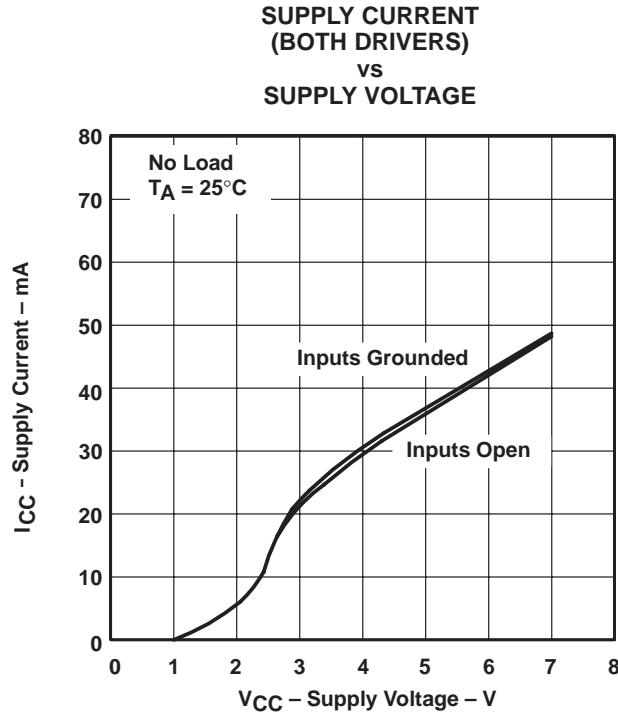


Figure 8

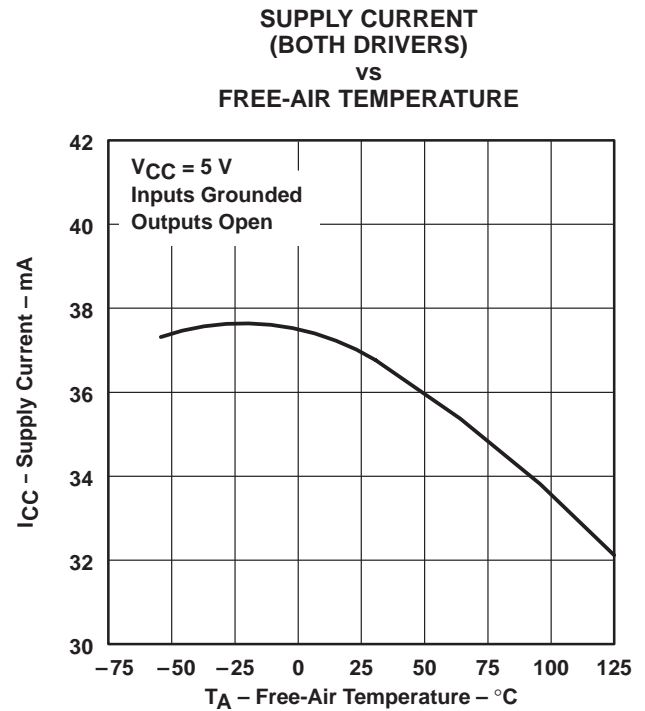


Figure 9

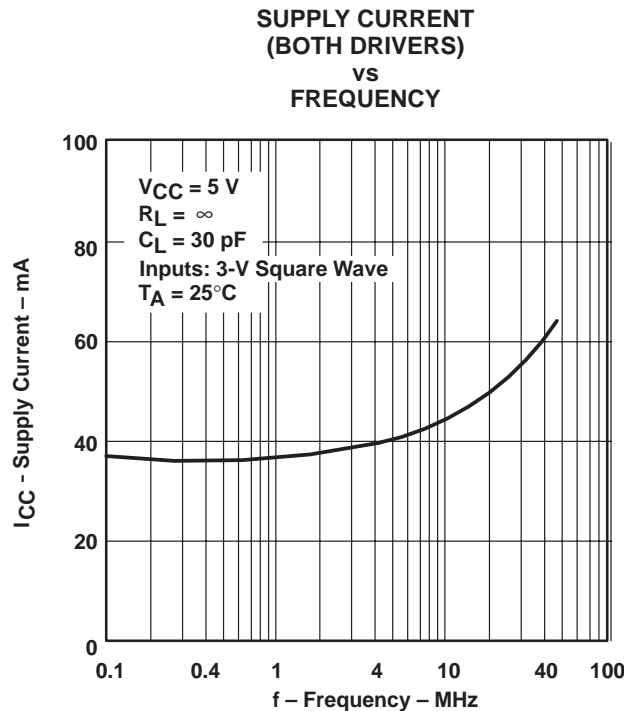


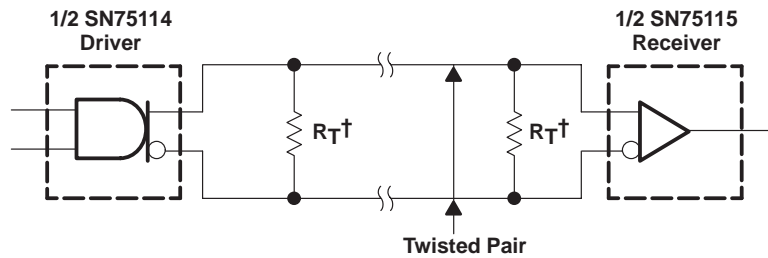
Figure 10

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. These parameters were measured with the active pullup connected to the sink output.

SN55114, SN75114 DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

APPLICATION INFORMATION



$^\dagger R_T = Z_O$. A capacitor can be connected in series with R_T to reduce power dissipation.

Figure 11. Basic Party-Line or Data-Bus Differential Data Transmission

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 5962-88744022A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | Level-NC-NC-NC |
| 5962-8874402EA | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | Level-NC-NC-NC |
| 5962-8874402FA | ACTIVE | CFP | W | 16 | 1 | TBD | A42 SNPB | Level-NC-NC-NC |
| JM38510/10403BEA | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | Level-NC-NC-NC |
