01E 13571

T-46-09-05

# CD4021A Types

### **CMOS 8-Stage Static Shift Register**

Asynchronous Parallel Input/Serial Output, Synchronous Serial Input/Serial Output

The RCA-CD4021A types are 8-stage parallel or serial-input/serial-output shift registers having common CLOCK and PARALLEL/SERIAL CONTROL inputs, a single SERIAL DATA input, and individual parallel Jam inputs to each register stage, Each register stage is a D-type, master-slave flip-flop. Q outputs are available from the sixth, seventh, and eighth stages.

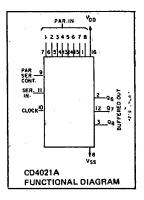
When the PARALLEL/SERIAL CONTROL input is low, data are serially shifted into the 8-stage register synchronously with the positive-going transition of the CLOCK pulse.

#### Features:

- Asynchronous parallel or synchronous serial operation under control of parallel/serial control-input
- Individual JAM inputs to each register stage
- Master-slave flip-flop register stages
- Fully static operation..... DC to 5 MHz
- Quiescent current specified to 15 V
- Maximum input leakage current of 1 μA at 15 V (full package-temperature range)
- 1-V noise margin (full package-temperature range)

When the PARALLEL/SERIAL CONTROL input is high, data are jammed into the 8-stage register via the parallel input lines asynchronously with the clock line.

Register expansion is possible using addi-



#### tional CD4021A packages.

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).

#### STATIC ELECTRICAL CHARACTERISTICS

1	١			L	LIMITS AT INDICATED TEMPERATURES (°C)							
	CON	DITIO	DN2	D, F	, K, H F	ACKA	GES	E	PA	CKAGE		UNITS
CHARACTERISTICS	v <sub>o</sub>	VIN	VDD		+2	25			+2	25	+85	UNIIS
., <u></u>	(V)	(V)	(V)	-55	TYP.	LIMIT	+125	-40	TYP.	LIMIT	+85	
	1	-	5	5	0.5	5	300	50	0.6	50	700	
Quiescent Device Current I <sub>1</sub> Max.	-	_	10	10	. 1	10	600	100	1	100	1400	μА
	<u>  -</u>		15	50	1_	50_	2000	500	5	500	5000	
Output Voltage; Low-Level.	_	5	5			0 Typ.;	0.05 M	ax.				
VOL.	-	10	10			0 Тур.;	0.05 M	ax.				v
High Level	-	0	5			4.95 M	n.; 5 ty	p.				•
v <sub>он</sub>	-	٥	10			9.95 M	n.; 10 T	ſγp.				
Noise Immunity; Inputs Low,	4.2	-	5			1.5 Min	.; 2.25	Тур.				
V <sub>NL</sub>	9	-	10			3 Min.;	4.5 Typ	э.	·			v
Inputs High	0.8	-	5			1.5 Min	.; 2.25	Тур.				•
v <sub>NH</sub>	1	-	10			3 Min.;	4.5 Typ	p.				
Noise Margin:	4.5	-	5			1 1	Min.					
Inputs Low, V <sub>NML</sub>	9	-	10			1 (	Min.					v
Inputs High,	0.5	-	5			1 1	Vin.					•
V <sub>NМН</sub>	1	_	10			1 1	Min.					
Output Drive Current : N-Channel												
(Sink),	0.5	_	5	0.15	0.3	0.12	0.085	0.072	0.3	0.06	0.05	
I <sub>D</sub> N Miń.	0.5	-	10	0.31	0.5	0.25	0.175	0.12	0.5	0,1	80.0	mA
P-Channel	Ī											
(Source)	4.5	ļ <u>-</u>	5	-0,1		-0.08			-0.16		-0.04	
I <sub>D</sub> P Min.	9.5	_	10	-0.25	-0.44	-0.20	-0.14	-0.12	-0.44	-0.1	-0.08	
Input Leakage Current,	Ar	y Inp	ut									
III. III	<u> </u>		15			±10 <sup>-1</sup>	туρ.,	± 1 Max				

#### Applications:

- Parallel to serial data conversion
- Asynchronous parallel input/serial output.
   data queueing
- General purpose register

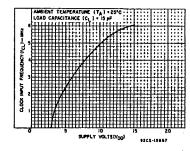


Fig. 1 — Typical clock input frequency vs. supply voltage.

