CYPRESS

PRELIMINARY

CY7C271A

32K x 8 Power Switched and Reprogrammable PROM

Features

- **CMOS for optimum speed/power**
- **Windowed for reprogrammability**
- **High speed**
  - **— 25 ns (commercial)**
  - **— 35 ns (military)**
- **Low power**
  - **— 275 mW (commercial)**
  - **— 330 mW (military)**
- **Super low standby power**
  - **— Less than 85 mW when deselected**
- **EPROM technology 100%programmable**
- **Slim 300-mil package**
- **Direct replacement for bipolar PROMs**
- **Capable of withstanding >4001V static discharge**

Functional Description
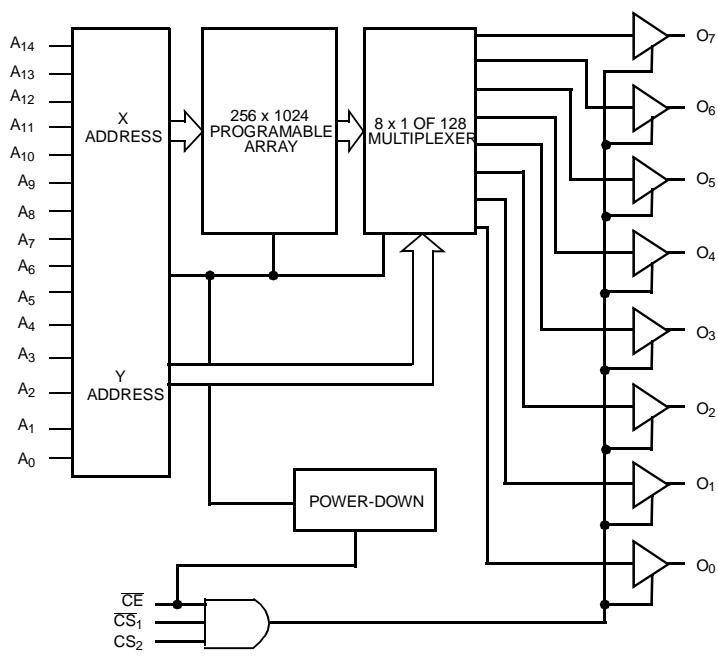
The CY7C271A is a high-performance 32,768-word by 8-bit CMOS PROM. When disabled ($\overline{CE}$ HIGH), the 7C271A auto- matically powers down into a low-power stand-by mode. The CY7C271A is packaged in the 300-mil slim package and is available in a cerDIP package equipped with an erasure win- dow to provide for reprogrammability. When exposed to UV light, the PROM is erased and can be reprogrammed. The memory cells utilize proven EPROM floating gate technology and byte-wide intelligent programming algorithms.
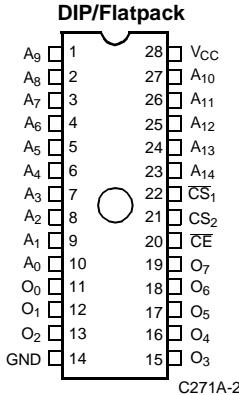
The CY7C271A offers the advantages of lower power, superior performance, and programming yield. The EPROM cell re- quires only 12.5V for the super voltage, and low current re- quirements allow for gang programming. The EPROM cells allow each memory location to be tested 100% because each location is written into, erased, and repeatedly exercised prior to encapsulation. Each PROM is also tested for AC perfor- mance to guarantee that after customer programming, the product will meet DC and AC specification limits.

