

**General Information**

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### Mechanical Data

# ORDERING INSTRUCTIONS

Electrical characteristics presented in this data book, unless otherwise noted, apply for the circuit type(s) listed in the page heading regardless of package. The availability of a circuit function in a particular package is shown in the "Available Options" table on each data sheet and is usually denoted by an alphabetical reference above the pin-connection diagram(s). These alphabetical references refer to mechanical outline drawings shown in this section.

Factory orders for circuits described in this data book should include a four-part type number as explained in the following example.

EXAMPLE:                   TLC    544M   J    /883B

**Prefix**

MUST CONTAIN TWO OR THREE LETTERS

TL . . . . . TI Linear Products  
TLC . . . . . TI Linear Silicon-Gate CMOS Products

STANDARD SECOND-SOURCE PREFIXES

AD . . . . . Analog Devices    ADC . . . . . National  
ICL . . . . . Intersil

**Unique Circuit Description Including Temperature Range**

MUST CONTAIN TWO TO SIX CHARACTERS  
(From Individual Data Sheets)

Examples:    10        1255A  
              191       32040C  
              1540

**Package**

MUST CONTAIN ONE OR TWO LETTERS

D, DW, FK, FN, J, JD, N, P  
(From Pin-Connection Diagrams on Individual Data Sheet)

MIL-STD-883B, Method 5004, Class B

OMIT/883B WHEN NOT APPLICABLE

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Mechanical Data

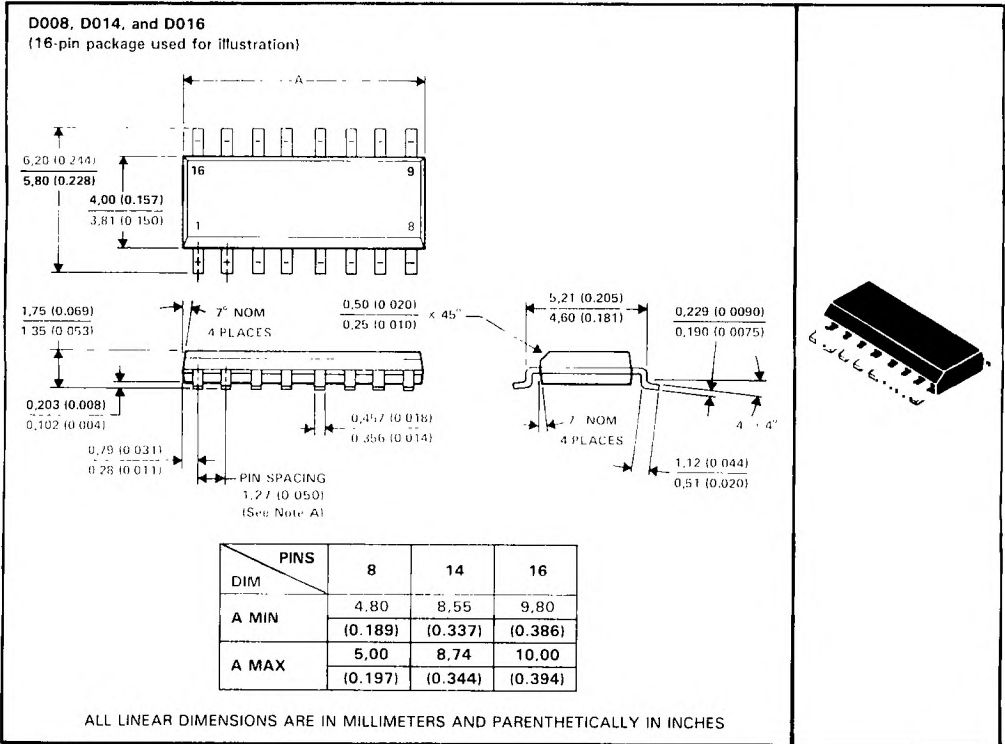
Circuits are shipped in one of the carriers below. Unless a specific method of shipment is specified by the customer (with possible additional costs), circuits will be shipped in the most practical carrier.

- |                            |                              |
|----------------------------|------------------------------|
| Small Outline (D, DW)      | Chip Carriers (FK, FN)       |
| Dual-In-Line (J, JD, N, P) |                              |
| — Slide Magazines          | — Anti-Static Plastic Tubing |
| — A-Channel Plastic Tubing |                              |
| — Sectioned Cardboard Box  |                              |
| — Individual Cardboard Box |                              |



**D008, D014, and D016 plastic "small outline" packages**

Each of these "small outline" packages consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



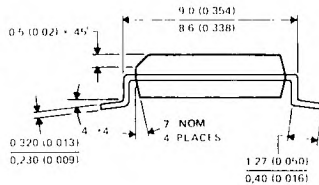
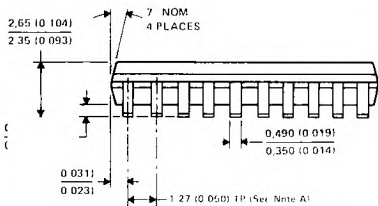
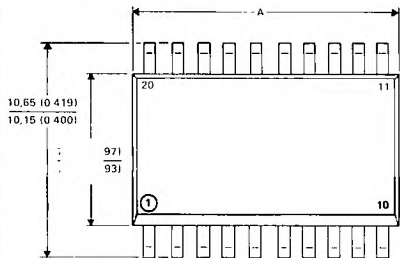
- NOTES:
- A. Leads are within 0,25 (0,010) radius of true position at maximum material dimension.
  - B. Body dimensions do not include mold flash or protrusion.
  - C. Mold flash or protrusion shall not exceed 0,15 (0 006).
  - D. Lead tips to be planar within ±0,051 (0,002) exclusive of solder.