| SN55114J | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | Level-NC-NC-NC |
| SN75114D | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75114DE4 | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75114DR | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75114DRE4 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75114J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI |
| SN75114N | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN75114NE4 | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SNJ55114FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | Level-NC-NC-NC |
| SNJ55114J | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | Level-NC-NC-NC |
| SNJ55114W | ACTIVE | CFP | W | 16 | 1 | TBD | A42 SNPB | Level-NC-NC-NC |

⁽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) 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.

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.

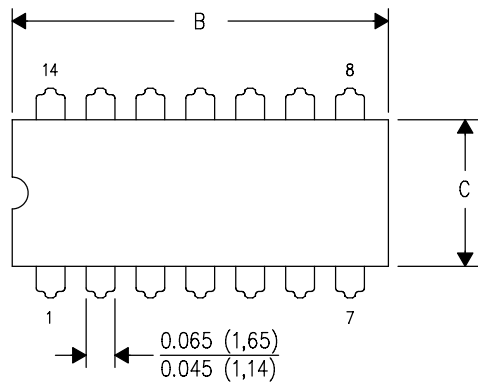
Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

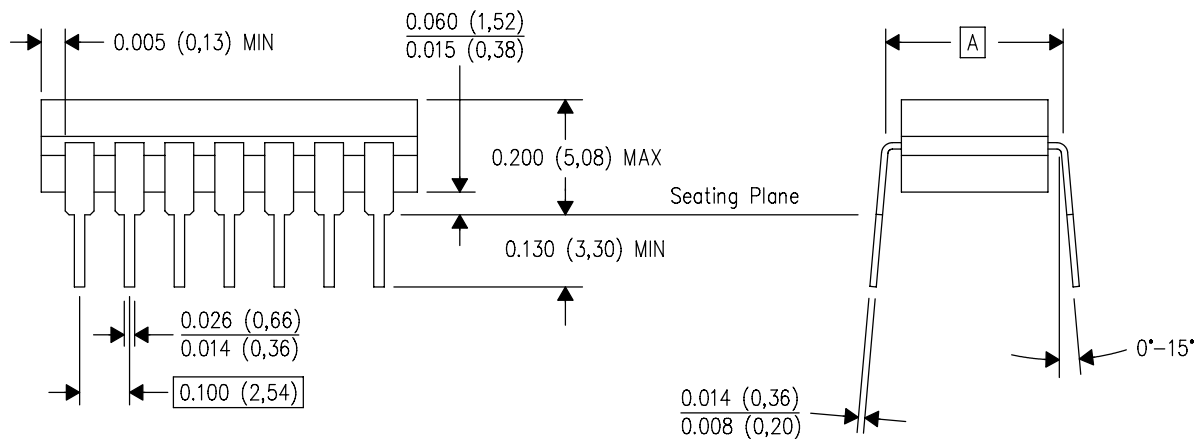
J (R-GDIP-T**)