Reading the 7C271A is accomplished by placing active LOW signals on $\overline{CS}_1$ and $\overline{CE}$, and an active HIGH on CS_2. The contents of the memory location addressed by the address lines (A_0 - A_{14}) will become available on the output lines (O_0 - O_7).
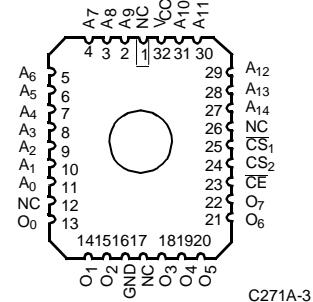
Logic Block Diagram / Pin Configurations

Selection Guide

		7C271A-25	7C271A-30	7C271A-35	7C271A-45	7C271A-55
Maximum Access Time (ns)		25	30	35	45	55
Maximum Operating Current (mA)	Com'l	75	75	50	50	50
	Military			85	60	60
Standby Current (mA)	Com'l	15	15	15	15	15
	Military			25	25	25

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature ....−65°C to +150°C

Ambient Temperature with
Power Applied...−55°C to +125°C

Supply Voltage to Ground Potential.................. −0.5V to +7.0V

DC Voltage Applied to Outputs
in High Z State.. −0.5V to +7.0V

DC Input Voltage ....−3.0V to +7.0V

DC Program Voltage 13.0V

Static Discharge Voltage .... >4001V
(per MIL-STD-883, Method 3015)

Latch-Up Current..>200 mA

UV Exposure .... 7258 Wsec/cm^2

Operating Range

Range	Ambient Temperature	V_{CC}
Commercial	0°C to +70°C	5V ±10%
Industrial[1]	−40°C to +85°C	5V ±10%
Military[2]	−55°C to +125°C	5V ±10%

## Electrical Characteristics Over the Operating Range[3, 4]

Parameter	Description	Test Conditions		7C271A-25 7C271A-30 Min.	Max.	7C271A-35 Min.	Max.	7C271A-45 7C271A-55 Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = −2.0 mA		2.4		2.4		2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8.0 mA			0.4		0.4		0.4	V
V_{IH}	Input HIGH Level	Guaranteed Input Logical HIGH Voltage for All Inputs		2.0	V_{CC}	2.0	V_{CC}	2.0	V_{CC}	V
V_{IL}	Input LOW Level	Guaranteed Input Logical LOW Voltage for All Inputs			0.8		0.8		0.8	V
I_{IX}	Input Leakage Current	GND ≤ V_{IN} ≤ V_{CC}		−10	+10	−10	+10	−10	+10	μA
I_{OZ}	Output Leakage Current	GND ≤ V_{OUT} ≤ V_{CC}, Output Disable		−10	+10	−10	+10	−10	+10	μA
I_{OS}	Output Short Circuit Current[5]	V_{CC}=Max, V_{OUT}=GND		−20	−90	−20	−90	−20	−90	mA
I_{CC}	Power Supply Current	V_{CC}=Max., I_{OUT}=0 mA, f=10 MHz	Com'l		75		50		50	mA
			Mil				85		60	
I_{SB}	Stand-By Current	V_{CC}=Max., $\overline{CE}$ = V_{IH}	Com'l		15		15		15	mA
			Mil				25		25	
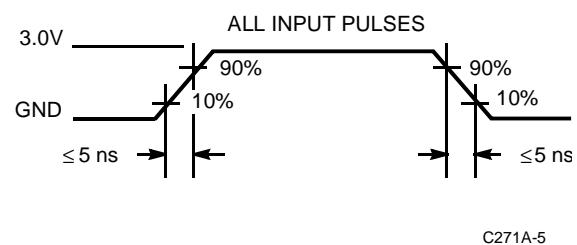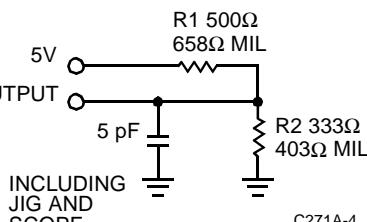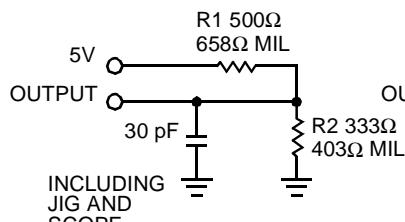
Capacitance[4]

| Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	T_A = 25°C, f = 1 MHz, V_{CC} = 5.0V	10	pF
C_{OUT}	Output Capacitance		10	pF

Notes:
1. Contact a Cypress representative for information on industrial temperature range specifications.
2. T_A is the "instant on" case temperature.
3. See the last page of this specification for Group A subgroup testing information.
4. See Introduction to CMOS PROMs in this Data Book for general information on testing.
5. For test purposes, not more than one output at a time should be shorted. Short circuit test duration should not exceed 30 seconds.

