CY7C243
CY7C244

4Kx8 Reprogrammable PROM

Features

- **CMOS for optimum speed/power**
- **Windowed for reprogrammability**
- **High speed**
  - **20 ns (commercial)**
  - **25 ns (military)**
- **Low power**
  - **550 mW (commercial)**
  - **660 mW (military)**
- **EPROM technology 100% programmable**
- **300-mil or 600-mil packaging available**
- **5V ± 10% V_{CC}, commercial and military**
- **Capable of withstanding greater than 2001V static discharge**
- **TTL-compatible I/O**
- **Direct replacement for bipolar PROMs**

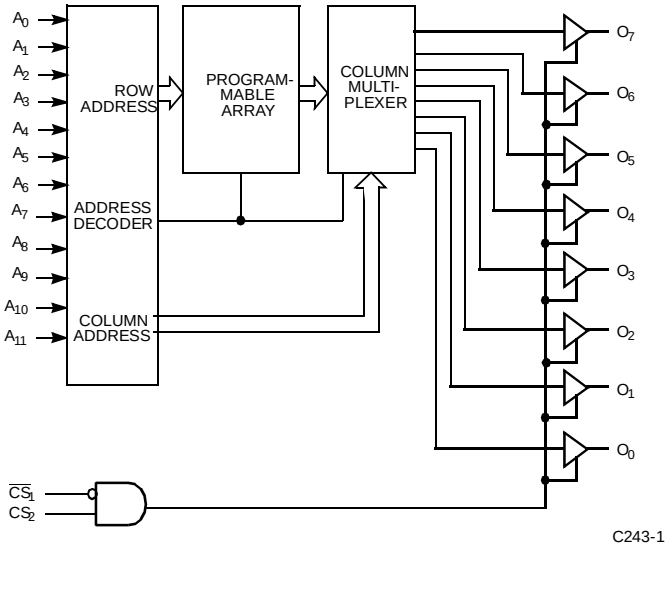
Functional Description

The CY7C243 and CY7C244 are high-performance 4K x 8 CMOS PROMs. The CY7C243 and CY7C244 are packaged in 300-mil-wide and 600-mil-wide packages respectively. The reprogrammable packages are equipped with an erasure window. When exposed to UV light, these PROMs are erased and can then be reprogrammed. The memory cells utilize proven EPROM floating-gate technology and byte-wide intelligent programming algorithms.

The CY7C243 and CY7C244 are plug-in replacements for bipolar devices and offer the advantages of lower power, superior performance and programming yield. The EPROM cell requires only 12.5V for the supervoltage and low current requirements allow for gang programming. The EPROM cells allow for each memory location to be tested 100%, as each cell is programmed, erased, and repeatedly exercised prior to encapsulation. Each PROM is also tested for AC performance to guarantee that after customer programming the product will meet DC and AC specification limits.

Read is accomplished by placing an active LOW signal on $\overline{CS}_1$ and an active HIGH on CS_2. The contents of the memory location addressed by the address line (A_0 – A_{11}) will become available on the output lines (O_0 – O_7).

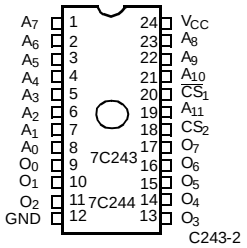
Logic Block Diagram



C243-1

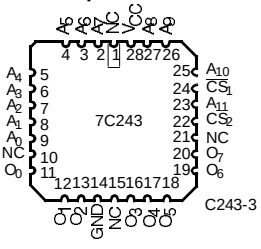
Pin Configurations

DIP/Flatboat
Top View



C243-2

LCC/PLCC (Opaque Only)
Top View



C243-3

Selection Guide

		7C243-20 7C244-20	7C243-25 7C244-25	7C243-35 7C244-35	7C243-45 7C244-45	7C243-55 7C244-55
Maximum Access Time (ns)		20	25	35	45	55
Maximum Operating Current (mA)	Commercial	100	100	80	80	80
	Military		120	100	100	100