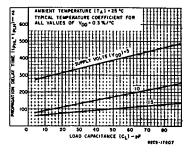


Fig. 2 — Typical propagation delay time vs. load capacitance.

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### CD4021A Types

MAXIMUM RATINGS, Absolute-Maximum Values:
STORAGE-TEMPERATURE RANGE (Tstg)
OPERATING-TEMPERATURE RANGE (TA)
PACKAGE TYPES D, F, K, H55 to +126°C
PACKAGE TYPE E , ,
DC SUPPLY-VOLTAGE RANGE, (VDD)
(Voltages referenced to VSS Terminal)
POWER DISSIPATION PER PACKAGE (PD)
FOR TA = -40 to +60°C (PACKAGE TYPE E)
FOR TA = +60 to +85°C (PACKAGE TYPE E) Derate Linearly at 12 mW/°C to 200 mW
FOR TA = -55 to +100°C (PACKAGE TYPES D, F, K)
FOR TA = +100 to +125°C (PACKAGE TYPES D, F, K) Derate Linearly at 12 mW/°C to 200 mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR
FOR TA = FULL PACKAGE-TEMPERATURE RANGE (ALL PACKAGE TYPES) 100 mW
INPUT VOLTAGE RANGE, ALL INPUTS
LEAD TEMPERATURE (DURING SOLDERING):
At distance 1/16 ± 1/32 inch (1.59 ± 0.79 mm) from case for 10 s max +265°C

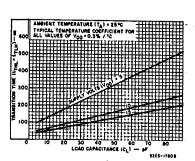
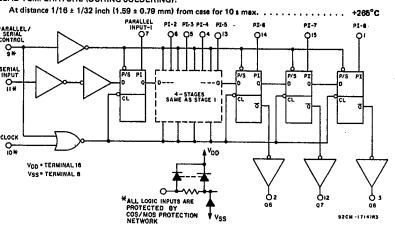


Fig. 3 — Typical transition time vs. load capacitance.



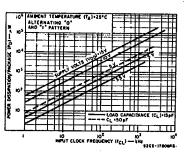


Fig. 4 — Typical dissipation characteristics.

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LIMITS

Fig. 5 - Logic diagram.

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

#### TRUTH TABLE

NO CHANGE

CL▲	Serial Input	Parallel/ Serial Control	PI-1	Pl∙n	Q <sub>1</sub> (Internal)	Qn				
Х	Х	1	0	0	0	0				
Х	Х	1	0	1	0	1				
Х	Х	1	1	0	1	0				
Х	х	1	1	1	1	1				
	0	0	х	х	0	Q <sub>n</sub> -1				
$\Box$	1	0	×	×	1	O <sub>n-1</sub>				
7	Х	0	Х	х	Q <sub>1</sub>	Qn				
A = L(	VEL CH	IANGÉ	X = DO							

Fig. 6 - Truth table.

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		1			
V <sub>DD</sub> (V)			E PACKAGE		UNITS
	MIN.	MAX.	MIN.	MAX.	
	3	12	3	12	v
5 10	350 80		500 100	-	ns
5 10	500 175	-	830 200	_	nş
5 10	dc dc	1 3	dc dc	0.6 2.5	MHz
	5 10 5 10	(V) PACH MIN.  3  5 350 80  10 500 175  5 dc	(V) PACKAGES  MIN. MAX.  3 12  5 350 10 80 10 175 5 dc 1	(V) PACKAGES PACK MIN. MAX. MIN.  3 12 3  5 350 500 10 80 100  5 500 830 10 175 200  5 dc 1 dc	(V) PACKAGES PACKAGE  MIN. MAX. MIN. MAX.  3 12 3 12  5 350 - 500 - 100

<sup>•</sup>If more than one unit is cascaded trCL should be made less than or equal to the sum of the transition time and the fixed propagation delay of the output of the driving stage for the estimated capacitive load.