AC Test Loads and Waveforms
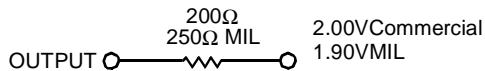
(a) Normal Load　　　　**(b) High-Z Load**
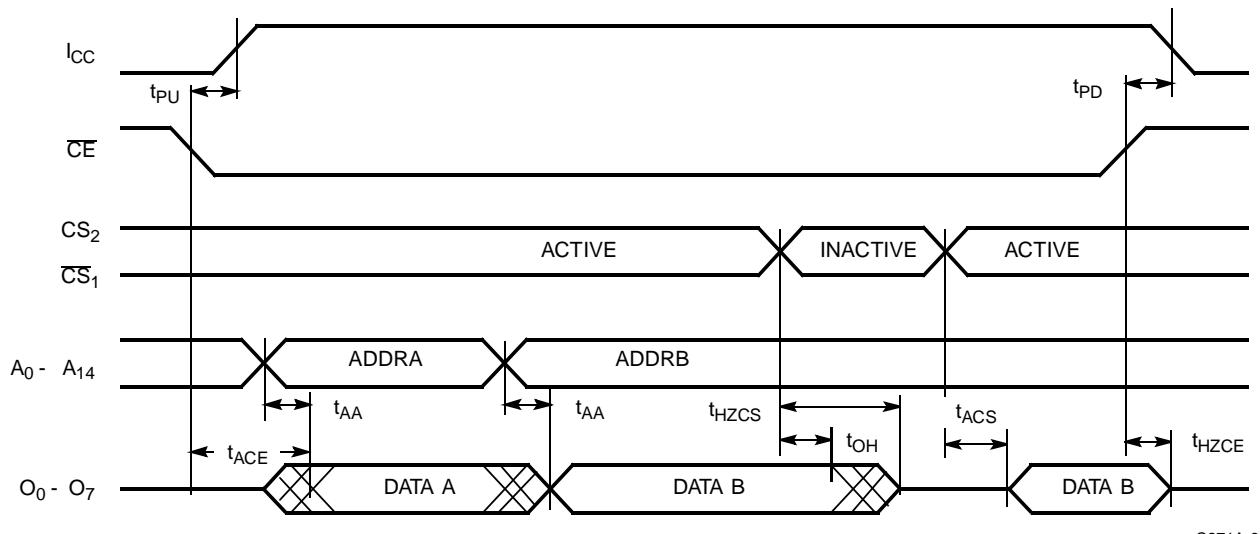
Equivalent to:　　THÉVENIN EQUIVALENT

Switching Characteristics Over the Operating Range[3,4]

Parameter	Description	7C271A-25 Min.	7C271A-25 Max.	7C271A-30 Min.	7C271A-30 Max.	7C271A-35 Min.	7C271A-35 Max.	7C271A-45 Min.	7C271A-45 Max.	7C271A-55 Min.	7C271A-55 Max.	Unit
t_{AA}	Address to Output Valid		25		30		35		45		55	ns
t_{ACS}	$\overline{CS}_1/CS_2$ Active to Output Valid		12		18		18		18		20	ns
t_{ACE}	$\overline{CE}$ Active to Output Valid		30		35		35		45		55	ns
t_{HZCS}	$\overline{CS}_1/CS_2$ Inactive to High Z		12		18		18		18		20	ns
t_{HZCE}	$\overline{CE}$ Inactive to High Z		12		18		18		18		20	ns
t_{PU}	$\overline{CE}$ Active to Power-Up	0		0		0		0		0		ns
t_{PD}	$\overline{CE}$ Inactive to Power-Down		30		35		40		40		50	ns
t_{OH}	Output Data Hold	0		0		0		0		0		ns

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Switching Waveform

C271A-6

Erasure Characteristics

Wavelengths of light less than 4000 Angstroms begin to erase the CY7C271A in the windowed package. For this reason, an opaque label should be placed over the window if the PROM is exposed to sunlight or fluorescent lighting for extended periods of time.