# MECHANICAL DATA

## DW016, DW020, DW024, and DW028 plastic "small outline" packages

Each of these "small outline" packages consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.

DW016, DW020, DW024, and DW028  
(20-pin package used for illustration)



DIM \ PINS	PINS			
	16	20	24	28†
A MIN	10,16 (0.400)	12,70 (0.500)	15,29 (0.602)	17,68 (0.696)
A MAX	10,36 (0.412)	12,70 (0.500)	15,49 (0.610)	17,88 (0.704)

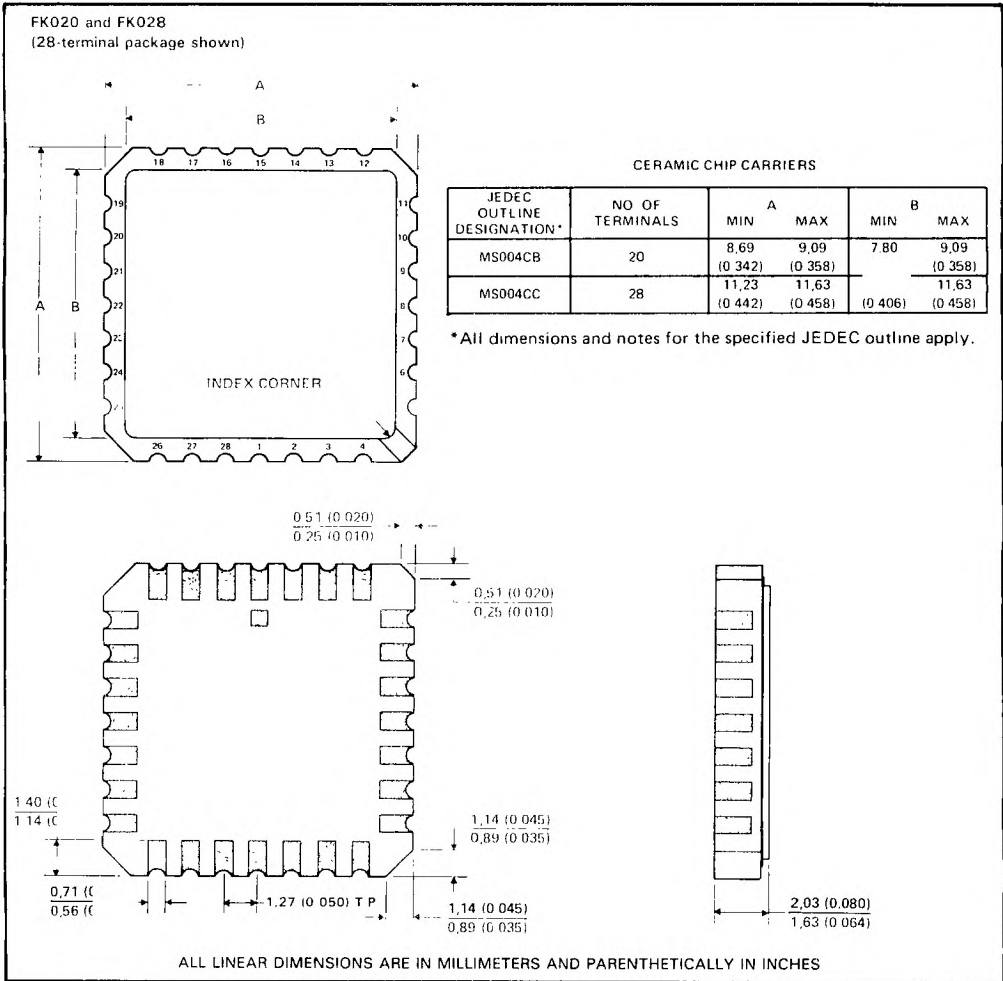
ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES

- †The 28-pin package drawing is presently classified as Advance Information.
- NOTES: A. Leads are within 0,25 (0.010) radius of true position at maximum material dimension.  
 B. Body dimensions do not include mold flash or protrusion.  
 C. Mold flash or protrusion shall not exceed 0,15 (0.006).  
 D. Lead tips to be planar within ±0,051 (0.002) exclusive of solder.

FK020 and FK028 ceramic chip carrier packages

Each of these hermetically sealed chip carrier packages has a three-layer ceramic base with a metal lid and braze seal. The packages are intended for surface mounting on solder lands on 1,27 (0.050-inch) centers. Terminals require no additional cleaning or processing when used in soldered assembly.

FK package terminal assignments conform to JEDEC Standards 1 and 2.