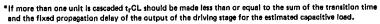
Clock Rise and Fall Time,  $t_rCL$ ,  $t_fCL$ 

### CD4021A Types

#### DYNAMIC ELECTRICAL CHARACTERISTICS

at  $T_A$  = 25°C, Input  $t_r$ ,  $t_f$  = 20 ns,  $C_L$  = 15 pF,  $R_L$  = 200  $k\Omega$ 

CHARACTERISTIC	CONDITIONS		D, F, K, H			E PACKAGE			UNITS
		V <sub>DD</sub>	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Propagation Delay		5	_	300	750	_	300	1000	
Time,** tPLH, tPHL		10	-	100	225	-	300	300	ns.
Transition Time;		5	_	150	300	-	150	400	ns
tTHL, tTLH		10	-	75	125	<u> </u>	75	150	113
Maximum Clock Input		5	1	2.5		0.6	2.5	-	MHz
Frequency, fCL		10	3	5	-	2.5	5	-	WITTE
Minimum Clock Pulse		5	-	200	500	-	200	830	ns
Width, tw		10		100	175		100	200	113
Clock Rise & Fall		5	_	-	15	-	-	15	μs
Time; trCL & tfCL*		10	_	_	5	-		5	
Minimum Data Set		5	_	100	350	-	100	500	ns
Up Time, to		10	-	50	80	-	50	100	113
Minimum High-Level Parallel/Serial		5		200	500		200	830	ns
Control Pulse Width tw		10	-	100	175	-	100	300	""
Input Capacitance C <sub>1</sub>	Any	Input	-	5	T -	<b>-</b>	5	-	рF



\*\*From Clock or Parallel/Serial Control Input

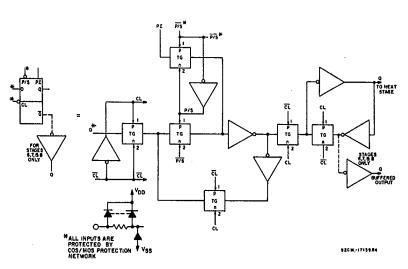


Fig. 10 - One typical stage and its equivalent detailed circuit.

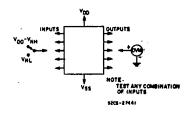


Fig. 7 - Noise-immunity test circuit.

Test performed with the following sequence of "One's" and "Zero's",

S1 S2 S3 S4 S5 0 0 1 0 0 1 0 1 1 1 1 0 1 0 1 0 1 1 1 1 0 1 0 0 0

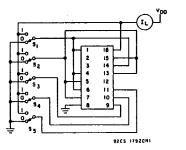


Fig. 8 - Quiescent device current test circuit.

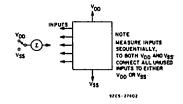
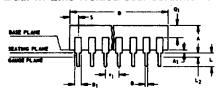


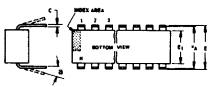
Fig. 9 - Input-leakage-current test circuit.

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### **Dimensional Outlines**

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





NOTES:

Refer to Rules for Dimensioning (JEDEC Publication No. 96) for Axial Lead Product Outlines.

- 1. When this device is supplied solder-dipped, the ma
- 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.  $e_A$  applies in zone  $L_2$  when unit installed.
- 4. a applies to spread leads prior to installation.
- 5. N is the maximum quantity of lead positions.
- 6. N<sub>2</sub> is the quantity of allowable missing leads.

