

T-43-21

# CD4000A, CD4001A, CD4002A, CD4025A Types

## CMOS NOR Gates

- Dual 3 Input plus Inverter—CD4000A
- Quad 2 Input—CD4001A
- Dual 4 Input—CD4002A
- Triple 3 Input—CD4025A

The RCA-CD4000A, CD4001A, CD4002A, and CD4025A NOR gates provide the system designer with direct implementation of the NOR function and supplement the existing family of CMOS gates.

These types are supplied in 14-lead hermetic dual-in-line ceramic packages (D and F suffixes), 14-lead dual-in-line plastic packages (E suffix), 14-lead ceramic flat packages (K suffix), and in chip form (H suffix).

### Features:

- Quiescent current specified to 15 V
- Maximum input leakage of 1  $\mu$ A at 15 V (full package-temperature range)
- 1-V noise margin (full package-temperature range)

### RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

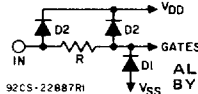
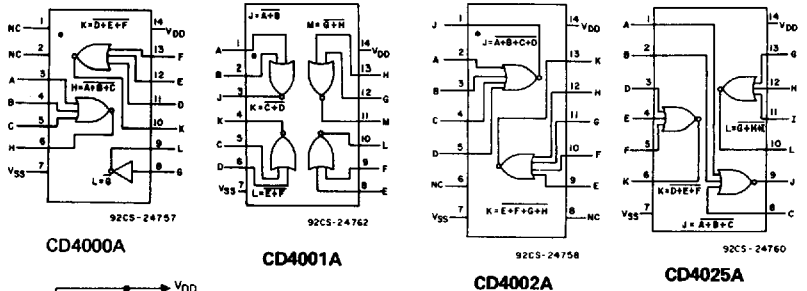
CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range (For $T_A$ = Full Package-Temperature Range)	3	12	V

### DYNAMIC ELECTRICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$ , $C_L = 15\text{ pF}$ , Input $t_r, t_f = 20\text{ ns}$

CHARACTERISTIC	TEST CONDITIONS	LIMITS				UNITS
		D, F, K, H PACKAGES		E PACKAGE		
		TYP.	MAX.	TYP.	MAX.	
Propagation Delay Time: High-to-Low Level, $t_{PHL}$	$V_{DD} = 5$	35/60	50/95	35/60	80/95	ns
	$V_{DD} = 10$	25/35	40/60	25/35	55/60	
Low-to-High Level, $t_{PLH}$	$V_{DD} = 5$	35/80	95/120	35/80	120/120	ns
	$V_{DD} = 10$	25/40	45/65	25/40	65/65	
Transition Time: High-to-Low Level, $t_{THL}$	$V_{DD} = 5$	65	125	65	200	ns
	$V_{DD} = 10$	35	70	35	115	
Low-to-High Level, $t_{TLH}$	$V_{DD} = 5$	65	175	65	300	ns
	$V_{DD} = 10$	35	75	35	125	
Input Capacitance, $C_i$	Any Input	5	—	5	—	pF

Note: Numbers to the right of slash mark are for CD4025A; numbers to the left of slash mark are for 4000A, 4001A, and 4002A.

### FUNCTIONAL DIAGRAMS



ALL INPUTS ARE PROTECTED BY COS/MOS PROTECTION NETWORK

### MAXIMUM RATINGS, Absolute-Maximum Values:

- STORAGE-TEMPERATURE RANGE ( $T_{stg}$ ) ..... -65 to +150 $^\circ\text{C}$
- OPERATING-TEMPERATURE RANGE ( $T_A$ ):
  - PACKAGE TYPES D, F, K, H ..... -55 to +125 $^\circ\text{C}$
  - PACKAGE TYPE E ..... -40 to +85 $^\circ\text{C}$
- DC SUPPLY-VOLTAGE RANGE, ( $V_{DD}$ ) (Voltages referenced to  $V_{SS}$  Terminal): ..... -0.5 to +15 V
- POWER DISSIPATION PER PACKAGE ( $P_D$ ):
  - FOR  $T_A = -40$  to +60 $^\circ\text{C}$  (PACKAGE TYPE E) ..... 500 mW
  - FOR  $T_A = +60$  to +85 $^\circ\text{C}$  (PACKAGE TYPE E) ..... Derate Linearly at 12 mW/ $^\circ\text{C}$  to 200 mW
  - FOR  $T_A = -55$  to +100 $^\circ\text{C}$  (PACKAGE TYPES D, F, K) ..... 500 mW
  - FOR  $T_A = +100$  to +125 $^\circ\text{C}$  (PACKAGE TYPES D, F, K) ..... Derate Linearly at 12 mW/ $^\circ\text{C}$  to 200 mW
- DEVICE DISSIPATION PER OUTPUT TRANSISTOR
  - FOR  $T_A =$  FULL PACKAGE-TEMPERATURE RANGE (ALL PACKAGE TYPES) ..... 100 mW
- INPUT VOLTAGE RANGE, ALL INPUTS ..... -0.5 to  $V_{DD} + 0.5$  V
- LEAD TEMPERATURE (DURING SOLDERING):
  - At distance 1/16  $\pm$  1/32 inch (1.59  $\pm$  0.79 mm) from case for 10 s max. .... +265 $^\circ\text{C}$