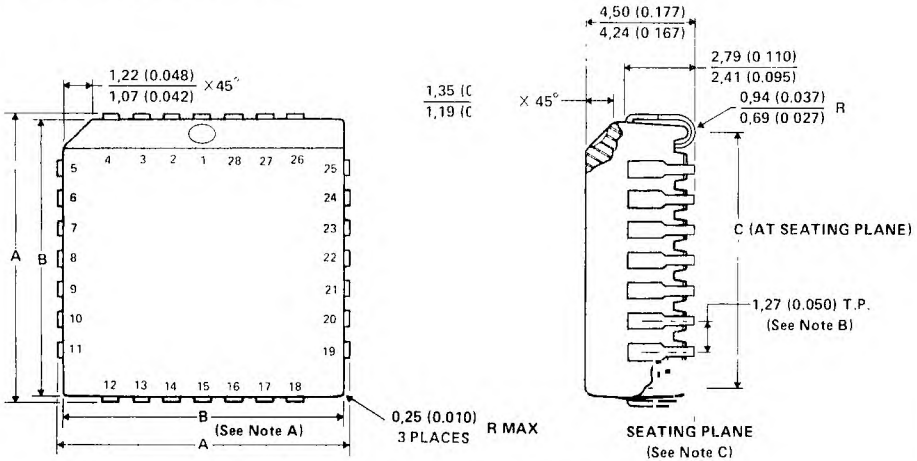


# MECHANICAL DATA

## FN020, FN028, FN044, FN068, and FN084 plastic chip carrier packages

Each of these chip carrier packages consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound withstands soldering temperatures with no deformation, and circuit performance characteristics remain stable when the devices are operated in high-humidity conditions. The packages are intended for surface mounting on solder lands on 1,27 (0.050) centers. Leads require no additional cleaning or processing when used in soldered assembly.

FN020, FN028, FN044, FN068, and FN084  
(28-terminal package used for illustration)



NO. OF TERMINALS	A		B		C	
	MIN	MAX	MIN	MAX	MIN	MAX
20	9,78 (0.385)	10,03 (0.395)	8,89 (0.350)	9,04 (0.356)	7,87 (0.310)	8,38 (0.330)
28	12,57 (0.495)	12,57 (0.495)	11,43 (0.450)	11,58 (0.456)	10,41 (0.410)	10,92 (0.430)
44	17,40 (0.685)	17,65 (0.695)	16,51 (0.650)	16,66 (0.656)	15,49 (0.610)	16,00 (0.630)
68	25,02 (0.985)	25,27 (0.995)	24,13 (0.950)	24,33 (0.956)	23,11 (0.910)	23,62 (0.930)
84	30,10 (1.185)	30,35 (1.195)	29,21 (1.150)	29,41 (1.158)	27,69 (1.090)	28,70 (1.130)

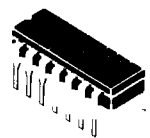
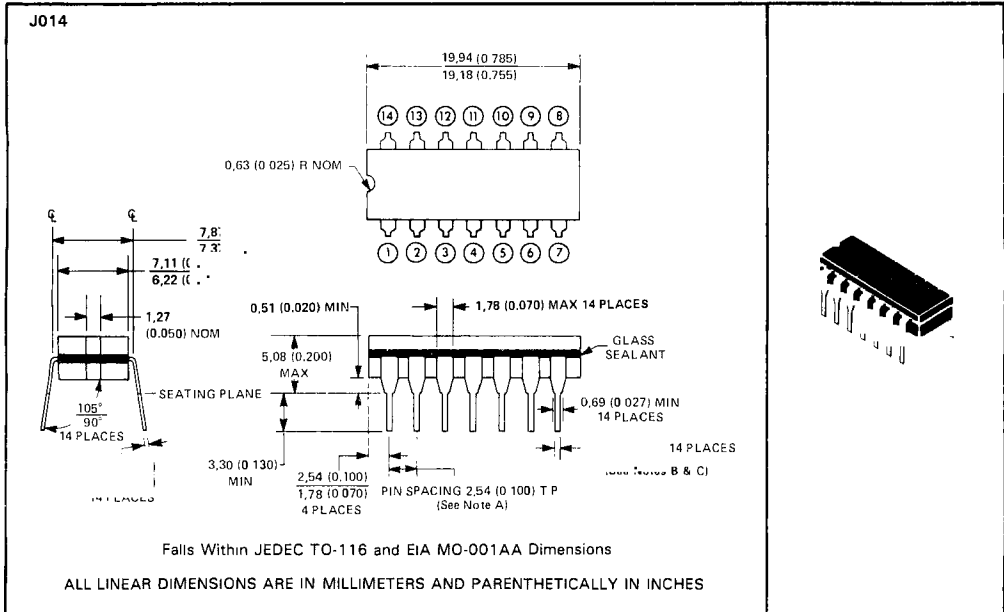
ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES

- NOTES: A. Centerline of center pin each side is within 0,10 (0.004) of package centerline as determined by dimension B.  
B. Location of each pin is within 0,127 (0.005) of true position with respect to center pin on each side.  
C. The lead contact points are planar within 0,10 (0.004).



**J014 ceramic dual-in-line package**

This hermetically sealed dual-in-line package consists of a ceramic base, ceramic cap, and a lead frame. Hermetic sealing is accomplished with glass. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Tin-plated ("bright-dipped") leads require no additional cleaning or processing when used in soldered assembly.