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

SYMBOL	IN	CHES	NOTE	MILLI	METERS
SIMBUL	MIN.	MAX.	NOTE	MIN.	MAX.
Α	0.120	0.160		3.05	4.06
A <sub>1</sub>	0.020	0.065		0.51	1.65
В	0.014	0.020		0.356	0.508
B1	0.060	0.066		1.27	1.65
С	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
E1	0.240	0.260		6.10	6.60
61	0.10	00 TP	2	2.5	4 TP
8A	0.30	00 TP	2, 3	7.6	2 TP
L	0.125	0.150		3.18	3.81
L2	0.000	0.030		0.000	0.76
а	00	150	4	00	150
N	1	4	5	14	
N <sub>1</sub>		0	6	0	
Q1	0.050	0.085		1.27	2.15
S	0.065	0.090		1.66	2.28

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

SYMBOL	INC	HES	NOTE	MILLIN	METERS
SAMBOL	MIN.	MAX.	NOIE	MIN.	MAX.
Α	0.120	0.160		3.05	4.06
Α1	0.020	0.065		0.51	1.65
8	0.014	0.020		0.356	0.508
В <sub>1</sub>	0.035	0.065		0.89	1.65
С	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
еı	0.1	00 TP	2	2.54 TP	
e <sub>A</sub>	0.3	00 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	00	15 <sup>0</sup>	4	00	15 <sup>0</sup>
N	1	6	5	1	6
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

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

SYMBOL	INC	CHES	NOTE	MILLIN	METERS
STIMBUL	MIN.	MAX.	NOTE	MIN.	MAX.
Α	0.090	0.200		2.29	5.08
A1	0.020	0.070		0.51	1.78
В	0.015	0.020	i'' '	0.381	0.508
81	0.045	0.055		1.143	1.397
С	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
E1	0.480	0.520		12.20	13.20
81	0.10	XO TP	2	2.54 TP	
eд	0.60	00 TP	2,3	15.24	TP
L	0.100	0.180		2.54	4.57
L2	0.000	0.030		0.00	0.76
а	00	150	4	00	15°
N	24		5	2	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

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

SYMBOL	INC	HES	NOTE	MILLIMETERS		
STMBUL	MIN.	MAX.	NOIE	MIN.	MAX.	
Α	0.090	0.200		2.29	5	
_ A <sub>1</sub>	0	0.070	2	0	1.77	
В	0.015	0.020		0.381	0.508	
B <sub>1</sub>	0.015	0.055		0.39	1.39	
C	0.008	0.012	1	0.204	0.304	
D	1.380	1.420		35.06	36.06	
E		0.625		15.24	15.87	
Εį	0.485	0.515		12.32	13.08	
91	0.10	O TP	2	2.54 TP		
eΔ	0.60	O TP	2,3	15.2	4 TP	
L	0.100			2.6	5	
L <sub>2</sub>	0	0.030		0	0.76	
а	0	150	4	00	150	
N	28		5	28		
N <sub>1</sub>	0		6	(	)	
Q <sub>1</sub>	0.020	0.070		0.51	1.77	
S	0.040	0.070		1.02	1.77	

92CM-20250R2

BASE PLANE   Part 5	
SEATING PLANE	Ţ
SWEETINE CONTRACTOR OF THE STATE OF THE STAT	+
MODEX AMEA UT U U U U U U U U U U U U U U U U U U	i.
*A SOTTOM ( VIEW   E1	
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#### NOTES:

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

- 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.
- and unit installed.

  a epaleies to spread leads prior to installed.

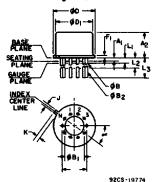
  b a applies to spread leads prior to installation.

  N is the maximum quantity of lead positions.

  N<sub>1</sub> is the quantity of allowable missing leads.

### TO-5 Style Package

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



SYMBOL	INC	HES	NOTE	MILLIM	ETERS	
STMBUL	MIN.	MAX.	HOIE	MIN.	MAX.	
a	0.2	230	2	5.84	I 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	
φB1	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	
φDη	0.305	0.335		7.75	8.50	
Fı	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	
L2	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:

- 1. Refer to Rules for Dimensioning Axial Lead Product Out-
- 2. Leads at gauge plane within 0.007" (0.178 mm) radius of True Position (TP) at maximum material condition.
- 3.  $\phi$ B applies between L<sub>1</sub> and L<sub>2</sub>.  $\phi$ B<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).
- 4. Measure from Max. φD.
- 5. N<sub>1</sub> is the quantity of allowable missing leads.
- 6. N is the maximum quantity of lead positions.