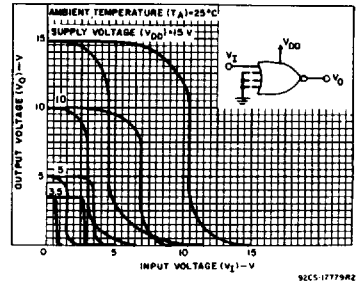


Fig. 1 — Minimum & maximum voltage transfer characteristics.

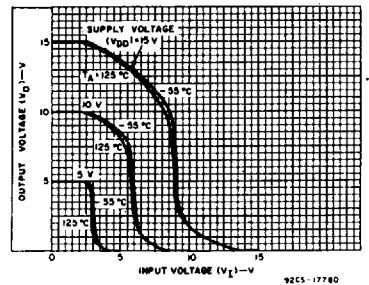


Fig. 2 — Typical voltage transfer characteristics as a function of temperature.

CD4000A, CD4001A, CD4002A, CD4025A Types

STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTICS	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)								UNITS
	V <sub>O</sub> (V)	V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	D, F, K, H PACKAGES				E PACKAGE				
				-55	+25		+125	-40	+25		+85	
				TYP.	LIMIT			TYP.	LIMIT			
Quiescent Device Current, I <sub>L</sub> Max.	-	-	5	0.05	0.001	0.05	3	0.5	0.005	0.5	15	μA
	-	-	10	0.1	0.001	0.1	6	5	0.005	5	30	
	-	-	15	0.02	2	40	50	0.5	50	500		
Output Voltage: Low Level, V <sub>OL</sub>	-	0, 5	5	0 Typ.; 0.05 Max								V
	-	0, 10	10	0 Typ.; 0.05 Max								
High Level V <sub>OH</sub>	-	0, 5	5	4.95 Min.; 5 Typ.								V
	-	0, 10	10	9.95 Min.; 10 Typ.								
Noise Immunity: Inputs Low, V <sub>NL</sub>	3.6	-	5	1.5 Min.; 2.25 Typ.								V
	7.2	-	10	3 Min.; 4.5 Typ.								
Inputs High V <sub>NH</sub>	1.4	-	5	1.5 Min.; 2.25 Typ.								V
	2.8	-	10	3 Min.; 4.5 Typ.								
Noise Margin: Inputs Low, V <sub>NML</sub>	4.5	-	5	1 Min.								V
	9	-	10	1 Min.								
Inputs High, V <sub>NMH</sub>	0.5	-	5	1 Min.								V
	1	-	10	1 Min.								
Output Drive Current: N-Channel (Sink), I <sub>D</sub> N Min.	0.4	-	5	0.5	1	0.4	0.28	0.35	1	0.3	0.24	mA
	0.5	-	10	1.1	2.5	0.9	0.65	0.72	2.5	0.6	0.48	
P-Channel (Source): I <sub>D</sub> P Min.	2.5	-	5	-0.62	-2	-0.5	-0.35	-0.35	-2	-0.3	-0.24	mA
	9.5	-	10	-0.62	-1	-0.5	-0.35	-0.3	-1	-0.25	-0.2	
Input Leakage Current, I <sub>IL</sub> , I <sub>IH</sub>	Any Input		15	±10 <sup>-5</sup> Typ., ±1 Max.								μA

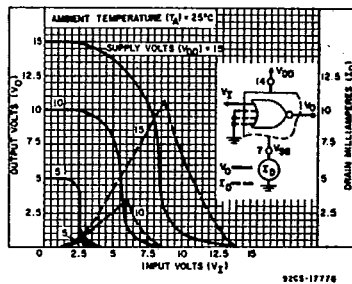


Fig. 3 - Typical current & voltage transfer characteristics.

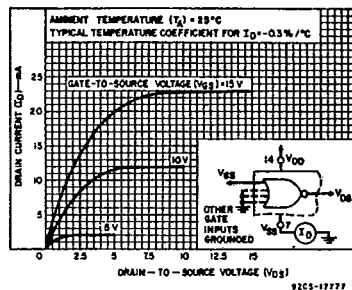


Fig. 4 - Typical n-channel drain characteristics.