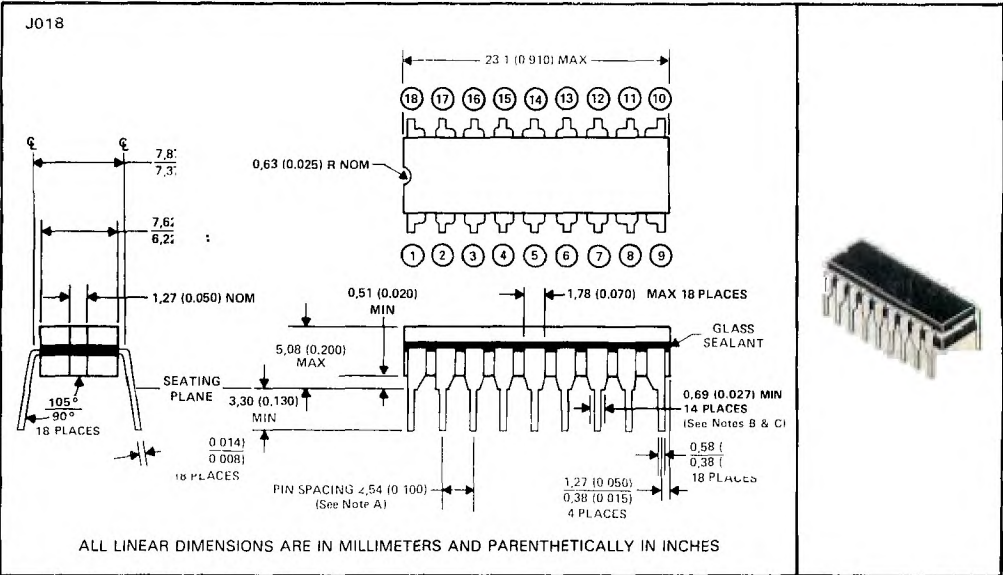
- NOTES: A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0.020) above the seating plane.

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Mechanical Data

# MECHANICAL DATA

## J018 ceramic dual-in-line package

This hermetically sealed dual-in-line package consists of a ceramic base, ceramic cap, and a lead frame. Hermetic sealing is accomplished with glass. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Tin-plated ("bright-dipped") leads require no additional cleaning or processing when used in soldered assembly.



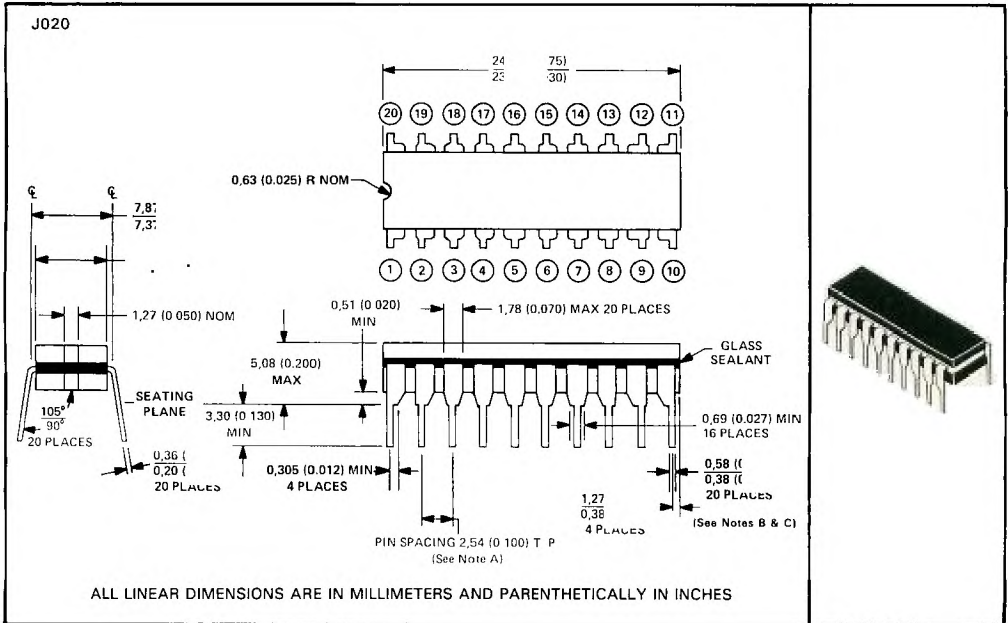
4

Mechanical Data

- NOTES: A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0.020) above the seating plane

J020 ceramic dual-in-line package

This hermetically sealed dual-in-line package consists of a ceramic base, ceramic cap, and a lead frame. Hermetic sealing is accomplished with glass. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Tin-plated ("bright-dipped") leads require no additional cleaning or processing when used in soldered assembly.

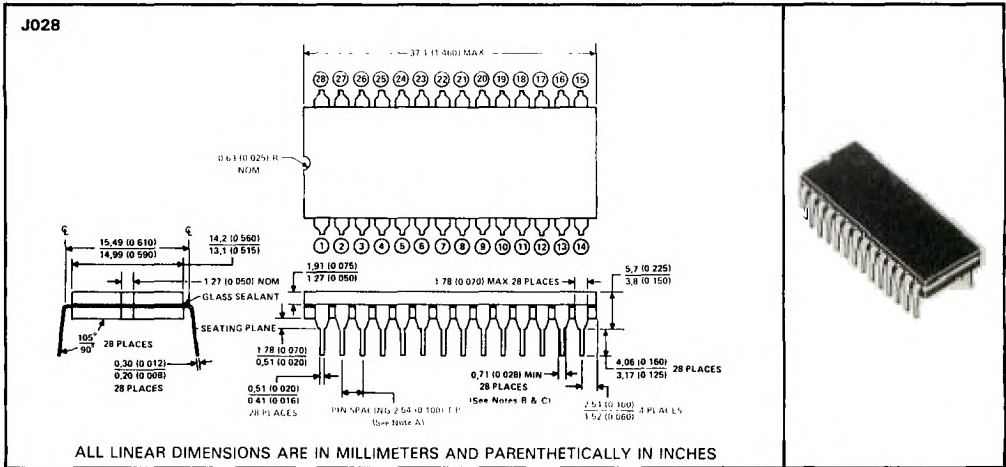


- NOTES: A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0.020) above the seating plane.