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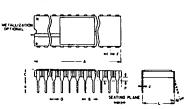
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### **Dimensional Outlines (Cont'd)**

#### **DUAL-IN-LINE SIDE-BRAZED CERAMIC PACKAGES**



- NOTES:

  1. Leads within 0.005" (0.13 mm)-radius of True Position at maximum material condition.

  2. Dimension "L" to center of leads when formed parallel.

  3. When this device is supplied solder-dipped, the maximum lead thickness (narrow portion) will not exceed 0.013" (0.33 mm).

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

SYMBOL	INC	HES	NOTE	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
А	0.890	0.915		22.606	23,241
С	1	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	
Н	0.035	0.065		0.889	1.651
J	0.008	0.012	3	0.203	0.304
К	0.125	0.150		3.175	3.810
L	0.290	0.310	2	7.366	7.874
M	00	15°		00	150
Р	0.025	0.045		0.635	1,143
N		18			18

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

SYMBOL	INCI	IES	NOTE	MILLIMETERS	
STIMBUL	MIN.	MAX.	INOIE	MIN.	MAX.
_ A	1.065	1.100		27.05	27.94
С	0.085	0.145		2.16	3.68
D	0.017	0.023		0.43	0.56
ш	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
К	0.125	0.175		3.18	4.45
L	0.380	0.420	2	9.65	10.67
M		70		_	70
P	0.025	0.050		0.64	1.27
N	22				22

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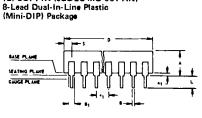
#### (D) SUFFIX 24-Lead Dual-In-Line Side-Brazed Ceramic Package

INC	HES	NOTE	MILLIN	AETERS
MIN.	MAX.	INOTE	MIN.	MAX.
1.180	1.220		29.98	30.98
0.085	0.145		2.16	3.68
0.015	0.023		0.39	0.58
0.044	REF.		1.02	REF.
0.100 BSC		1	2.54 BSC	
0.030	0.070		0.77	1.77
0.008	0.012	3	0.21	0.30
0.125	0.175		3.18	4.44
0.580	0.620	2	14.74	15.74
_	7°			7°
0.025	0.050		0.64	1.27
- 7	4		1 2	4
	MIN. 1.180 0.085 0.015 0.044 0.100 0.030 0.008 0.125 0.580 -	1.180 1.220 0.085 0.145 0.015 0.023 0.040 REF. 0.100 BSC 0.030 0.070 0.008 0.012 0.125 0.175 0.580 0.620 - 7°	MIN. MAX.  1.180 1.220 0.085 0.145 0.015 0.023 0.040 REF. 0.100 BSC 1 0.030 0.070 0.008 0.012 3 0.125 0.175 0.580 0.620 2 - 7° 0.025 0.050	MIN. MAX. 1.180 1.220 29.98 0.085 0.145 2.16 0.015 0.023 0.39 0.040 REF. 1.02 0.100 BSC 1 2.54 0.030 0.070 0.77 0.008 0.012 3 0.21 0.125 0.175 3.18 0.580 0.620 2 14.78 0.025 0.050 0.684

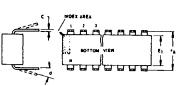
(D) SUFFIX 40-Lead Dual-In-Line Side-Brazed Ceramic Package

SYMBOL	INCHES		NOTE	MILLIMETERS		
_	MIN.	MAX.		MIN.	MAX.	
Α	1.980	2.020		50,30	51.30	
С	0.095	0.155		2.43	3.93	
D	0.017	0.023		0.43	0.56	
F	0.050	REF.		1,27	REF.	
G	0.100 BSC		1	2.54 BSC		
н	0.030	0.070		0.76	1.78	
J	0.008	0.012	3	0.20	0.30	
К	0.125	0.175	† <del></del>	3.18	4,45	
Ĺ	0.580	0.620	2	14.74	15.74	
М	_	70		l	70	
Р	0.025	0.050		0.64	1.27	
N		10	1	40		

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



(E) SUFFIX (JEDEC MO-001-AN)