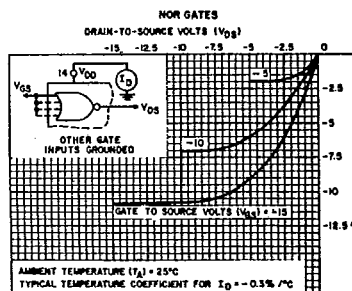


Fig. 5 - Typical p-channel drain characteristics.

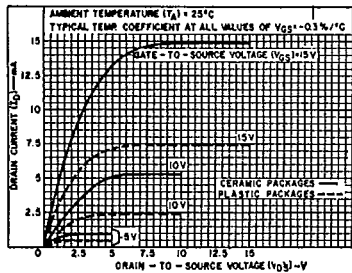


Fig. 6 - Minimum n-channel drain characteristics.

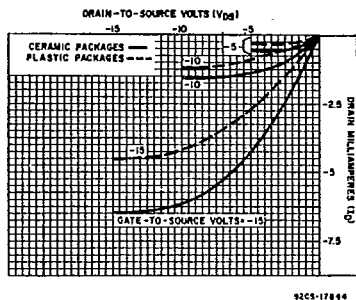


Fig. 7 - Minimum p-channel drain characteristics.

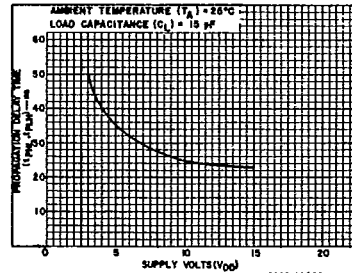


Fig. 8 - Typical propagation delay time vs. V<sub>DD</sub>.

CD4000A, CD4001A, CD4002A, CD4025A Types

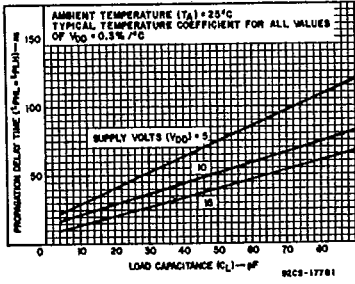


Fig. 9 - Typical propagation delay time vs. C<sub>L</sub>.

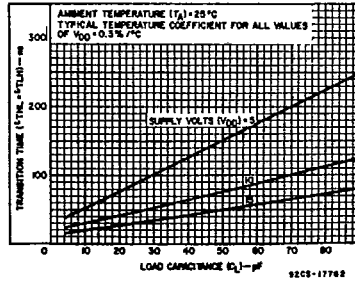


Fig. 10 - Typical transition time vs. C<sub>L</sub>.

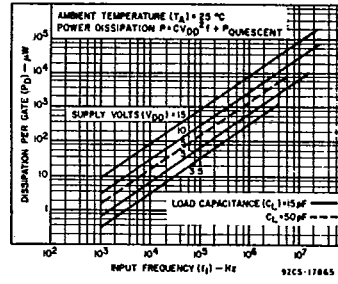


Fig. 11 - Typical dissipation characteristics.

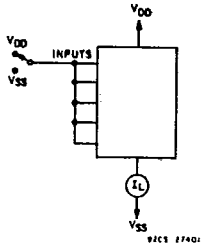


Fig. 12 - Quiescent device current test circuit.

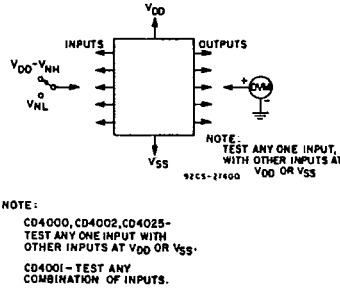


Fig. 13 - Noise immunity test circuit.

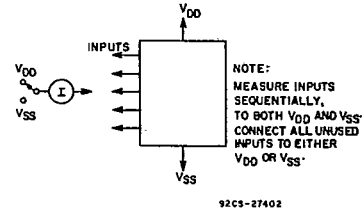
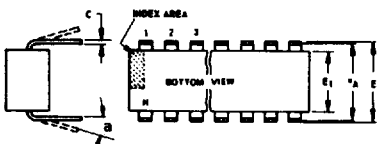
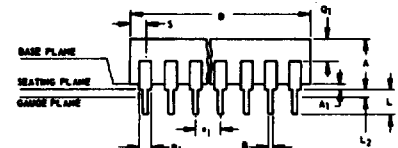


Fig. 14 - Input leakage current test circuit.