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) |



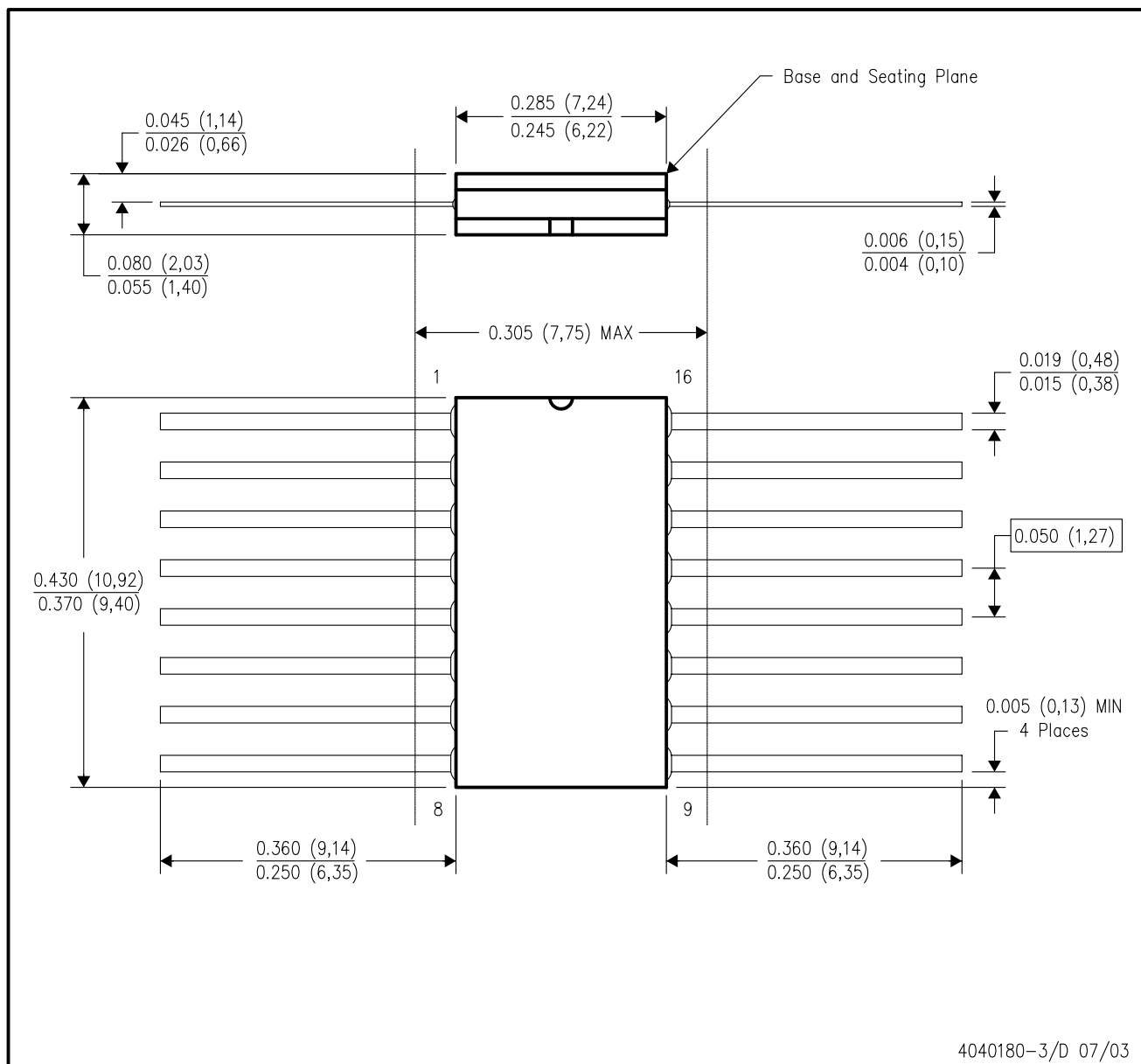
4040083/F 03/03

- NOTES:
- 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.