SYMBOL	INC	1ES	NOTE	MILLIA	TETERS
STMBUL	MIN.	MAX.	NOTE	MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub>	0.020	0.050		0.508	1.27
В	0.014	0.020		0.356	0.508
81	0.035	0.065		0.889	1.65
С	0.008	0.012	1	0.203	0.304
D	0.370	0.400	1	9.40	10.16
E	0.300	0.325		7.62	8.25
E1	0.240	0.260		6.10	6.60
81	0.100 TP		2	2.54 TP	
8A	0.	300 TP	2, 3	7.62 TP	
Ļ	0.125	0.150	1	3.18	3.81
L <sub>2</sub>	0.000	0.030	1	0.000	0.762
a	0	15	4	0	15
N		8	5		8
N1	,	0	6		0
<u>a</u> 1	0.040	0.075		1.02	1.90
s	0.015	0.060		0.381	1.52

92CS-24026 RI

#### 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 guage plane with maximum material condition and unit installed.
- 3.  $e_A$  applies in zone  $L_2$  when unit installed.
- 4. a applies to spread leads prior to installation.
- 5. N is the maximum quantity of lead positions.
- 6. N<sub>1</sub> is the quantity of allowable missing leads.

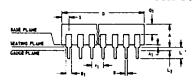
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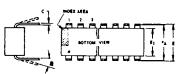
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### Dimensional Outlines (Cont'd)

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### Duai-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.

- 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.
- 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.

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

Plastic Package

8. N<sub>1</sub> 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	INC	HES	NOTE	MILLIA	METERS
STMBOL	MIN.	MAX.	MOIE	MIN.	MAX.
A	0.155	0.200		3.94	5.08
A <sub>1</sub> .	0.020	0.060		0.51	1.27
8	0.014	0.020		0.356	0.508
81	0.060	0.065		1.27	1.65
С	0.008	0.012	1	0.204	0.304
0	0.745	0.770		18.93	19.55
E	0.300	0.325		7.62	8.25
Εţ	0.240	0.260		6.10	6.60
41	0.10	00 TP	2	2.54 TP	
•A	0.30	00 TP	2, 3	7.62 TP	
L	0.125	0.150		3.18	3.81
L2	0.000	0.030		0.000	0.76
8	00	150	4	00	150
N	14		5	14	
N <sub>1</sub>	0		6		0
Q1	0.040	0.075		1.02	1.90
S	0.065	0.090		1.66	2.28

92SS-4296R3

(E) SUFFIX

Plastic Package

22-Lead Dual-In-Line

SYMBOL	INC	INCHES		MILLIA	METERS
	MIN.	MAX.	<u></u> .	MIN.	MAX.
A.	0.155	0.200		3.94	5.08
Α1	0.020	0.050		0.508	1.27
8	0.014	0.020		0.356	0.508
81	0.035	0.065		0.89	1.65
Ç	0.008	0.012	1	0.204	0.304
D	0.845	0.886	l	21.47	22.47
Εį	0.240	0.260		6.10	6.60
<b>0</b> 1	0	100 TP	2	2.54 TP	
. •A	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	18		18	
N <sub>1</sub>	0	0		(	)
s	0.015	0.060		0.39	1.52

SYMBOL	INC	HES	NOTE	MILLIA	IETERS
	MIN.	MAX.		MIN.	MAX.
Α.	0.155	0.200		3.94	5.08
Α1	0.020	0.050		0.508	1.27
8	0.014	0.020		0.356	0.508
81	0.035	0.065	l	0.89	1.65
Ç	0.008	0.012	1	0.204	0.304
D	0.845	0.886	1	21.47	22.47
Εį	0.240	0.260		6.10	6.60
61	0	100 TP	2	2.5	4 TP
•A	0	300 TP	2,3	7.6	2 TP
L	0.125	0.150		3.18	3.81
a	0°	15°	4	0°	15°
N	18	18		18	
Nı	0		6	0	)
S	0.015	0.060		0.39	1.52