## Dimensional Outlines

### Dual-In-Line Welded-Seal Ceramic Packages



- NOTES:**  
Refer to Rules for Dimensioning (JEDEC Publication No. 95) for Axial Lead Product Outlines.
- When this device is supplied solder-dipped, the maximum lead thickness (narrow portion) will not exceed 0.013" (0.33 mm).
  - Leads within 0.005" (0.12 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.
  - e<sub>A</sub> applies in zone L<sub>2</sub> when unit installed.
  - a applies to spread leads prior to installation.
  - N is the maximum quantity of lead positions.
  - N<sub>1</sub> is the quantity of allowable missing leads.

(D) SUFFIX (JEDEC MO-001-AD)  
14-Lead Dual-In-Line Welded-Seal Ceramic Package

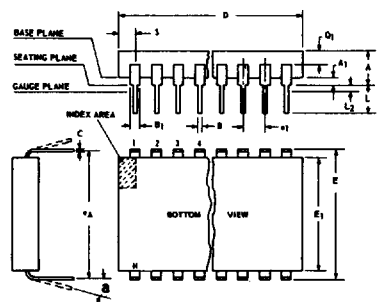
SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.120	0.160		3.05	4.06
A <sub>1</sub>	0.020	0.065		0.51	1.65
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.060	0.065		1.27	1.65
C	0.008	0.012	1	0.204	0.304
D	0.745	0.770		18.93	19.55
E	0.300	0.325		7.62	8.25
E <sub>1</sub>	0.240	0.260		6.10	6.60
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.300 TP		2, 3	7.62 TP	
L	0.125	0.150		3.18	3.81
L <sub>2</sub>	0.000	0.030		0.000	0.76
a	0°	15°	4	0°	15°
N	14		5	14	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.050	0.085		1.27	2.15
S	0.065	0.090		1.66	2.28

92SS-4411R2

(D) SUFFIX (JEDEC MO-001-AE)  
16-Lead Dual-In-Line Welded-Seal Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.120	0.160		3.05	4.06
A <sub>1</sub>	0.020	0.065		0.51	1.65
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.035	0.065		0.89	1.65
C	0.008	0.012	1	0.204	0.304
D	0.745	0.785		18.93	19.93
E	0.300	0.325		7.62	8.25
E <sub>1</sub>	0.240	0.260		6.10	6.60
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.300 TP		2, 3	7.62 TP	
L	0.125	0.150		3.18	3.81
L <sub>2</sub>	0.000	0.030		0.000	0.76
a	0°	15°	4	0°	15°
N	16		5	16	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.050	0.085		1.27	2.15
S	0.015	0.060		0.39	1.52

92SS-4266R5



- NOTES:**  
Refer to Rules for Dimensioning (JEDEC Publication No. 95) for Axial Lead Product Outlines.
- When this device is supplied solder-dipped, the maximum lead thickness (narrow portion) will not exceed 0.013" (0.33 mm).
  - Leads within 0.005" (0.12 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.
  - e<sub>A</sub> applies in zone L<sub>2</sub> when unit installed.
  - a applies to spread leads prior to installation.
  - N is the maximum quantity of lead positions.
  - N<sub>1</sub> is the quantity of allowable missing leads.

(D) SUFFIX (JEDEC MO-015-AG)  
24-Lead Dual-In-Line Welded-Seal Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.090	0.200		2.29	5.08
A <sub>1</sub>	0.020	0.070		0.51	1.78
B	0.015	0.020		0.381	0.508
B <sub>1</sub>	0.045	0.055		1.143	1.397
C	0.008	0.012	1	0.204	0.304
D	1.15	1.22		29.21	30.98
E	0.600	0.625		15.24	15.87
E <sub>1</sub>	0.480	0.520		12.20	13.20
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.600 TP		2, 3	15.24 TP	
L	0.100	0.180		2.54	4.57
L <sub>2</sub>	0.000	0.030		0.00	0.76
a	0°	15°	4	0°	15°
N	24		5	24	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.020	0.080		0.51	2.03
S	0.020	0.060		0.51	1.52