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
(V_{CC} to GND).....–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
(Pin 19 DIP, Pin 23 LCC) 13.0V

Static Discharge Voltage ..... >2001V
(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		7C243-20, 25 7C244-20, 25 Min.	7C243-20, 25 7C244-20, 25 Max.	7C243-35, 45, 55 7C244-35, 45, 55 Min.	7C243-35, 45, 55 7C244-35, 45, 55 Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = –2.0 mA		2.4				V
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = –4.0 mA				2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8 mA (6 mA Mil)			0.4			V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 16 mA					0.4	V
V_{IH}	Input HIGH Level			2.0	V_{CC} + 0.3	2.0	V_{CC} + 0.3	V
V_{IL}	Input LOW Level				0.8		0.8	V
I_{IX}	Input Current	GND ≤ V_{IN} ≤ V_{CC}		–10	+10	–10	+10	µA
V_{CD}	Input Diode Clamp Voltage			Note 4		Note 4		
I_{OZ}	Output Leakage Current	0 ≤ V_{OUT} ≤ V_{CC}, Output Disabled		–10	+10	–10	+10	µA
I_{OS}	Output Short Circuit Current[5]	V_{CC} = Max., V_{OUT} = GND		–20	–90	–20	–90	mA
I_{CC}	Power Supply Current	V_{CC} = Max., I_{OUT} = 0 mA	Com'l		100		80	mA
			Mil		120		100	
V_{PP}	Programming Supply Voltage			12	13	12	13	V
I_{PP}	Programming Supply Current				50		50	mA

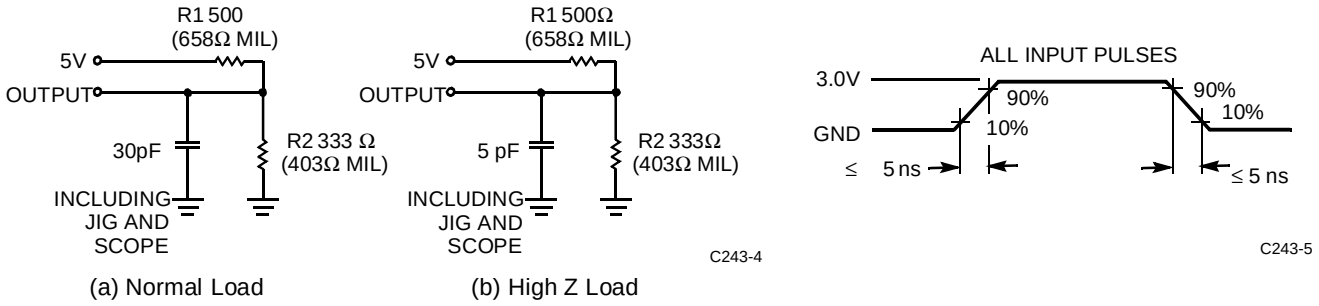
Notes:
1. See the Ordering Information section regarding industrial temperature range specification.
2. T_A is the "instant on" case temperature.
3. See the last page of this specification for Group A subgroup testing information.
4. See the "Introduction to CMOS PROMs" section of the Cypress Data Book 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.

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

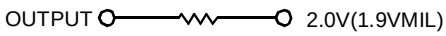
AC Test Loads and Waveforms[4]