MECHANICAL DATA

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



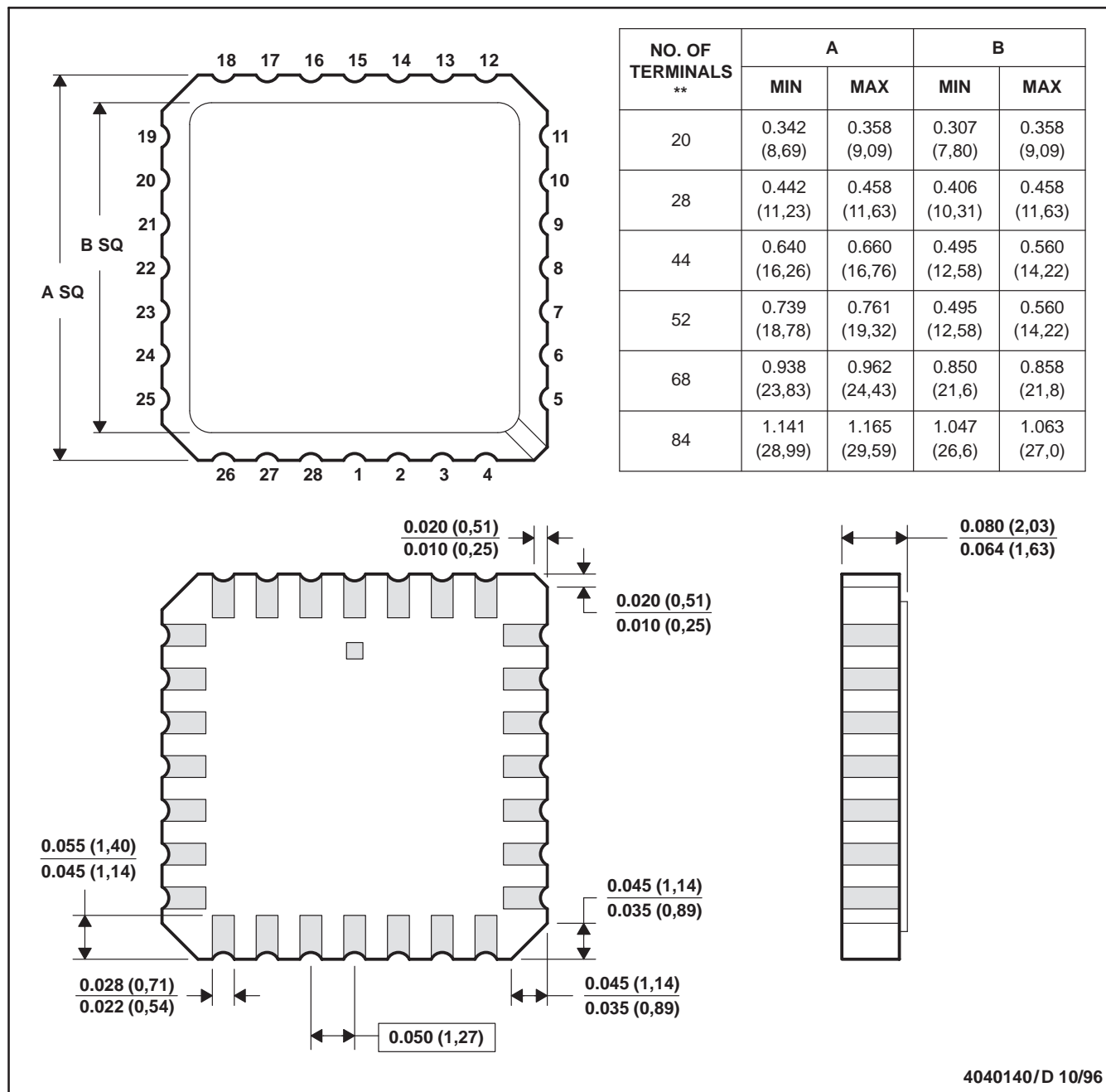
MECHANICAL DATA

MLCC006B – OCTOBER 1996

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