92CS-19948R4

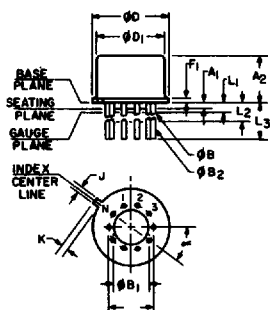
(D) SUFFIX (JEDEC MO-015-AH)  
28-Lead Dual-In-Line Welded-Seal Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.090	0.200		2.29	5
A <sub>1</sub>	0	0.070	2	0	1.77
B	0.015	0.020		0.381	0.508
B <sub>1</sub>	0.015	0.065		0.39	1.39
C	0.008	0.012	1	0.204	0.304
D	1.380	1.420		35.06	36.06
E	0.600	0.625		15.24	15.87
E <sub>1</sub>	0.485	0.515		12.32	13.08
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.600 TP		2, 3	15.24 TP	
L	0.100	0.200		2.6	5
L <sub>2</sub>	0	0.030		0	0.76
a	0°	15°	4	0°	15°
N	28		5	28	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.020	0.070		0.51	1.77
S	0.040	0.070		1.02	1.77

92CM-20250R2

### TO-5 Style Package

(T) SUFFIX (JEDEC MO-006-AG)  
12-Lead Metal Package



92CS-19774

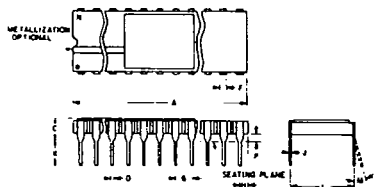
SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
a	0.230		2	5.84 TP	
A <sub>1</sub>	0	0		0	0
A <sub>2</sub>	0.165	0.185		4.19	4.70
φB	0.016	0.019	3	0.407	0.482
φB <sub>1</sub>	0	0		0	0
φB <sub>2</sub>	0.016	0.021	3	0.407	0.533
φD	0.335	0.370		8.51	9.39
φD <sub>1</sub>	0.305	0.335		7.75	8.50
F <sub>1</sub>	0.020	0.040		0.51	1.01
j	0.028	0.034		0.712	0.863
k	0.029	0.045	4	0.74	1.14
L <sub>1</sub>	0.000	0.050	3	0.00	1.27
L <sub>2</sub>	0.250	0.500	3	6.4	12.7
L <sub>3</sub>	0.500	0.562	3	12.7	14.27
a	30° TP			30° TP	
N	12		6	12	
N <sub>1</sub>	1		5	1	

**NOTES:**

- Refer to Rules for Dimensioning Axial Lead Product Outlines.
- Leads at gauge plane within 0.007" (0.178 mm) radius of True Position (TP) at maximum material condition.
- φB applies between L<sub>1</sub> and L<sub>2</sub>. φB<sub>2</sub> applies between L<sub>2</sub> and 0.500" (12.70 mm) from seating plane. Diameter is uncontrolled in L<sub>1</sub> and beyond 0.500" (12.70 mm).
- Measure from Max. φD.
- N<sub>1</sub> is the quantity of allowable missing leads.
- N is the maximum quantity of lead positions.

Dimensional Outlines (Cont'd)

DUAL-IN-LINE SIDE-BRAZED CERAMIC PACKAGES



(D) SUFFIX  
18-Lead Dual-In-Line  
Side-Brazed Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.890	0.915		22.606	23.241
C	—	0.200		—	5.080
D	0.015	0.021		0.381	0.533
F	0.054	REF.	1	1.371	REF.
G	0.100	BSC	1	2.54	BSC
H	0.035	0.065		0.889	1.651
J	0.008	0.012	3	0.203	0.304
K	0.125	0.150		3.175	3.810
L	0.290	0.310	2	7.366	7.874
M	0°	15°		0°	15°
P	0.025	0.045		0.635	1.143
N	18			18	

92CS-27231R1

(D) SUFFIX  
22-Lead Dual-In-Line  
Side-Brazed Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	1.065	1.100		27.05	27.94
C	0.085	0.145		2.16	3.68
D	0.017	0.023		0.43	0.58
F	0.040	REF.	1	1.02	REF.
G	0.100	BSC	1	2.54	BSC
H	0.030	0.070		0.76	1.78
J	0.008	0.012	3	0.20	0.30
K	0.125	0.175		3.18	4.45
L	0.380	0.420	2	9.65	10.67
M	—	7°		—	7°
P	0.025	0.050		0.64	1.27
N	22			22	

92CS-25186R2

NOTES:

- Leads within 0.005" (0.13 mm)-radius of True Position at maximum material condition.
- Dimension "L" to center of leads when formed parallel.
- When this device is supplied solder-dipped, the maximum lead thickness (narrow portion) will not exceed 0.013" (0.33 mm).