Test Load for -20 through-25 speeds

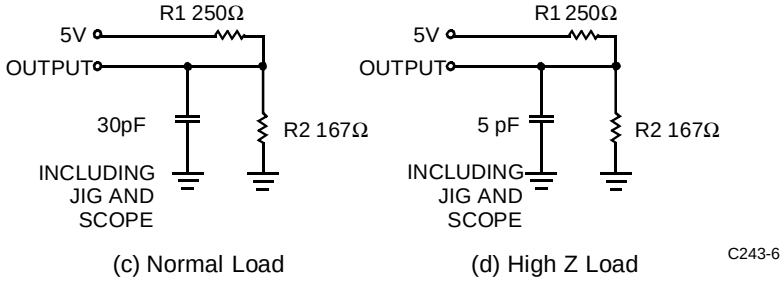


(a) Normal Load (b) High Z Load

Equivalent to: THÈVENIN EQUIVALENT

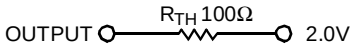


Test Load for -35 through -55 speeds



(c) Normal Load (d) High Z Load

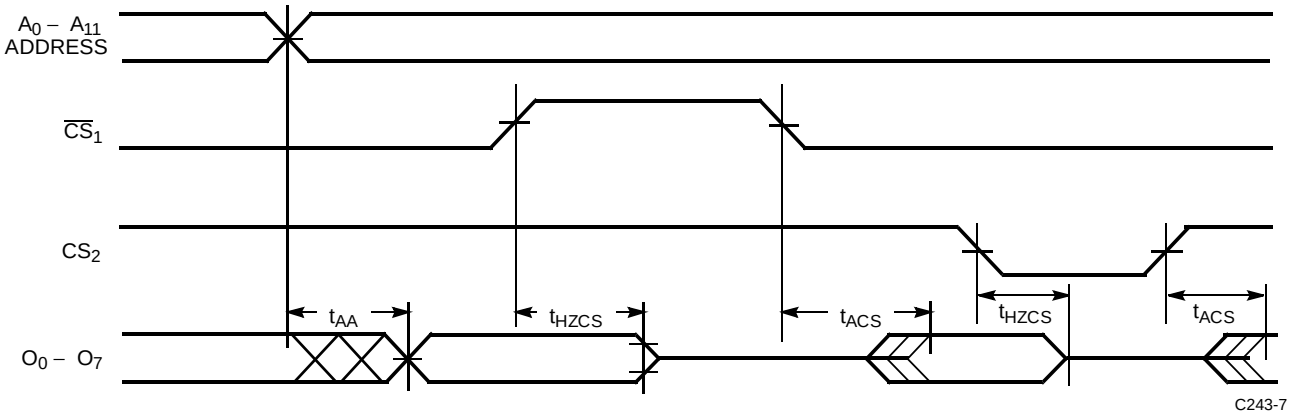
Equivalent to: THÈVENIN EQUIVALENT



Switching Characteristics Over the Operating Range[2, 3, 4]

Parameter	Description	7C243-20 7C244-20		7C243-25 7C244-25		7C243-35 7C244-35		7C243-45 7C244-45		7C243-55 7C244-55		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t_{AA}	Address to Output Valid		20		25		35		45		55	ns
t_{HZCS} (Com'l)	Chip Select Inactive to High Z		12		12		20		25		25	ns
t_{HZCS} (Mil)	Chip Select Inactive to High Z				15		20		25		25	ns
t_{ACS} (Com'l)	Chip Select Active to Output Valid		12		12		20		25		25	ns
t_{ACS} (Mil)	Chip Select Active to Output Valid				15		20		25		25	ns

Switching Waveforms[4]



Erasure Characteristics

Wavelengths of light less than 4000 Angstroms begin to erase the devices 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/cm^2. For an ultraviolet lamp with a 12 mW/cm^2 power rating, the exposure time would be approximately 35 minutes. The CY7C243 or CY7C244 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.

Operating Modes

Read is the normal operating mode for a programmed device. In this mode, all signals are normal TTL levels. The PROM is addressed with a 12-bit field, an active LOW signal is applied to $\overline{CS}_1$, an active HIGH is applied to CS_2, and the contents of the addressed location appear on the data out pins.

Table 1. Mode Selection.