# MECHANICAL DATA

## J028 ceramic dual-in-line package

This hermetically sealed dual-in-line package consists of a ceramic base, ceramic cap, and a lead frame. Hermetic sealing is accomplished with glass. The package is intended for insertion in mounting-hole rows on 15,24 (0.600) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Tin-plated ("bright-dipped") leads require no additional cleaning or processing when used in soldered assembly.

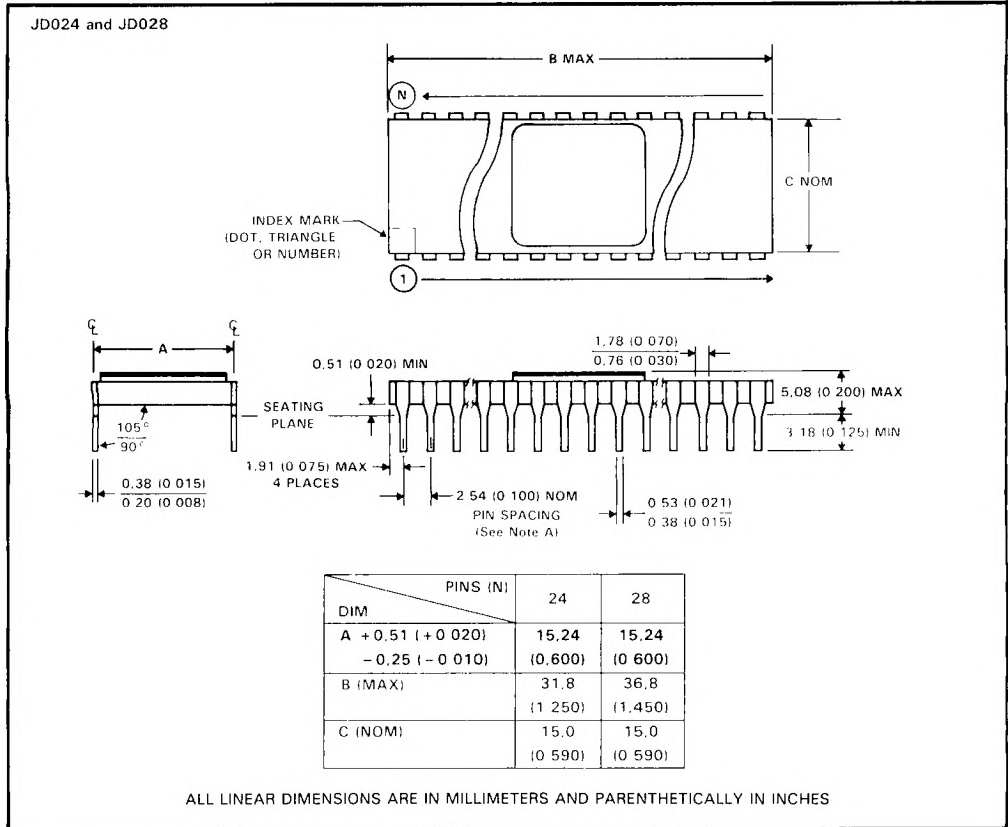


ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHEMICALLY IN INCHES

- NOTES:
- A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.
  - B. This dimension does not apply for solder-dipped leads.
  - C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0.020) above the seating plane.

JD024 and JD028 ceramic side-braze dual-in-line packages

Each of these hermetically sealed dual-in-line packages consists of a ceramic base, metal can, and side-brazed tin-plated leads. These packages are intended for insertion in mounting-hole rows on 15, 14 (0.600) centers. Leads require no additional cleaning or processing when used in soldered assembly.