(D) SUFFIX  
24-Lead Dual-In-Line  
Side-Brazed Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	1.180	1.220		29.98	30.98
C	0.085	0.145		2.16	3.68
D	0.015	0.023		0.39	0.58
F	0.040	REF.		1.02	REF.
G	0.100	BSC	1	2.54	BSC
H	0.030	0.070		0.77	1.77
J	0.008	0.012	3	0.21	0.30
K	0.125	0.175		3.18	4.44
L	0.580	0.620	2	14.74	15.74
M	—	7°		—	7°
P	0.025	0.050		0.64	1.27
N	24			24	

92CS-30968R1

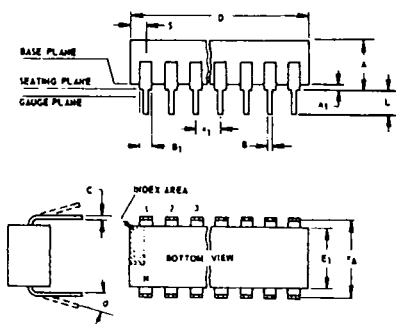
(D) SUFFIX  
40-Lead Dual-In-Line  
Side-Brazed Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	1.980	2.020		50.30	51.30
C	0.095	0.155		2.43	3.93
D	0.017	0.023		0.43	0.58
F	0.050	REF.		1.27	REF.
G	0.100	BSC	1	2.54	BSC
H	0.030	0.070		0.76	1.78
J	0.008	0.012	3	0.20	0.30
K	0.125	0.175		3.18	4.45
L	0.580	0.620	2	14.74	15.74
M	—	7°		—	7°
P	0.025	0.050		0.64	1.27
N	40			40	

92CM-27029R2

Dual-In-Line Plastic and Frit-Seal Ceramic Packages

(E) SUFFIX (JEDEC MO-001-AN)  
8-Lead Dual-In-Line Plastic  
(Mini-DIP) Package



SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub>	0.020	0.050		0.508	1.27
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.035	0.065		0.889	1.65
C	0.008	0.012	1	0.203	0.304
D	0.370	0.400		9.40	10.16
E	0.300	0.325		7.62	8.25
E <sub>1</sub>	0.240	0.260		6.10	6.60
e <sub>1</sub>	0.100	TP	2	2.54	TP
e <sub>A</sub>	0.300	TP	2, 3	7.62	TP
L	0.125	0.150		3.18	3.81
L <sub>2</sub>	0.000	0.030		0.000	0.762
a	0	15	4	0	15
N	8		5	8	
N <sub>1</sub>	0		6	0	
O <sub>1</sub>	0.040	0.075		1.02	1.90
S	0.015	0.060		0.381	1.52

92CS-24026 R1

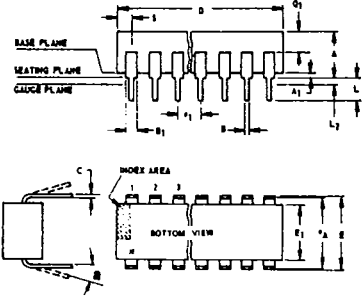
NOTES:

Refer to Rules for Dimensioning (JEDEC Publication No. 95) for Axial Lead Product Outlines.

- When this device is supplied solder-dipped, the maximum lead thickness (narrow portion) will not exceed 0.013".
- Leads within 0.005" (0.12 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.
- e<sub>A</sub> applies in zone L<sub>2</sub> when unit installed.
- a applies to spread leads prior to installation.
- N is the maximum quantity of lead positions.
- N<sub>1</sub> is the quantity of allowable missing leads.

Dimensional Outlines (Cont'd)

Dual-In-Line Plastic and Frit-Seal Ceramic Packages (Cont'd)



NOTES:  
Refer to Rules for Dimensioning (JEDEC Publication No. 95) for Axial Lead Product Outlines.  
1. When this device is supplied solder dipped, the maximum lead thickness (narrow portion) will not exceed 0.013" (0.33 mm).  
2. Leads within 0.005" (0.12 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.  
3. eA applies in zone L2 when unit installed.  
4. a applies to spread leads prior to installation.  
5. N is the maximum quantity of lead positions.  
6. N1 is the quantity of allowable missing leads.

(E) and (F) SUFFIXES (JEDEC MO-001-AB)  
14-Lead Dual-In-Line Plastic or Frit-Seal Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub>	0.020	0.050		0.51	1.27
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.050	0.065		1.27	1.65
C	0.008	0.012	1	0.204	0.304
D	0.745	0.770		18.93	19.55
E	0.300	0.325		7.62	8.25
E <sub>1</sub>	0.240	0.260		6.10	6.60
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.300 TP		2, 3	7.62 TP	
L	0.125	0.150		3.18	3.81
L <sub>2</sub>	0.000	0.030		0.000	0.76
a	0°	15°	4	0°	15°
N	14		5	14	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.040	0.075		1.02	1.90
S	0.065	0.090		1.66	2.28