		Pin Function[6]						
	Read or Output Disable	**A_{11}**	**A_{10}**	**A_9**	**A_8**	**CS_1**	**$\overline{CS_2}$**	**O_7 - O_0**
Mode	**Program**	**V_{PP}**	**LATCH**	**$\overline{PGM}$**	**$\overline{VFY}$**	**$\overline{CS_1}$**	**NA**	**D_7 - D_0**
Read		A_{11}	A_{10}	A_9	A_8	V_{IL}	V_{IH}	O_7 - O_0
Output Disable		A_{11}	A_{10}	A_9	A_8	V_{IH}	X	High Z
Output Disable		A_{11}	A_{10}	A_9	A_8	X	V_{IL}	High Z

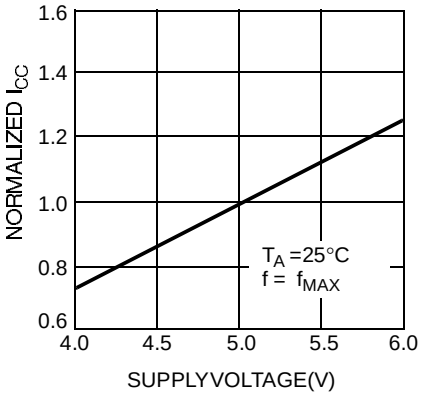
Notes:
6. X can be V_{IL} or V_{IH}.

Programming Information

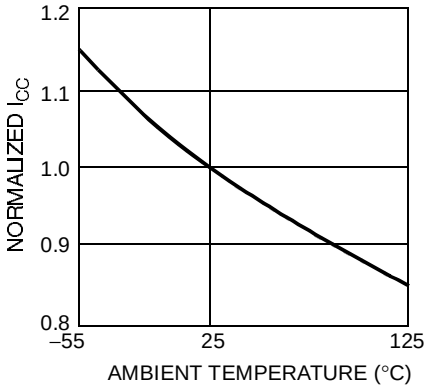
Programming support is available from Cypress as well as from a number of third-party software vendors. For detailed programming information, including a listing of software packages, please see the PROM Programming Information located at the end of this section. Programming algorithms can be obtained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

Typical DC and AC Characteristic

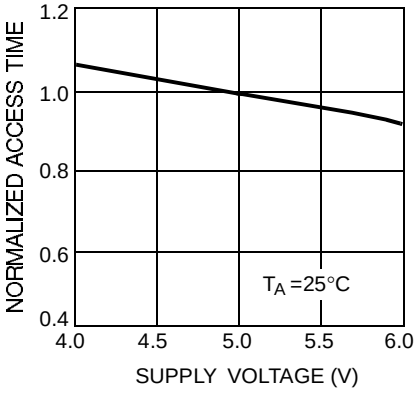
NORMALIZED SUPPLY CURRENT vs. SUPPLY VOLTAGE



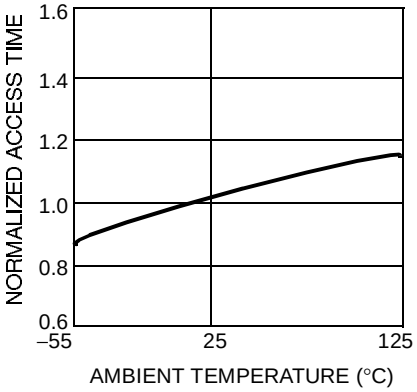
NORMALIZED SUPPLY CURRENT vs. AMBIENT TEMPERATURE



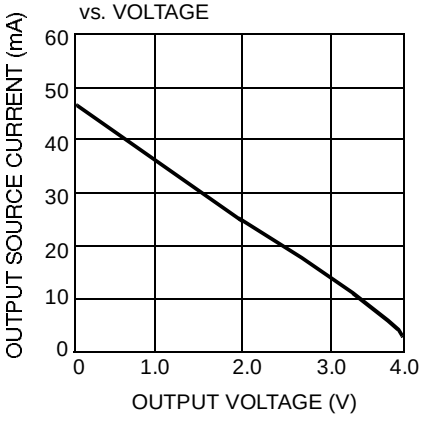
NORMALIZED ACCESS TIME vs. SUPPLY VOLTAGE