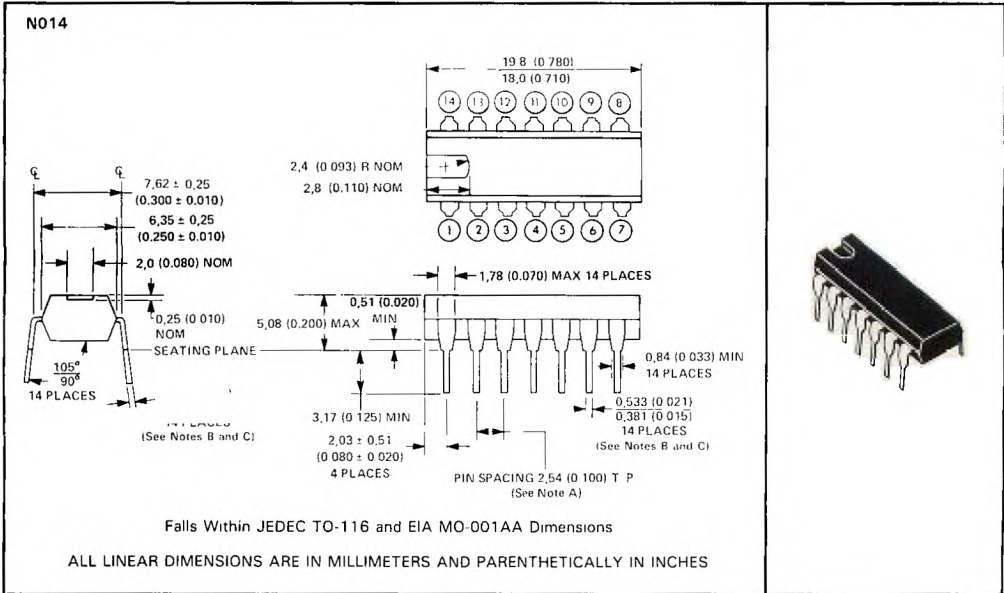


NOTE A: Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.

# MECHANICAL DATA

## N014 plastic dual-in-line package

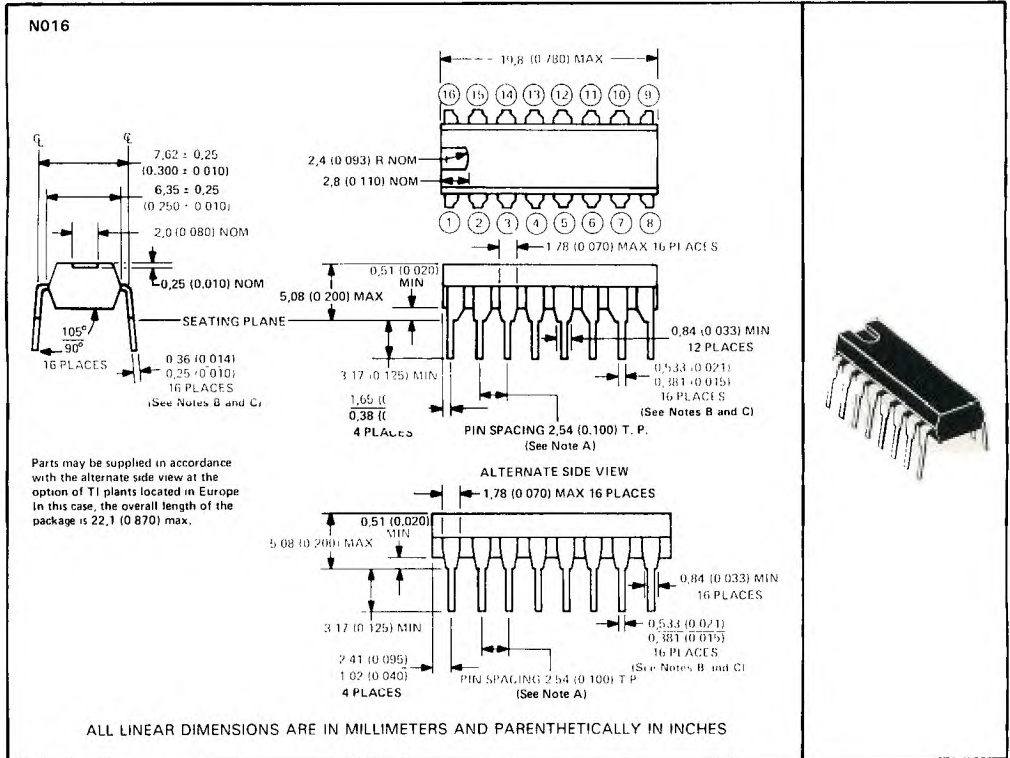
This dual-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers (see Note A). Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assembly.



- NOTES: A. Each pin centerline is located within 0.25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0.51 (0.020) above seating plane.

**N016 plastic dual-in-line package**

This dual-in-line package consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assembly.



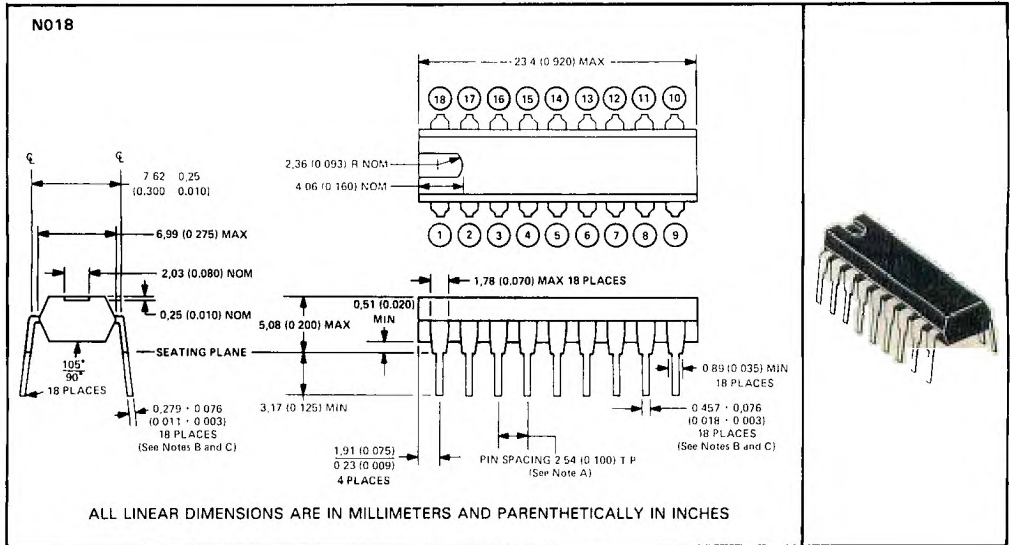
4  
Mechanical Data

- NOTES: A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0.020) above seating plane

# MECHANICAL DATA

## N018 plastic dual-in-line package

This dual-in-line package consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assembly.

