

T-45-23-21  
CD4018A Types

### CMOS Presettable Divide-By-'N' Counter

The RCA-CD4018A types consist of 5 Johnson-Counter stages, buffered  $\bar{Q}$  outputs from each stage, and counter preset control gating. CLOCK, RESET, DATA, PRESET ENABLE, and 5 individual JAM inputs are provided. Divide by 10, 8, 6, 4, or 2 counter configurations can be implemented by the use of a CD4011A gate package to properly gate the feedback connection to the DATA input. Divide-by-9, 7, 5, or 3 counter configurations can be implemented by the use of a CD4011A gate package to properly gate the feedback connection to the DATA input. Divide-by functions greater than 10 can be achieved by use of multiple CD4018A

units. The counter is advanced one count at the positive clock-signal transition. A high RESET signal clears the counter to an all-zero condition. A high PRESET-ENABLE signal allows information on the JAM inputs to preset the counter. Anti-lock gating is provided to assure the proper counting sequence.

These types are supplied in 16-lead hermetic dual-in-line ceramic packages (D and F suffixes), 16-lead dual-in-line plastic package (E suffix), 16-lead ceramic flat package (K suffix), and in chip form (H suffix).

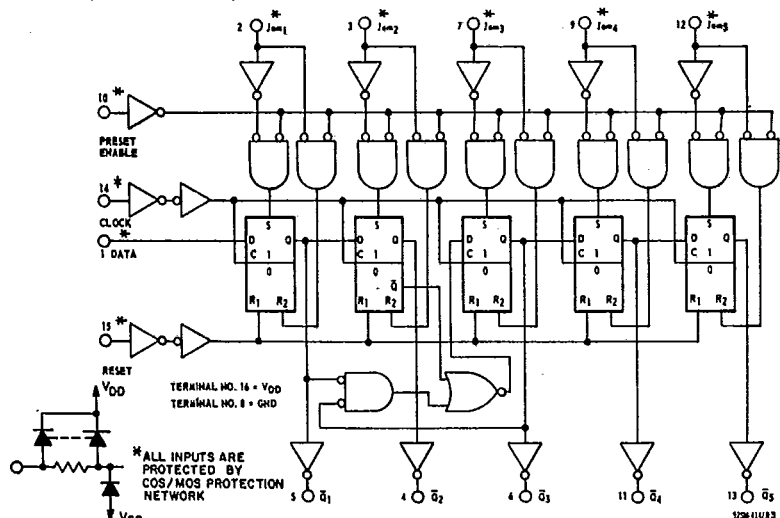
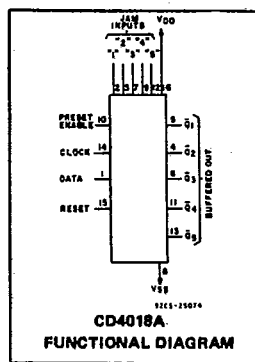


Fig. 1 - Logic diagram.

**Features:**

- Medium speed operation . . . . 5 MHz (typ.) at  $V_{DD} - V_{SS} = 10\text{ V}$
- Fully static operation
- Quiescent current specified to 15  $\mu\text{A}$
- Maximum input leakage current of 1  $\mu\text{A}$  at 15 V (full package-temperature range)
- 1-V noise margin (full package-temperature range)

**Applications:**

- Fixed and programmable divide-by-10, 9, 8, 7, 6, 5, 4, 3, 2 counters
- Fixed and programmable counters greater than 10
- Programmable decade counters
- Divide-by-'N' counters/frequency synthesizers
- Frequency division
- Counter control/timers

("DATA" INPUT TIED TO  $\bar{Q}_5$  FOR DECADE COUNTER CONFIGURATION)

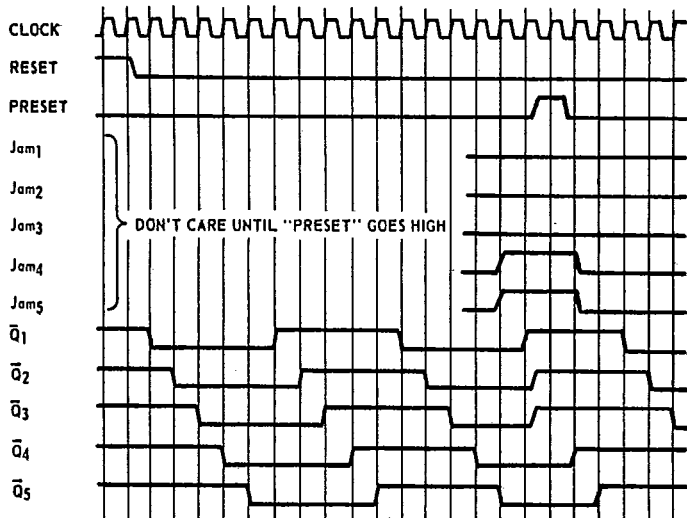


Fig. 2 - Timing diagram.