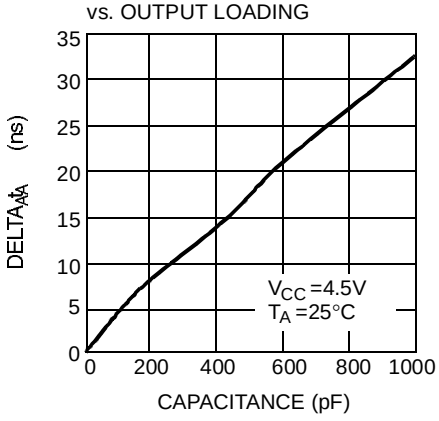
NORMALIZED ACCESS TIME vs. TEMPERATURE



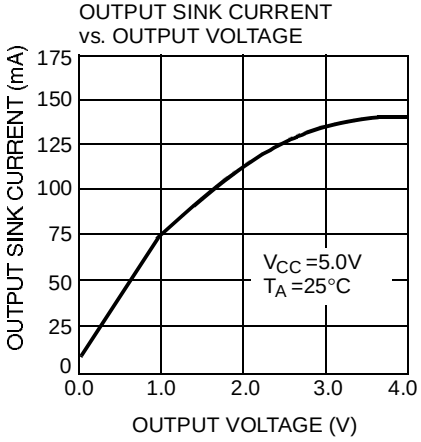
OUTPUT SOURCE CURRENT vs. VOLTAGE



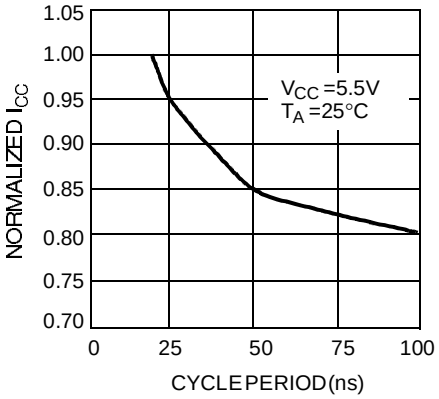
TYPICAL ACCESS TIME CHANGE vs. OUTPUT LOADING



OUTPUT SINK CURRENT vs. OUTPUT VOLTAGE



NORMALIZED SUPPLY CURRENT vs. CYCLE PERIOD



Ordering Information [7]

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
20	CY7C243-20JC	J64	28-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C243-20PC	P13	24-Lead (300-Mil) Molded DIP	
	CY7C243-20WC	W14	24-Lead (300-Mil) Windowed CerDIP	
25	CY7C243-25JC	J64	28-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C243-25PC	P13	24-Lead (300-Mil) Molded DIP	
	CY7C243-25WC	W14	24-Lead (300-Mil) Windowed CerDIP	
	CY7C243-25DMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY7C243-25LMB	L64	28-Square Leadless Chip Carrier	
	CY7C243-25QMB	Q64	28-Pin Windowed Leadless Chip Carrier	
	CY7C243-25WMB	W14	24-Lead (300-Mil) Windowed CerDIP	
35	CY7C243-35JC	J64	28-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C243-35PC	P13	24-Lead (300-Mil) Molded DIP	
	CY7C243-35WC	W14	24-Lead (300-Mil) Windowed CerDIP	
	CY7C243-35DMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY7C243-35LMB	L64	28-Square Leadless Chip Carrier	
	CY7C243-35QMB	Q64	28-Pin Windowed Leadless Chip Carrier	
	CY7C243-35WMB	W14	24-Lead (300-Mil) Windowed CerDIP	
45	CY7C243-45JC	J64	28-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C243-45PC	P13	24-Lead (300-Mil) Molded DIP	
	CY7C243-45WC	W14	24-Lead (300-Mil) Windowed CerDIP	
	CY7C243-45DMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY7C243-45LMB	L64	28-Square Leadless Chip Carrier	
	CY7C243-45QMB	Q64	28-Pin Windowed Leadless Chip Carrier	
	CY7C243-45WMB	W14	24-Lead (300-Mil) Windowed CerDIP	
55	CY7C243-55JC	J64	28-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C243-55PC	P13	24-Lead (300-Mil) Molded DIP	
	CY7C243-55WC	W14	24-Lead (300-Mil) Windowed CerDIP	
	CY7C243-55DMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY7C243-55LMB	L64	28-Square Leadless Chip Carrier	
	CY7C243-55QMB	Q64	28-Pin Windowed Leadless Chip Carrier	
	CY7C243-55WMB	W14	24-Lead (300-Mil) Windowed CerDIP	