SYMBOL	INC	HES	NOTE	MILLIA	METERS
STMBOL	MIN.	MAX.	NOTE	MIN.	MAX.
Α	0.155	0.200		3.94	5.08
A1	0.020	0.050		0.508	1.27
₿	0.015	0.020		0.381	0.508
B <sub>1</sub>	0.035	0.065		0.89	1.65
С	0.008	0.012	1	0.204	0.304
D		1.120	<u>.</u>		28.44
E	0.390	0.420		9.91	10.66
E <sub>1</sub>	0.345	0.355	1	8.77	9.01
81	0.10	O TP	2	2.54 TP	
θΑ	0.40	O TP	2, 3	10.16 TP	
	0.125	0.150		3.18	3.81
L <sub>2</sub>	0	0.030	ł	1 0	0.762
a	20	15°	4	20	150
N	2	2	5	1	22
N <sub>1</sub>	0		6	ĺ	0
01	0.055	0.085		1.40	2.15
S	0.015	0.060	Į	0.381	1.27

92CS-30830

SEATING PLANE

92CS-30630

- NOTES.
  Rafer to Rules for Dimensioning (JEDEC Publication No. 95) for Assal Lead Product Outlines.

  1. When this device is supplied solder-dipped, the maximum lead thickness instroin portional will not exceed 0.013".

  2. Leads within 0.005" (0.12 mm) radius of True Position (TP) at upon plane with maximum material condition and unit installed.

  3. supplies in price at leads price to initialization.

  4. supplies to greate leads price to initialization.

  5. Mis the maximum quantity of lead positions.

  6. My 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

SYMBOL	INCHES		NOTE	MILLIN	METERS
STAIBUL	MIN.	MAX.	NOTE	MIN.	MAX.
Α	0.120	0.250		3,10	6.30
A1	0.020	0.070		0.51	1.77
В	0.016	0.020		0.407	0.508
81	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		0.625		15.24	15.87
Εţ	0.515	0.580	<u>L</u> .	13.09	14.73
81	0.10	O TP	2	2.54 TP	
ВД	0.60	0 TP	2,3	15.24 TP	
L		0.200		2.54	5.00
L2	0.000	0.030	1	0.00	0.76
8	00	150	4	00	150
N	24		5	2	4
N <sub>1</sub>	0		6	0	)
01		0.075		1.02	1.90
S	0.040	0.100	1	1.02	2.54

92CS26938R2

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

SYMBOL	INC	IES	11075	MILLIN	AETERS
SYMBUL	MIN.	MAX.	NOTE	MIN.	MAX.
Α	0.155	0.200		3.94	5.08
Αį	0.020	0.050		0.51	1.27
В	0.014	0.020		0.356	0.508
81	0.035	0.065	l .	0.89	1.65
С	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
Εş	0.240	0.260	1	6.10	6.60
ėı	0.1	00 TP	2	2.54 TP	
®A	0.3	00 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
а	00	15 <sup>0</sup>	4	00	15 <sup>0</sup>
N	16		5	1	6
N <sub>1</sub>	0		6	<u> </u>	0
Q <sub>1</sub>	0.040	0.075		1.02	1.90
s	0.015	0.060		0,39	1.52

92CM-15967R4

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

SYMBOL	IL_INCHES NOTE		NOTE	MILLIMETERS		
a i iii boʻl	MIN.	MAX.	NOTE	MIN.	MAX.	
Α	0.165	0.210		4.20	5.33	
A <sub>1</sub>	0.015	0.045		0.381	1.14	
В	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	
Εį	0.245	0.300		6.23	7.62	
e1	0.1	00 TP	2	2.54 TP		
ΘA	0.3	00 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	20	150	4	20	150	
N	16		5	16		
N <sub>1</sub>	0.		6	(	).	
Q <sub>1</sub>	0.050	0.080		1.27	2.03	
S	0.010	0.060		0.254	1.52	