92SS-4148R2

EXTERNAL CONNECTIONS FOR DIVIDE BY 10, 9, 8, 7, 6, 5, 4, 3 OPERATION

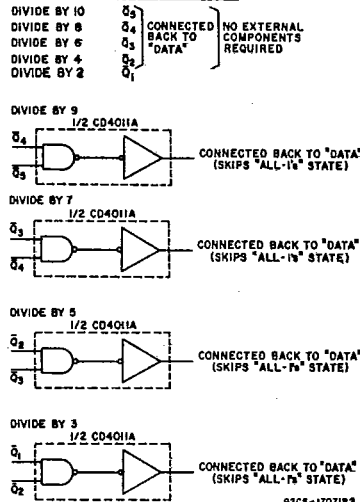


Fig. 3 - External connections for divide by 10, 9, 8, 7, 6, 5, 4, 3, 2 operation.

# CD4018A Types

## MAXIMUM RATINGS, Absolute-Maximum Values:

STORAGE-TEMPERATURE RANGE ( $T_{STG}$ )	-65 to +150°C
OPERATING-TEMPERATURE RANGE ( $T_A$ ):	
PACKAGE TYPES D, F, K, H	-55 to +125°C
PACKAGE TYPE E	-40 to +85°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°C (PACKAGE TYPE E)	500 mW
FOR $T_A = +60$ to +85°C (PACKAGE TYPE E)	Derate Linearly at 12 mW/°C to 200 mW
FOR $T_A = -55$ to +100°C (PACKAGE TYPES D, F, K)	500 mW
FOR $T_A = +100$ to +125°C (PACKAGE TYPES D, F, K)	Derate Linearly at 12 mW/°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 ± 1/32 Inch (1.59 ± 0.79 mm) from case for 10 s max.	+265°C

DYNAMIC ELECTRICAL CHARACTERISTICS at  $T_A = 25^\circ\text{C}$ , Input  $t_r, t_f = 20$  ns,  
 $C_L = 15$  pF,  $R_L = 200$  k $\Omega$

CHARACTERISTIC	TEST CONDITIONS	LIMITS						UNITS	
		$V_{DD}$ (V)	D, F, K, H Packages			E Package			
			Min.	Typ.	Max.	Min.	Typ.		Max.
<b>CLOCKED OPERATION</b>									
Propagation Delay Time; $t_{PLH}, t_{PHL}$ To $\bar{Q}_5$ Output	5	-	350	1000	-	350	1300	ns	
		10	-	125	250	-	125		300
To Other Outputs	5	-	500	1200	-	500	1600	ns	
	10	-	200	400	-	200	500		
Transition Time; $t_{THL}, t_{TLH}$ To $\bar{Q}_5$ Output	5	-	100	300	-	100	350	ns	
	10	-	60	150	-	60	200		
To Other Outputs	5	-	300	900	-	300	1200	ns	
	10	-	125	350	-	125	450		
Maximum Clock Input Frequency, $f_{CL}$	5	1	2.5	-	0.6	2.5	-	MHz	
	10	3	5	-	2	5	-		
Min. Clock Pulse Width, $t_W$	5	-	200	500	-	200	830	ns	
	10	-	100	170	-	100	250		
Clock Rise & Fall Time; $t_r, t_f$	5	-	-	15	-	-	15	$\mu\text{s}$	
	10	-	-	15	-	-	15		
Min. Data Input Set-Up Time, $t_S$	5	-	175	500	-	175	700	ns	
	10	-	75	200	-	75	300		
Average Input Capacitance, $C_i$	Any Input	-	5	-	-	5	-	pF	
<b>PRESET* OR RESET OPERATION</b>									
Propagation Delay Time; $t_{PLH}, t_{PHL}$ To $\bar{Q}_5$ Output	5	-	350	1000	-	350	1300	ns	
		10	-	125	250	-	125		300
To Other Outputs	5	-	500	1200	-	500	1600	ns	
	10	-	200	400	-	200	500		
Min. Preset or Reset Pulse Width $t_W$	5	-	200	500	-	200	830	ns	
	10	-	100	185	-	100	250		
Min. Preset or Reset Removal Time	5	-	300	750	-	300	1000	ns	
	10	-	100	225	-	100	275		

\* At PRESET ENABLE OR JAM Inputs.