The recommended dose of ultraviolet light for erasure is a wavelength of 2537 Angstroms for a minimum dose (UV intensity multiplied by exposure time) of 25 Wsec/cm2. For an ultraviolet lamp with a 12 mW/cm^2 power rating, the exposure time would be approximately 35 minutes. The CY7C271A needs to be within 1 inch of the lamp during erasure. Permanent damage may result if the PROM is exposed to high-intensity UV light for an extended period of time. 7258 Wsec/cm^2 is the recommended maximum dosage.

Programming Modes

Programming support is available from Cypress as well as from a number of third-party software vendors. For detailed programming information, including a listing of software packages, please see the PROM Programming Information located at the end of this section. Programming algorithms can be obtained from any Cypress representative.

Table 1. Programming Electrical Characteristics.

| Parameter	Description	Min.	Max.	Unit
V_{PP}	Programming Power Supply	12.5	13	V
I_{PP}	Programming Supply Current		50	mA
V_{IHP}	Programming Input Voltage HIGH	3.0	V_{CC}	V
V_{ILP}	Programming Input Voltage LOW	-0.5	0.4	V
V_{CCP}	Programming V_{CC}	6.0	6.5	V

Table 2. Mode Selection.
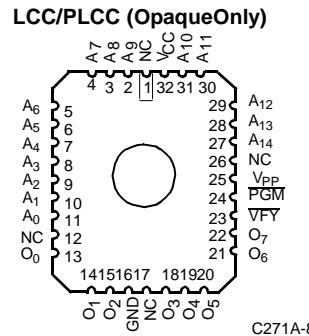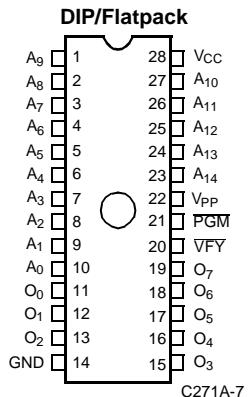
Mode	$\overline{CS}_1/V_{PP}$	$CS_2/\overline{PGM}$	$\overline{CE}/\overline{VFY}$	A_0	A_9	Data