92SS-4296R3

(E) and (F) SUFFIXES (JEDEC MO-001-AC)  
16-Lead Dual-In-Line Plastic or Frit-Seal Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub>	0.020	0.050		0.51	1.27
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.035	0.065		0.89	1.65
C	0.008	0.012	1	0.204	0.304
D	0.745	0.785		18.93	19.93
E	0.300	0.325		7.62	8.25
E <sub>1</sub>	0.240	0.260		6.10	6.60
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.300 TP		2, 3	7.62 TP	
L	0.125	0.150		3.18	3.81
L <sub>2</sub>	0.000	0.030		0.000	0.76
a	0°	15°	4	0°	15°
N	16		5	16	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.040	0.075		1.02	1.90
S	0.015	0.060		0.39	1.52

92CM-15967R4

(E) SUFFIX  
18-Lead Dual-In-Line Plastic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub>	0.020	0.050		0.508	1.27
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.035	0.065		0.89	1.65
C	0.008	0.012	1	0.204	0.304
D	0.845	0.885		21.47	22.47
E <sub>1</sub>	0.240	0.260		6.10	6.60
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.300 TP		2, 3	7.62 TP	
L	0.125	0.150		3.18	3.81
a	0°	15°	4	0°	15°
N	18		5	18	
N <sub>1</sub>	0		6	0	
S	0.015	0.060		0.39	1.52

92CS-30630

(E) SUFFIX  
22-Lead Dual-In-Line Plastic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub>	0.020	0.050		0.508	1.27
B	0.015	0.020		0.381	0.508
B <sub>1</sub>	0.035	0.065		0.89	1.65
C	0.008	0.012	1	0.204	0.304
D		1.120			28.44
E	0.390	0.420		9.91	10.66
E <sub>1</sub>	0.345	0.355		8.77	9.01
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.400 TP		2, 3	10.16 TP	
L	0.125	0.150		3.18	3.81
L <sub>2</sub>	0	0.030		0	0.762
a	2°	15°	4	2°	15°
N	22		5	22	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.055	0.085		1.40	2.15
S	0.015	0.060		0.381	1.27

92CS-30830

(F) SUFFIX (JEDEC MO-001-AG)  
16-Lead Dual-In-Line Frit-Seal Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.165	0.210		4.20	5.33
A <sub>1</sub>	0.015	0.045		0.381	1.14
B	0.015	0.020		0.381	0.508
B <sub>1</sub>	0.045	0.070		1.15	1.77
C	0.009	0.011	1	0.229	0.279
D	0.750	0.795		19.05	20.19
E	0.295	0.325		7.50	8.25
E <sub>1</sub>	0.245	0.300		6.23	7.62
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.300 TP		2, 3	7.62 TP	
L	0.120	0.160		3.05	4.06
L <sub>2</sub>	0.000	0.030		0.000	0.76
a	2°	15°	4	2°	15°
N	16		5	16	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.050	0.080		1.27	2.03
S	0.010	0.060		0.254	1.52

92CM-22284R1

(E) and (F) SUFFIXES (JEDEC MO-015-AA)  
24-Lead Dual-In-Line Plastic or Frit-Seal Ceramic Package

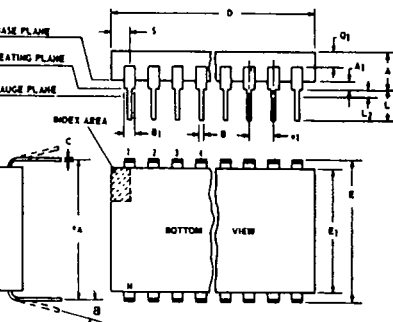
SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.120	0.250		3.10	6.30
A <sub>1</sub>	0.020	0.070		0.51	1.77
B	0.016	0.020		0.407	0.508
B <sub>1</sub>	0.028	0.070		0.72	1.77
C	0.008	0.012	1	0.204	0.304
D	1.20	1.29		30.48	32.76
E	0.600	0.625		15.24	15.87
E <sub>1</sub>	0.515	0.580		13.09	14.73
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.600 TP		2, 3	15.24 TP	
L	0.100	0.200		2.54	5.00
L <sub>2</sub>	0.000	0.030		0.00	0.76
a	0°	15°	4	0°	15°
N	24		5	24	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.040	0.075		1.02	1.90
S	0.040	0.100		1.02	2.54