Notes:

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

Ordering Information (Continued)[7]

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
20	CY7C244-20PC	P11	24-Lead (600-Mil) Molded DIP	Commercial
	CY7C244-20WC	W12	24-Lead (600-Mil) Windowed CerDIP	
25	CY7C244-25PC	P11	24-Lead (600-Mil) Molded DIP	Commercial
	CY7C244-25WC	W12	24-Lead (600-Mil) Windowed CerDIP	
	CY7C244-25DMB	D12	24-Lead (600-Mil) CerDIP	Military
	CY7C244-25WMB	W12	24-Lead (600-Mil) Windowed CerDIP	
35	CY7C244-35PC	P11	24-Lead (600-Mil) Molded DIP	Commercial
	CY7C244-35WC	W12	24-Lead (600-Mil) Windowed CerDIP	
	CY7C244-35DMB	D12	24-Lead (600-Mil) CerDIP	Military
	CY7C244-35WMB	W12	24-Lead (600-Mil) Windowed CerDIP	
45	CY7C244-45PC	P11	24-Lead (600-Mil) Molded DIP	Commercial
	CY7C244-45WC	W12	24-Lead (600-Mil) Windowed CerDIP	
	CY7C244-45DMB	D12	24-Lead (600-Mil) CerDIP	Military
	CY7C244-45WMB	W12	24-Lead (600-Mil) Windowed CerDIP	
55	CY7C244-55PC	P11	24-Lead (600-Mil) Molded DIP	Commercial
	CY7C244-55WC	W12	24-Lead (600-Mil) Windowed CerDIP	
	CY7C244-55DMB	D12	24-Lead (600-Mil) CerDIP	Military
	CY7C244-55WMB	W12	24-Lead (600-Mil) Windowed CerDIP	