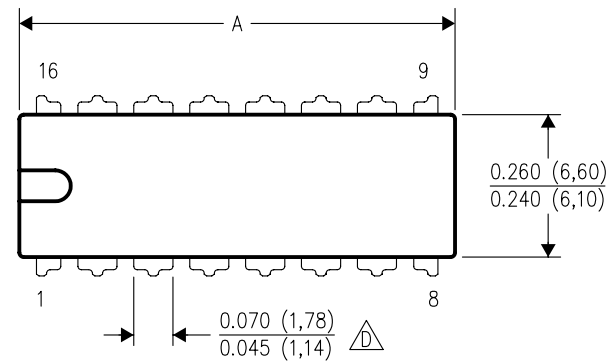
- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

MECHANICAL DATA

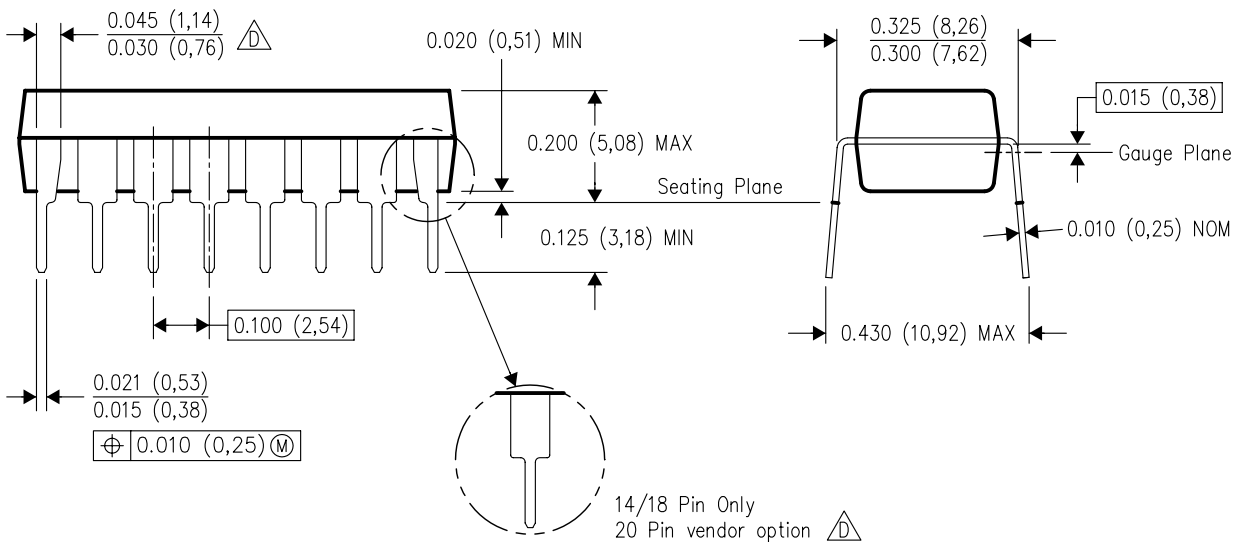
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE





| DIM \ PINS ** | 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

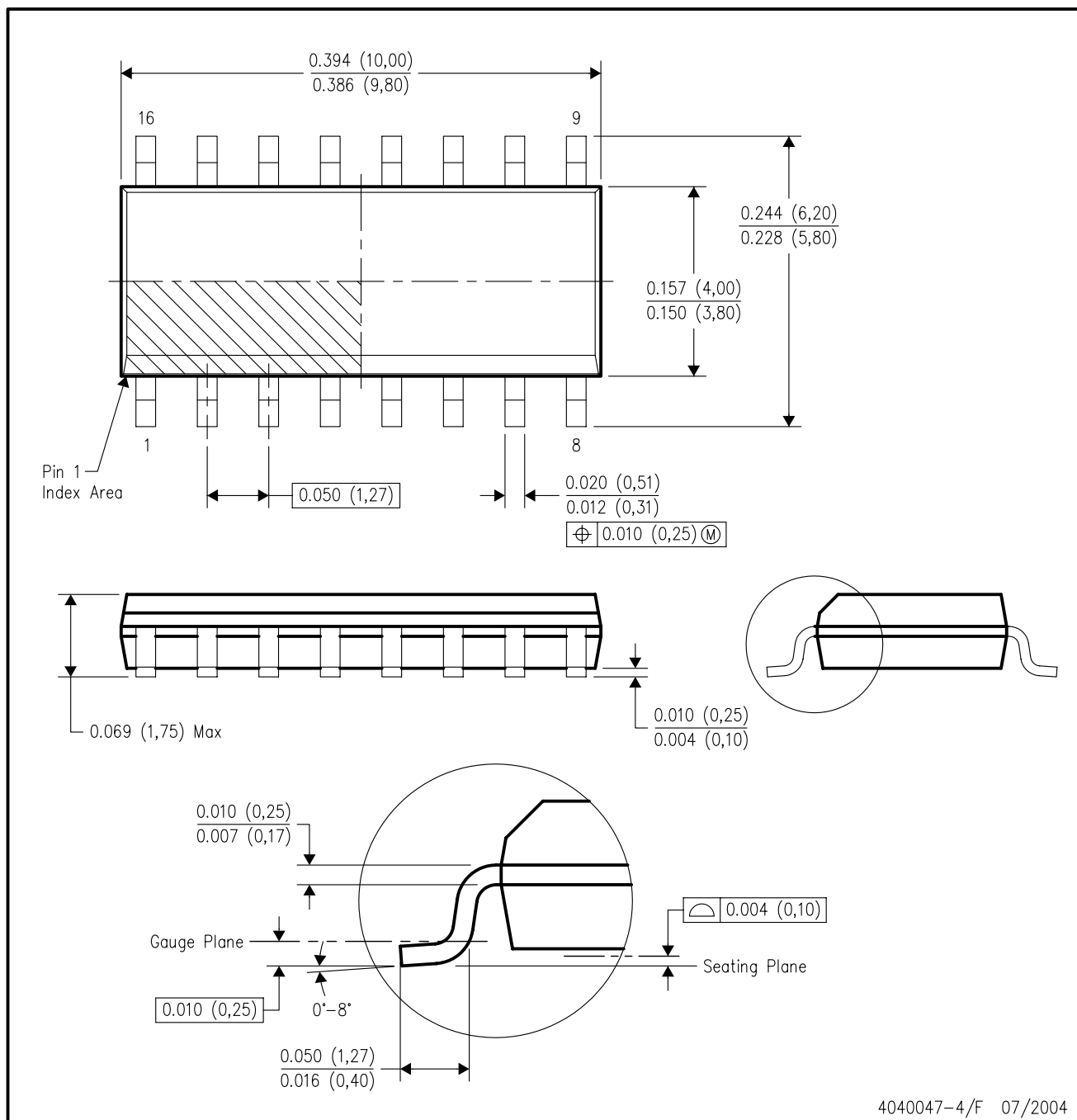
NOTES:

- 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.

MECHANICAL DATA

D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



4040047-4/F 07/2004

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

| | |
|------------------|--|
| Amplifiers | amplifier.ti.com |
| Data Converters | dataconverter.ti.com |
| DSP | dsp.ti.com |
| Interface | interface.ti.com |
| Logic | logic.ti.com |
| Power Mgmt | power.ti.com |
| Microcontrollers | microcontroller.ti.com |

Applications

| | |
|--------------------|--|
| Audio | www.ti.com/audio |
| Automotive | www.ti.com/automotive |
| Broadband | www.ti.com/broadband |
| Digital Control | www.ti.com/digitalcontrol |
| Military | www.ti.com/military |
| Optical Networking | www.ti.com/opticalnetwork |
| Security | www.ti.com/security |
| Telephony | www.ti.com/telephony |
| Video & Imaging | www.ti.com/video |
| Wireless | www.ti.com/wireless |

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265