92CS26938R2

(E) SUFFIX  
40-Lead Dual-In-Line Plastic Package

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.120	0.250		3.10	6.30
A <sub>1</sub>	0.020	0.070		0.51	1.77
B	0.016	0.020		0.407	0.508
B <sub>1</sub>	0.028	0.070		0.72	1.77
C	0.008	0.012	1	0.204	0.304
D	2.000	2.090		50.80	53.09
E <sub>1</sub>	0.515	0.580		13.09	14.73
e <sub>1</sub>	0.100 TP		2	2.54 TP	
e <sub>A</sub>	0.600 TP		2, 3	15.24 TP	
L	0.100	0.200		2.54	5.00
L <sub>2</sub>	0.000	0.030		0.00	0.76
a	0°	15°	4	0°	15°
N	40		5	40	
N <sub>1</sub>	0		6	0	
Q <sub>1</sub>	0.065	0.095		1.66	2.41
S	0.040	0.100		1.02	2.54

92CS-30959



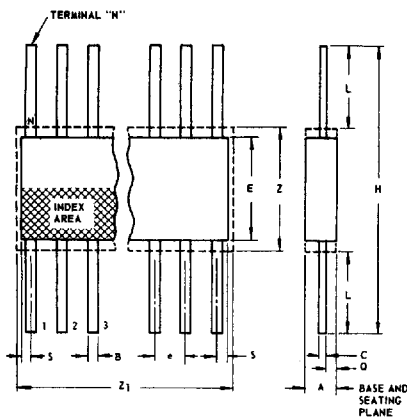
NOTES:  
Refer to Rules for Dimensioning (JEDEC Publication No. 95) for Axial Lead Product Outlines.  
1. When this device is supplied solder dipped, the maximum lead thickness (narrow portion) will not exceed 0.013".  
2. Leads within 0.005" (0.12 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.  
3. eA applies in zone L2 when unit installed.  
4. a applies to spread leads prior to installation.  
5. N is the maximum quantity of lead positions.  
6. N1 is the quantity of allowable missing leads.

T-90-20

Dimensional Outlines (Cont'd)

Ceramic Flat Packs

(K) SUFFIX (JEDEC MO-004-AF)  
14-Lead



SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.008	0.100		0.21	2.54
B	0.015	0.019	1	0.381	0.482
C	0.003	0.006	1	0.077	0.152
e	0.050 TP		2	1.27 TP	
E	0.200	0.300		5.1	7.6
H	0.600	1.000		15.3	25.4
L	0.150	0.350		3.9	8.8
N	14		3	14	
Q	0.005	0.050		0.13	1.27
S	0.000	0.050		0.00	1.27
Z	0.300		4	7.62	
Z <sub>1</sub>	0.400		4	10.16	

92SS-4300R3

NOTES:

1. Refer to JEDEC Publication No. 95 for Rules for Dimensioning Peripheral Lead Outlines.
2. Leads within 0.005" (0.12 mm) radius of True Position (TP) at maximum material condition.
3. N is the maximum quantity of lead positions.
4. Z and Z<sub>1</sub> determine a zone within which all body and lead irregularities lie.

(K) SUFFIX (JEDEC MO-004-AG)  
16-Lead

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.008	0.100		0.21	2.54
B	0.015	0.019	1	0.381	0.482
C	0.003	0.006	1	0.077	0.152
e	0.050 TP		2	1.27 TP	
E	0.200	0.300		5.1	7.6
H	0.600	1.000		15.3	25.4
L	0.150	0.350		3.9	8.8
N	16		3	16	
Q	0.005	0.050		0.13	1.27
S	0.000	0.025		0.00	0.63
Z	0.300		4	7.62	
Z <sub>1</sub>	0.400		4	10.16	

92CS-17271R3

(K) SUFFIX  
24-Lead

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.075	0.120		1.91	3.04
B	0.018	0.022	1	0.458	0.558
C	0.004	0.007	1	0.102	0.177
e	0.050 TP		2	1.27 TP	
E	0.600	0.700		15.24	17.78
H	1.150	1.350		29.21	34.29
L	0.225	0.325		5.72	8.25
N	24		3	24	
Q	0.035	0.070		0.89	1.77
S	0.060	0.110	1	1.53	2.79
Z	0.700		4	17.78	
Z <sub>1</sub>	0.750		4	19.05	

92CS-19949R2

(K) SUFFIX  
28-Lead

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.075	0.120		1.91	3.04
B	0.018	0.022	1	0.458	0.558
C	0.004	0.007	1	0.102	0.177
e	0.050 TP		2	1.27 TP	
E	0.600	0.700		15.24	17.78
H	1.150	1.350		29.21	34.29
L	0.225	0.325		5.72	8.25
N	28		3	28	
Q	0.035	0.070		0.89	1.77
S	0	0.060	1	0	1.53
Z	0.700		4	17.78	
Z <sub>1</sub>	0.750		4	19.05	

92CS-20972