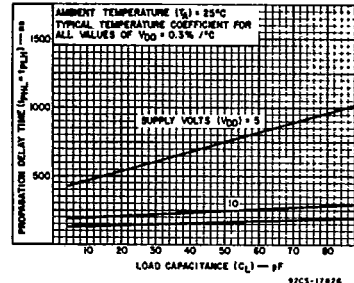


Fig. 4 - Typical propagation delay time vs. load capacitance for decoded outputs.

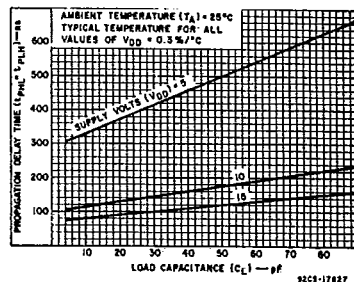


Fig. 5 - Typical propagation delay time vs. load capacitance for  $\bar{Q}_5$  output.

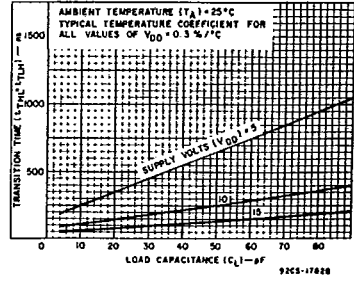


Fig. 6 - Typical transition time vs. load capacitance for decoded outputs.

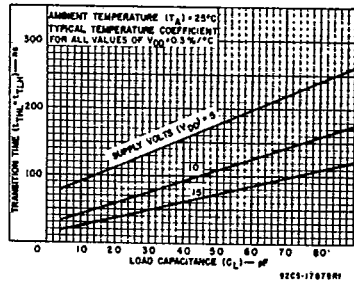


Fig. 7 - Typical transition time vs. load capacitance for  $\bar{Q}_5$  output.

### CD4018A Types

RECOMMENDED OPERATING CONDITIONS at  $T_A = 25^\circ\text{C}$ , Except as Noted.  
For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	VDD (V)	LIMITS				UNITS
		D, F, K, H Packages		E Package		
		Min.	Max.	Min.	Max.	
Supply-Voltage Range (For $T_A =$ Full Package-Temperature Range)		3	12	3	12	V
Data Setup Time, $t_s$	5 10	500 200	—	700 300	—	ns
Clock Pulse Width, $t_{pw}$	5 10	500 170	—	830 250	—	ns
Clock Input Frequency, $f_{CL}$	5 10	dc	1 3	dc	0.6 2	MHz
Clock Rise and Fall Time, $t_{r,CL}$ , $t_{f,CL}$	5 10	—	15 15	—	15 15	$\mu\text{s}$
Preset or Reset Pulse Width, $t_{pw}$	5 10	500 165	—	830 250	—	ns
Preset or Reset Removal Time	5 10	750 225	—	1000 275	—	ns

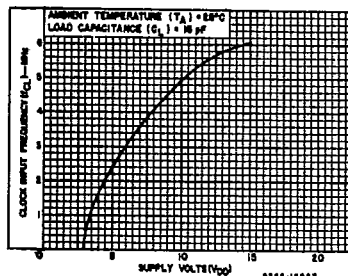


Fig. 8 - Typical maximum input clock frequency vs. supply voltage.