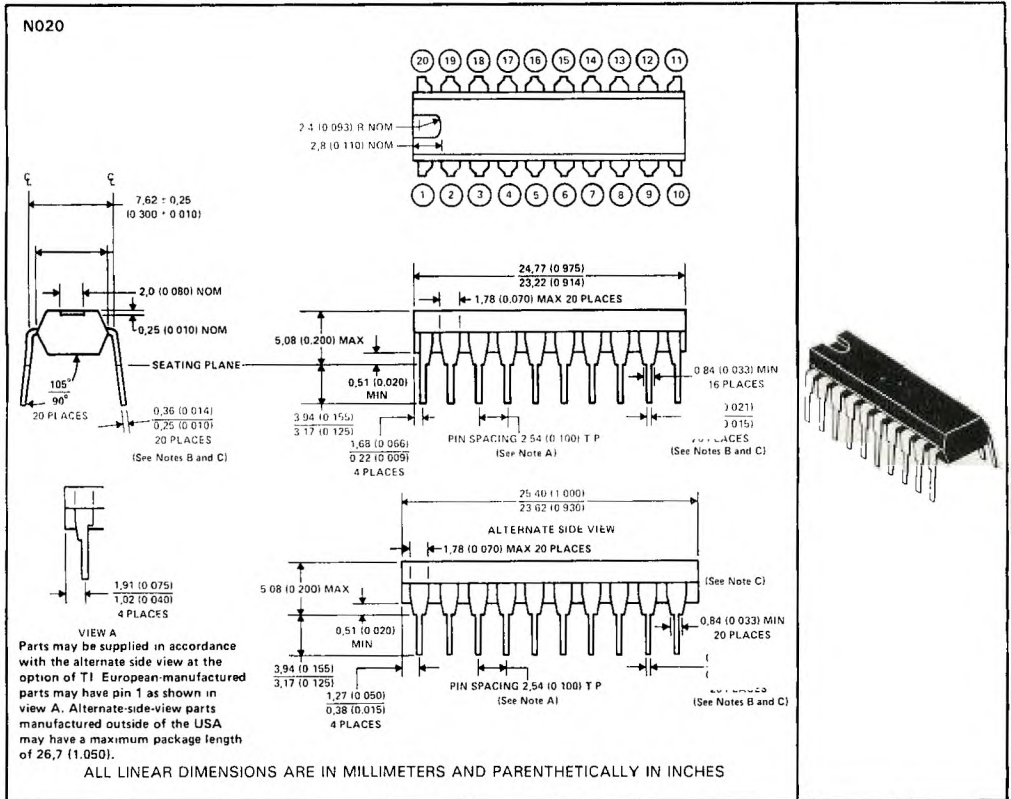


- NOTES: A. Each pin centerline is located within 0.25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0.51 (0.020) above seating plane.



**N020 plastic dual-in-line package**

This dual-in-line package consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assembly.



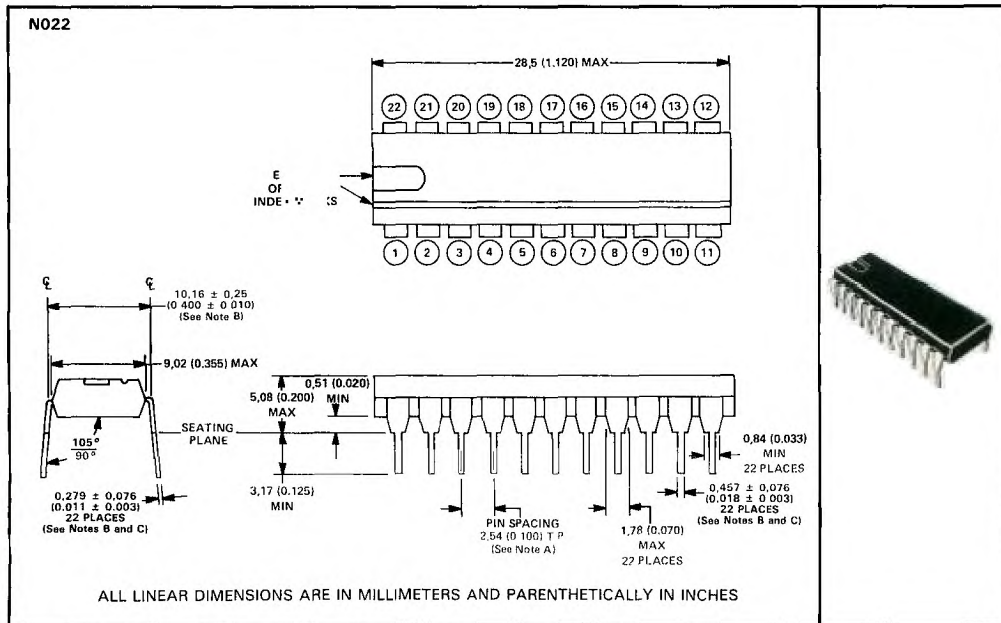
4  
Mechanical Data

- NOTES: A. Each pin centerline is located within 0.25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0.51 (0.020) above seating plane

# MECHANICAL DATA

## N022 plastic dual-in-line package

This dual-in-line package consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 10,16 (0.400) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assembly.