92CM-22284R1

#### (E) SUFFIX 40-Lead Dual-In-Line Piastic Package

INC	HES	MOTE	MILLIMETERS	
MIN.	MAX.	NOTE	MIN.	MAX.
0.120	0.250		3.10	6.30
0.020	0.070	[ <u>.</u>	0.51	1.77
0.016	0.020	l	0.407	0.508
0.028	0.070		0.72	1.77
0.008	0.012	1	0.204	0.304
2.000	2.090	L	50.80	53.09
			13.09	14.73
0.10	O TP	2	2.54 TP	
	Ю ТР	2,3	15.24 TP	
			2.54	5,00
				0.76
- 00	15°	4	CO	150
40		5	4	0.
0		6		)
	0.095		1.66	2.41
0.040	0.100	ł	1.02	2.54
	0.120 0.020 0.018 0.028 0.008 2.000 0.515 0.10 0.000 0.000	0.120 0.250 0.020 0.070 0.016 0.020 0.028 0.070 0.028 0.070 0.008 0.012 0.000 0.090 0.100 TP 0.100 0.000 0.000 0.030 00 150 0.000 0.030 0 0.000 0.030 0 0.000 0.030	MIN.   MAX.   0.120   0.250   0.020   0.070   0.016   0.020   0.070   0.088   0.070   0.088   0.070   0.088   0.012   1   0.000   0.516   0.580   0.100   TP   2,3   0.100   0.000   0.030   0.000   0.030   0.000   0.030   0   5   4   40   6   6   0.066   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.095   0.000   0.095   0.095   0.095   0.095   0.000   0.095   0.095   0.095   0.000   0.095   0.095   0.000   0.095   0.000   0.095   0.005   0.095   0.005   0.095   0.005	MIN. MAX. MIN. 0.120 0.250 0.070 0.51 0.016 0.020 0.070 0.72 0.028 0.070 0.72 0.008 0.012 1 0.204 2.000 2.090 13.09 0.515 0.580 13.09 0.100 TP 2,3 15.24 0.600 TP 2,3 15.24 0.100 0.200 2.54 0.000 0.030 0.00 0 150 4 00 0 6 6 0

92CS-30959

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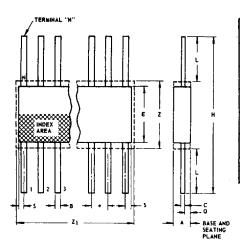
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T-90-20

# **Dimensional Outlines (Cont'd)**

#### **Ceramic Flat Packs**

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



SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.	NOIE	MIN.	MAX.
Α	0.008	0.100		0.21	2.54
В	0.015	0.019	1	0.381	0.482
С	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
н	0.600	1.000		15.3	25.4
L	0.150	0.350		3.9	8.8
N	14		3	14	
a	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	

#### 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 Z1 determine a zone within which all body and lead irregularities lie.

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

SYMBOL	INCHES			MILLIMETERS	
	MIN.	MAX.	NOTE	MIN.	MAX
Α	0.008	0.100		0.21	2.54
В	0.015	0.019	1	0.381	0.482
С	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
н	0.600	1.000		15.3	25.4
L	0.150	0.350		3.9	8.8
N	16		3	16	
Ω	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>	9.400		4	10.16	

92CS-1727IR3

#### (K) SUFFIX 24-Lead

SYMBOL	INCHES		NOTE	MILLIMETERS	
	MIN.	MAX.	IAOLE	MIN.	MAX.
Α	0.075	0.120		1.91	3.04
В	0.018	0.022	1	0.458	0.558
С	0.004	0.007	1	0.102	0.177
е	0.050 TP		2	1.27 TP	
E	0.600	0.700		15.24	17.78
Н	1.150	1.350		29.21	34.29
L	0.225	0.325		5.72	8.25
N	24		3	24	
a	0.035	0.070		0.89	1.77
S	0.060	0.110	1	1.53	2.79
Z	0.700		4	17.78	
Z1_	0.750		4	19.05	

92CS-19949R2

#### (K) SUFFIX 28-Lead

SYMBOL	INCHES			MILLIMETERS	
	MIN.	MAX.	NOTE	MIN.	MAX.
Α	0.075	0.120		1.91	3.04
В	0.018	0.022	1	0.458	0.558
С	0.004	0.007	1	0.102	0.177
6	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	
a	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	

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