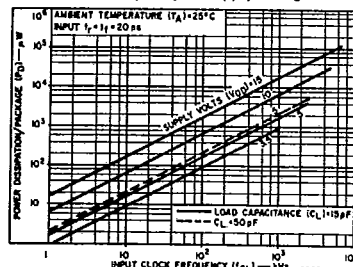


Fig. 9 - Typical dissipation characteristics

### STATIC ELECTRICAL CHARACTERISTICS

Characteristic	Conditions			Limits at Indicated Temperatures ( $^\circ\text{C}$ )								Units		
				D, F, K, H Packages				E Package						
	V <sub>O</sub> (V)	V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	-55	+25	+125	-40	+25	+85	Typ.	Limit		Typ.	Limit
Quiescent Device Current $I_Q$ Max.	—	—	5	5	0.3	5	300	50	0.5	50	700			
	—	—	10	10	0.5	10	600	100	1	100	1400			
	—	—	15	50	1	60	2000	500	5	500	6000			
Output Voltage: Low Level, $V_{OL}$	—	5	5	0 Typ.; 0.05 Max.										V
	—	10	10	0 Typ.; 0.05 Max.										
High Level, $V_{OH}$	—	0	5	4.95 Min.; 5 Typ.										V
	—	0	10	9.95 Min.; 10 Typ.										
Noise Immunity: Inputs Low, $V_{NL}$	4.2	—	5	1.5 Min.; 2.25 Typ.										V
	9	—	10	3 Min.; 4.5 Typ.										
Inputs High, $V_{NH}$	0.8	—	5	1.5 Min.; 2.25 Typ.										V
	1	—	10	3 Min.; 4.5 Typ.										
Noise Margin: Inputs Low, $V_{NML}$	4.5	—	5	1 Min.										V
	9	—	10	1 Min.										
Inputs High, $V_{NMH}$	0.5	—	5	1 Min.										V
	1	—	10	1 Min.										
Output Drive Current: n-Channel (Sink) $I_{DN}$ Min.	$\bar{O}_5$	0.5	—	5	0.18	0.4	0.15	0.105	0.095	0.4	0.08	0.065	mA	
		0.5	—	10	0.45	1	0.35	0.25	0.3	1	0.25	0.2		
	$O_1, O_2$ $O_3, O_4$	0.5	—	5	0.06	0.1	0.05	0.035	0.03	0.1	0.025	0.02		
p-Channel (Source) $I_{DP}$ Min.	$\bar{O}_6$	4.5	—	5	-0.185	-0.4	-0.15	-0.105	-0.095	-0.4	-0.08	-0.065	mA	
		9.5	—	10	-0.45	-1	-0.35	-0.25	-0.3	-1	-0.25	-0.2		
	$O_1, O_2$ $O_3, O_4$	4.5	—	5	-0.075	-0.15	-0.06	-0.04	-0.035	-0.15	-0.03	-0.024		
Input Leakage Current, $I_{IL}$ , $I_{IH}$ Max.	Any Input		—	—	15	$\pm 10^{-5}$ Typ., $\pm 1$ Max.								$\mu\text{A}$

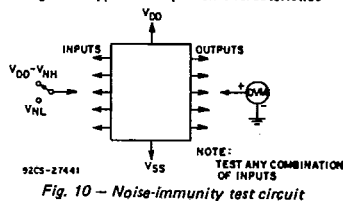


Fig. 10 - Noise-immunity test circuit

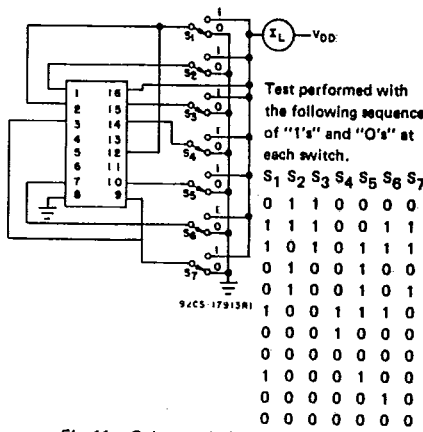


Fig. 11 - Quiescent-device-current test circuit.

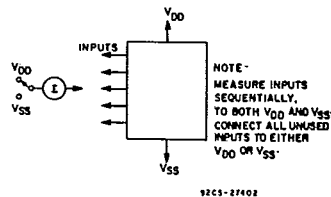
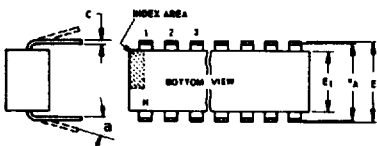
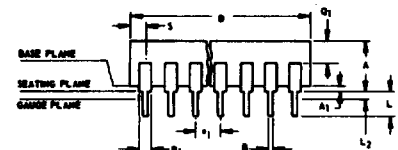


Fig. 12 - Input-leakage-current test circuit.