			Pin Function[6]			
Read	V_{IL}	V_{IH}	V_{IL}	A_0	A_9	$O_7 - O_0$
Output Disable	V_{IH}	V_{IH}	V_{IL}	A_0	A_9	High Z
Output Disable	V_{IL}	V_{IL}	V_{IL}	A_0	A_9	High Z
Stand-by	X	X	V_{IH}	A_0	A_9	High Z
Program	V_{PP}	V_{ILP}	V_{IHP}	A_0	A_9	$D_7 - D_0$
Program Verify	V_{PP}	V_{IHP}	V_{ILP}	A_0	A_9	$O_7 - O_0$
Program Inhibit	V_{PP}	V_{IHP}	V_{IHP}	X	X	X
Signature (MFG)	V_{ILP}	V_{ILP}	V_{ILP}	V_{ILP}	V_{HV}[7]	34H
Signature (DEV)	V_{ILP}	V_{ILP}	V_{ILP}	V_{IHP}	V_{HV}[7]	20H
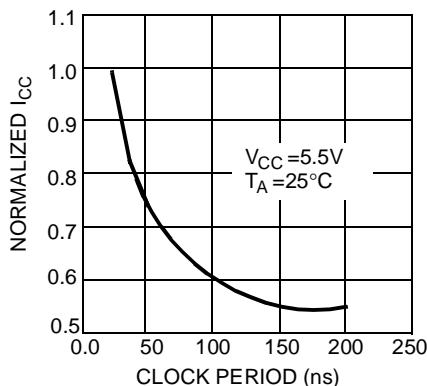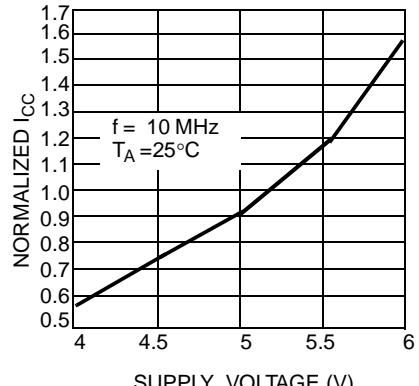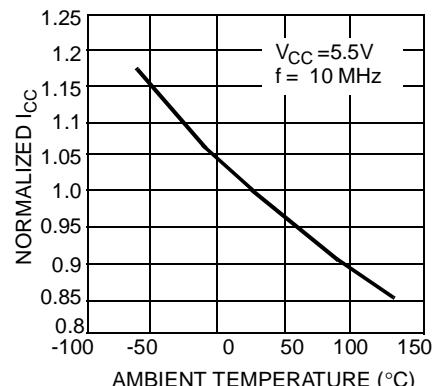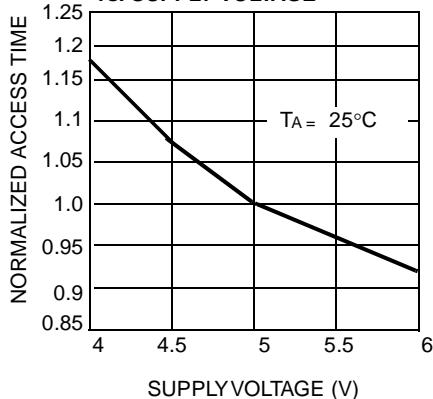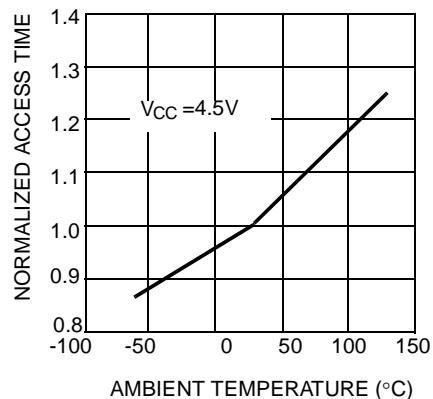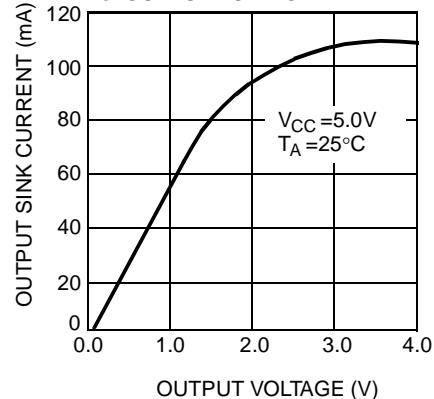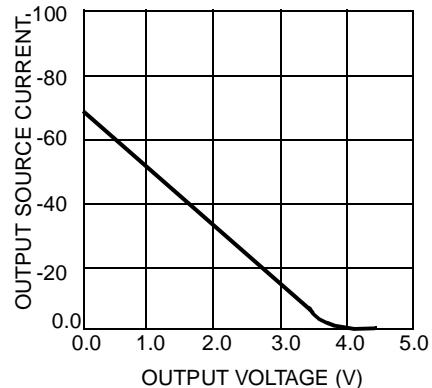
Notes:
6. X can be V_{IL} or V_{IH}.
7. V_{HV}=12±0.5V

Programming Pinouts

DIP/Flatpack

C271A-7

LCC/PLCC (OpaqueOnly)

C271A-8

5

Typical DC and AC Characteristics

NORMALIZED SUPPLY CURRENT vs. CYCLE PERIOD

NORMALIZED SUPPLY CURRENT vs. SUPPLY VOLTAGE

NORMALIZED SUPPLY CURRENT vs. AMBIENT TEMPERATURE

NORMALIZED ACCESS TIME vs. SUPPLY VOLTAGE

NORMALIZED ACCESS TIME vs. AMBIENT TEMPERATURE

OUTPUT SINK CURRENT vs. OUTPUT VOLTAGE

OUTPUT SOURCE CURRENT vs. OUTPUT VOLTAGE

C271A-9

6

Ordering Information[8]