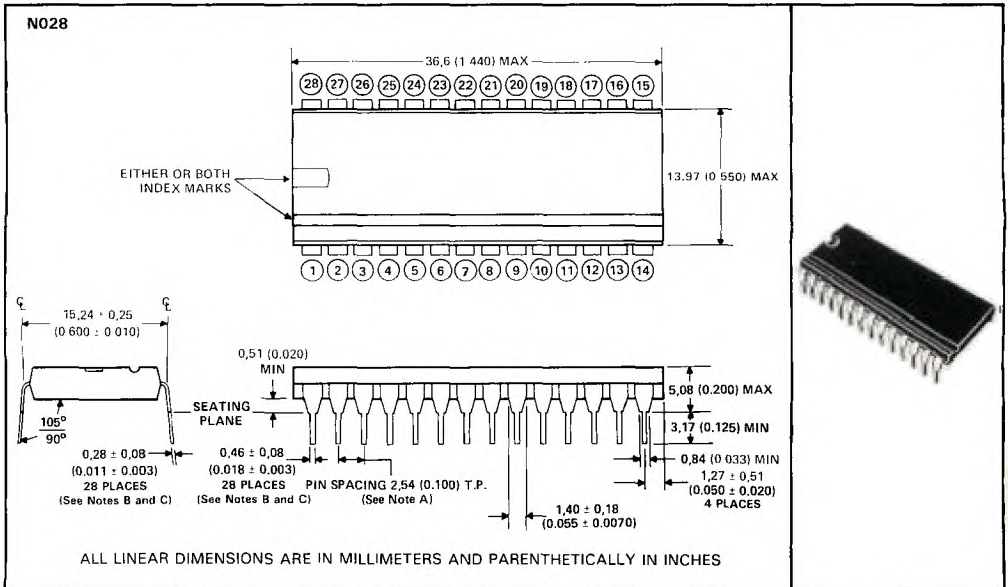


- NOTES: A. Each pin centerline is located within 0,25 (0,010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0,020) above seating plane.

4 Mechanical Data

**N028 plastic dual-in-line package**

This dual-in-line package consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 15,24 (0.600) centers. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assembly.

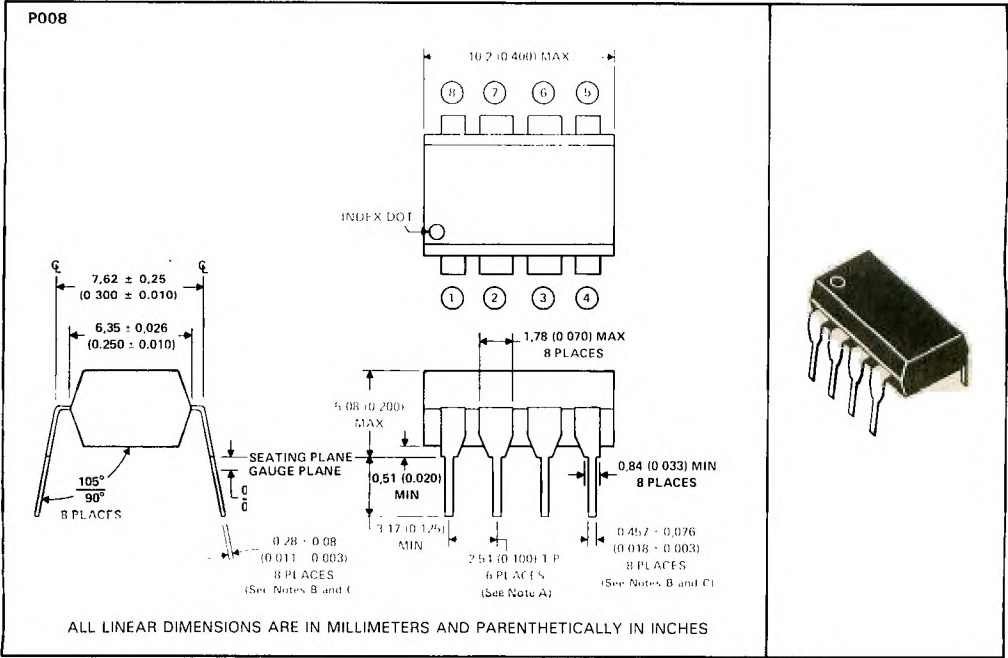


- NOTES: A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.  
 B. This dimension does not apply for solder-dipped leads.  
 C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0,51 (0.020) above seating plane.

# MECHANICAL DATA

## P008 dual-in-line plastic package

This package consists of a circuit mounted on an 8-pin lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high-humidity conditions. The package is intended for insertion in mounting-hole rows on 7,62 (0.300) centers (See Note A). Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Solder-plated leads require no additional cleaning or processing when used in soldered assembly.



- NOTES:
- A. Each pin centerline is located within 0.25 (0.010) of its true longitudinal position.
  - B. This dimension does not apply for solder-dipped leads.
  - C. When solder-dipped leads are specified, dipped area of the lead extends from the lead tip to at least 0.51 (0.020) above seating plane.

4 Mechanical Data