## 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

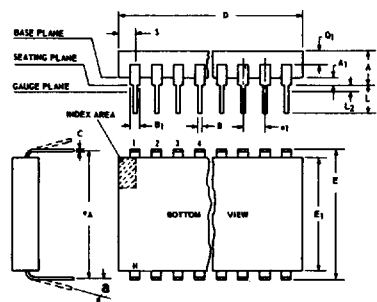
SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.120	0.160		3.05	4.06
A <sub>1</sub>	0.020	0.065		0.51	1.65
B	0.014	0.020		0.356	0.508
B <sub>1</sub>	0.060	0.065		1.27	1.65
C	0.008	0.012	1	0.204	0.304
D	0.745	0.770		18.93	19.55
E	0.300	0.325		7.62	8.25
E <sub>1</sub>	0.240	0.260		6.10	6.60
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

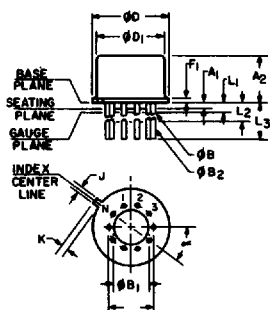
(D) SUFFIX (JEDEC MO-015-AH)  
28-Lead Dual-In-Line Welded-Seal  
Ceramic Package

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

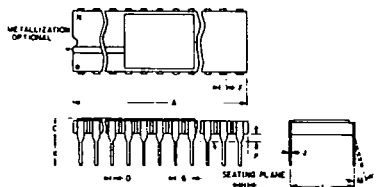
SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
a	0.230		2	5.84 TP	
A <sub>1</sub>	0	0		0	0
A <sub>2</sub>	0.165	0.185		4.19	4.70
φB	0.016	0.019	3	0.407	0.482
φB <sub>1</sub>	0	0		0	0
φB <sub>2</sub>	0.016	0.021	3	0.407	0.533
φD	0.335	0.370		8.51	9.39
φD <sub>1</sub>	0.305	0.335		7.75	8.50
F <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

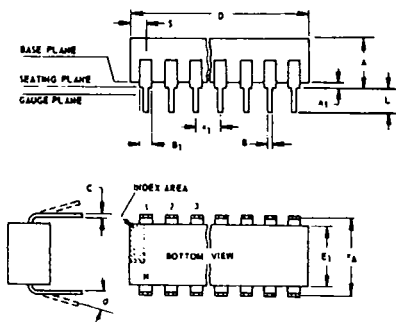
(D) SUFFIX  
40-Lead Dual-In-Line  
Side-Brazed Ceramic Package

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

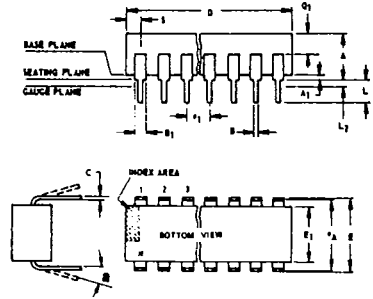
92CS-24026 R1

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

Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E, E1, e1, eA, L, L2, a, N, N1, Q1, S.

92SS-4296R3

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

Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E, E1, e1, eA, L, L2, a, N, N1, Q1, S.

92CM-15967R4

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

Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E1, e1, eA, L, L2, a, N, N1, S.

92CS-30630

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

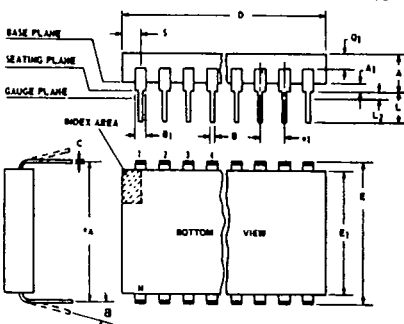
Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E, E1, e1, eA, L, L2, a, N, N1, Q1, S.

92CS-30830

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

Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E, E1, e1, eA, L, L2, a, N, N1, Q1, S.

92CM-22284R1



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.

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

Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E, E1, e1, eA, L, L2, a, N, N1, Q1, S.

92CS26938R2

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

Table with columns: SYMBOL, INCHES (MIN, MAX), NOTE, MILLIMETERS (MIN, MAX). Rows include A, A1, B, B1, C, D, E1, e1, eA, L, L2, a, N, N1, Q1, S.

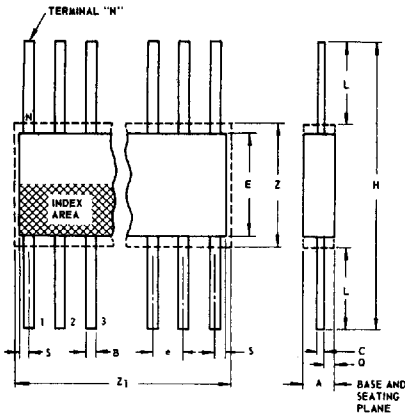
92CS-30959

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