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
25	CY7C271A-25JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
30	CY7C271A-30JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C271A-30PC	P21	28-Lead (300-Mil) Molded DIP	
	CY7C271A-30WC	W22	28-Lead (300-Mil) Windowed CerDIP	
35	CY7C271A-35JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C271A-35PC	P21	28-Lead (300-Mil) Molded DIP	
	CY7C271A-35WC	W22	28-Lead (300-Mil) Windowed CerDIP	
	CY7C271A-35DMB	D22	28-Lead (300-Mil) CerDIP	Military
	CY7C271A-35KMB	K74	28-Lead Rectangular Cerpack	
	CY7C271A-35LMB	L55	32-Pin Rectangular Leadless Chip Carrier	
	CY7C271A-35QMB	Q55	32-Pin Windowed Rectangular Leadless Chip Carrier	
	CY7C271A-35TMB	T74	28-Lead Windowed Cerpack	
	CY7C271A-35WMB	W22	28-Lead (300-Mil) Windowed CerDIP	
45	CY7C271A-45JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C271A-45PC	P21	28-Lead (300-Mil) Molded DIP	
	CY7C271A-45WC	W22	28-Lead (300-Mil) Windowed CerDIP	
	CY7C271A-45DMB	D22	28-Lead (300-Mil) CerDIP	Military
	CY7C271A-45KMB	K74	28-Lead Rectangular Cerpack	
	CY7C271A-45LMB	L55	32-Pin Rectangular Leadless Chip Carrier	
	CY7C271A-45QMB	Q55	32-Pin Windowed Rectangular Leadless Chip Carrier	
	CY7C271A-45TMB	T74	28-Lead Windowed Cerpack	
	CY7C271A-45WMB	W22	28-Lead (300-Mil) Windowed CerDIP	
55	CY7C271A-55JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C271A-55PC	P21	28-Lead (300-Mil) Molded DIP	
	CY7C271A-55WC	W22	28-Lead (300-Mil) Windowed CerDIP	
	CY7C271A-55DMB	D22	28-Lead (300-Mil) CerDIP	Military
	CY7C271A-55KMB	K74	28-Lead Rectangular Cerpack	
	CY7C271A-55LMB	L55	32-Pin Rectangular Leadless Chip Carrier	
	CY7C271A-55QMB	Q55	32-Pin Windowed Rectangular Leadless Chip Carrier	
	CY7C271A-55TMB	T74	28-Lead Windowed Cerpack	
	CY7C271A-55WMB	W22	28-Lead (300-Mil) Windowed CerDIP	

Notes:
8. Most of these products are available in industrial temperature range. Contact a Cypress representative for specifications and product availability.

MILITARY SPECIFICATIONS
Group A Subgroup Testing

DC Characteristics

| Parameter	Subgroups
V_{OH}	1, 2, 3
V_{OL}	1, 2, 3
V_{IH}	1, 2, 3
V_{IL}	1, 2, 3
I_{IX}	1, 2, 3
I_{OZ}	1, 2, 3
I_{CC}	1, 2, 3
I_{SB}	1, 2, 3
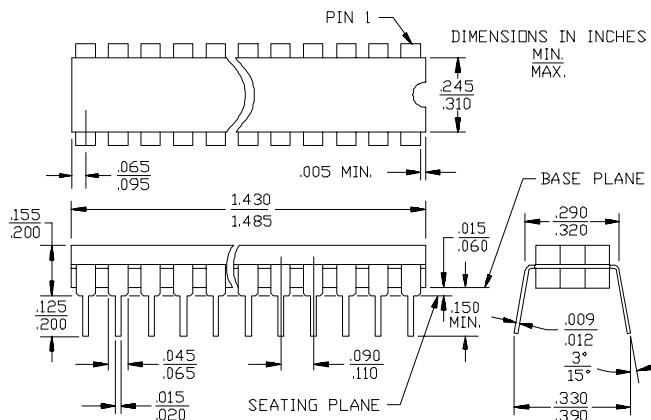
Switching Characteristics

| Parameter	Subgroups
t_{AA}	7, 8, 9, 10, 11
t_{ACS}	7, 8, 9, 10, 11
t_{ACE}	7, 8, 9, 10, 11
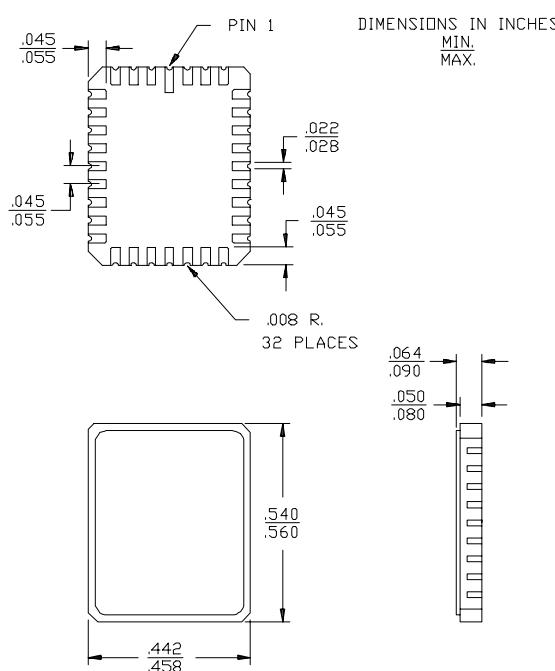
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Package Diagrams
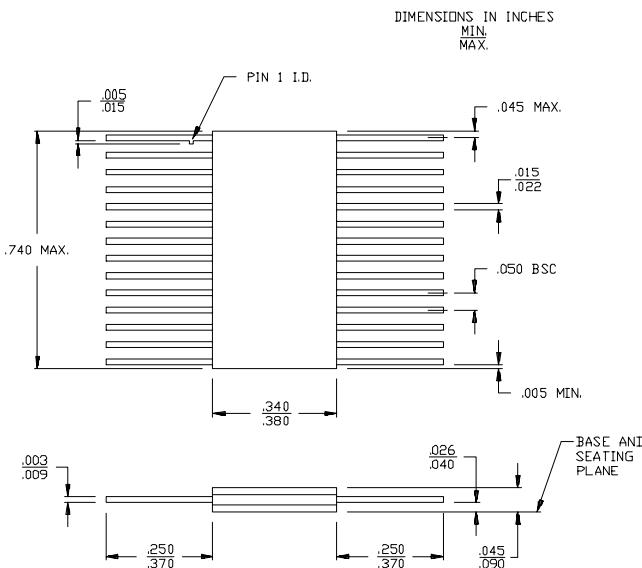
28-Lead (300-Mil) CerDip D22
MIL-STD-1835 D-15 Config A
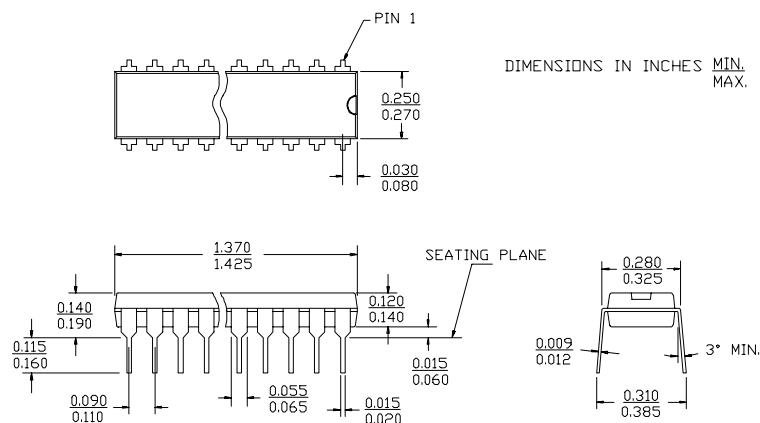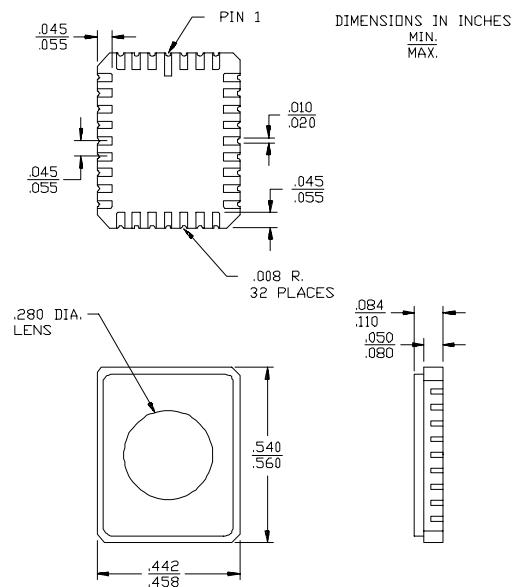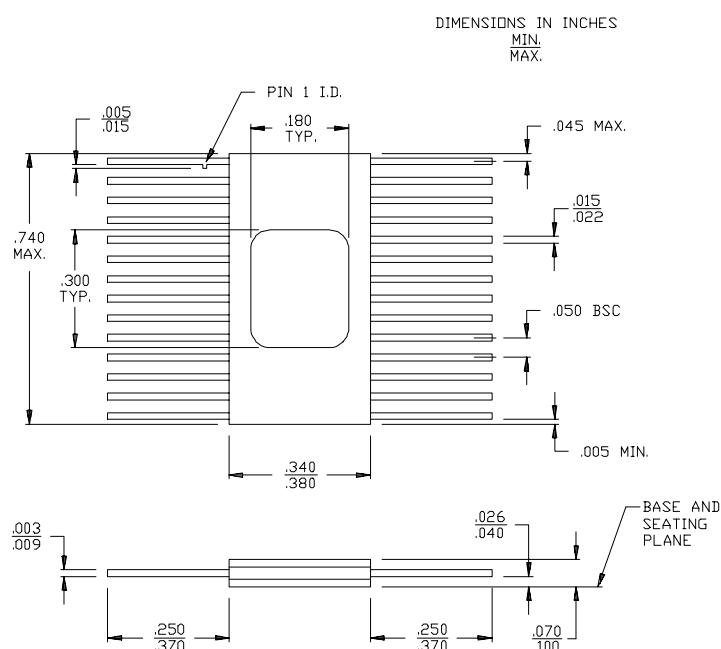
**32-Pin Rectangular Leadless Chip Carrier L55**
MIL-STD-1835 C-12

28-Lead Rectangular Cerpack K74
MIL-STD-1835 F-11 Config. A

## Package Diagrams (continued)

28-Lead (300-MIL) Molded DIP P21

PIN 1

DIMENSIONS IN INCHES $\frac{MIN.}{MAX.}$

$\frac{0.250}{0.270}$

$\frac{0.030}{0.080}$

$\frac{1.370}{1.425}$

SEATING PLANE

$\frac{0.280}{0.325}$

$\frac{0.140}{0.190}$

$\frac{0.120}{0.140}$

$\frac{0.115}{0.160}$

$\frac{0.009}{0.012}$

3° MIN.

$\frac{0.015}{0.060}$

$\frac{0.090}{0.110}$

$\frac{0.055}{0.065}$

$\frac{0.015}{0.020}$

$\frac{0.310}{0.385}$

32-Pin Windowed Rectangular Leadless Chip Carrier
Q55 MIL-STD-1835 C-12

$\frac{.045}{.055}$

PIN 1

DIMENSIONS IN INCHES
$\frac{MIN.}{MAX.}$

$\frac{.010}{.020}$

$\frac{.045}{.055}$

$\frac{.045}{.055}$

.008 R.
32 PLACES

.280 DIA.
LENS

$\frac{.084}{.110}$

$\frac{.050}{.080}$

$\frac{.540}{.560}$

$\frac{.442}{.458}$

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Package Diagrams (continued)

28-Lead Windowed Cerpack T74

28-Lead (300-MIL) Windowed CerDIP W22
MIL-STD-1835 D-15 Config A