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

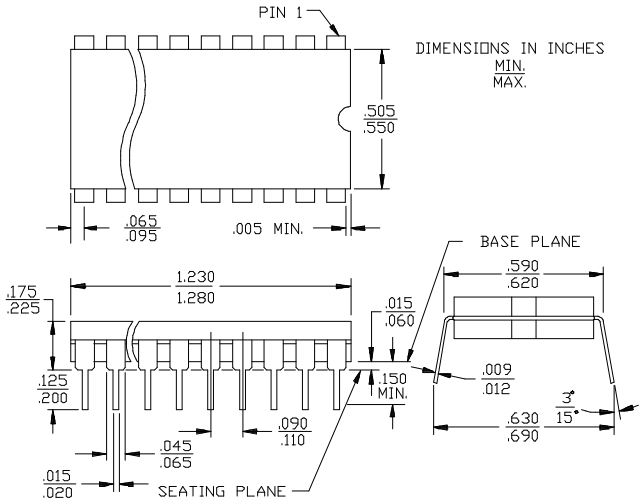
Switching Characteristics

Parameter	Subgroups
t_{AA}	7, 8, 9, 10, 11
t_{ACS}	7, 8, 9, 10, 11

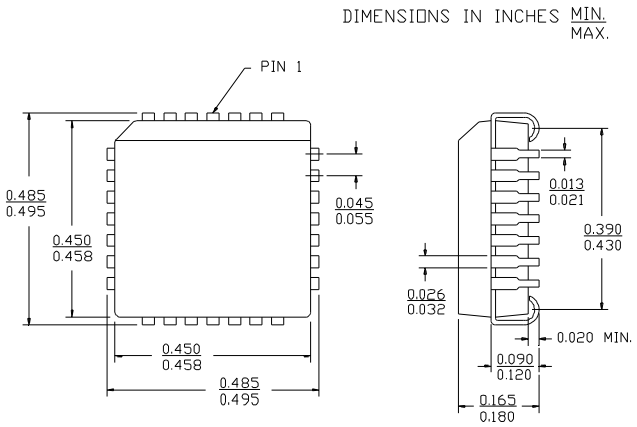
Document #: 38-00360-A

Package Diagrams

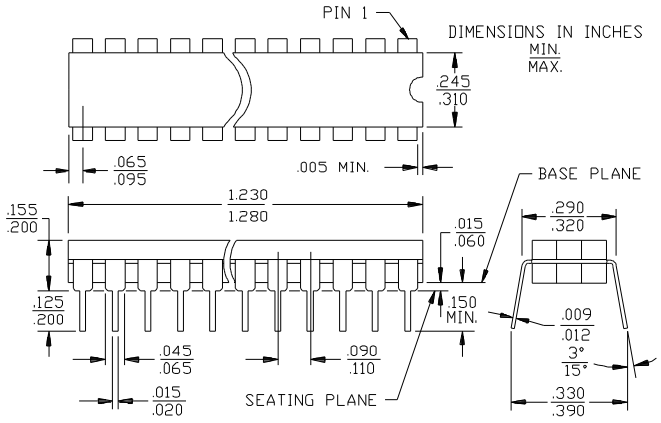
24-Lead (600-Mil) CerDIP D12
MIL-STD-1835 D-3Config.A



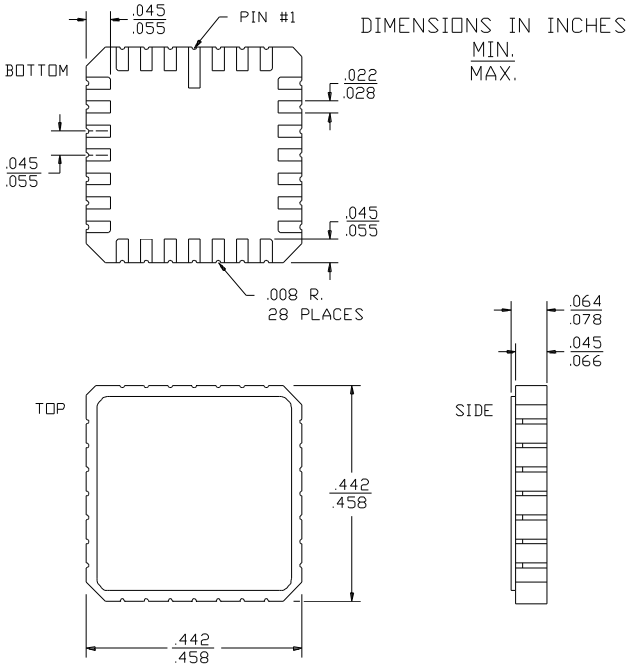
28-Lead Plastic Leaded Chip Carrier J64



24-Lead (300-Mil) CerDIP D14
MIL-STD-1835 D-9 Config.A

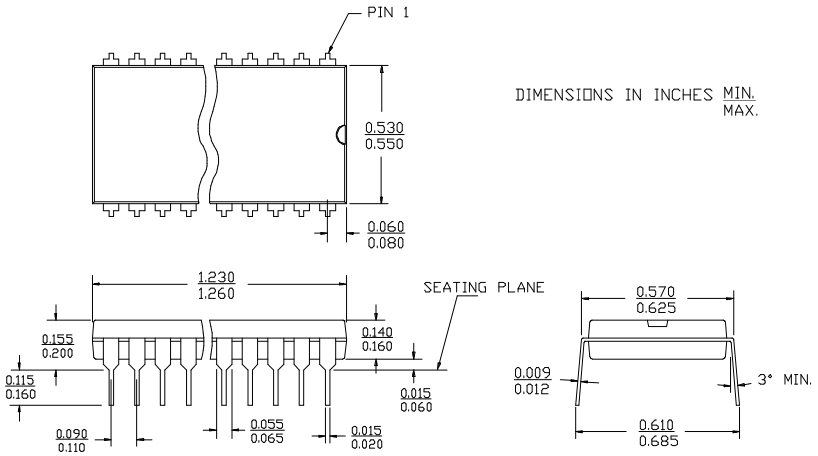


28-Square Leadless Chip Carrier L64
MIL-STD-1835 C-4

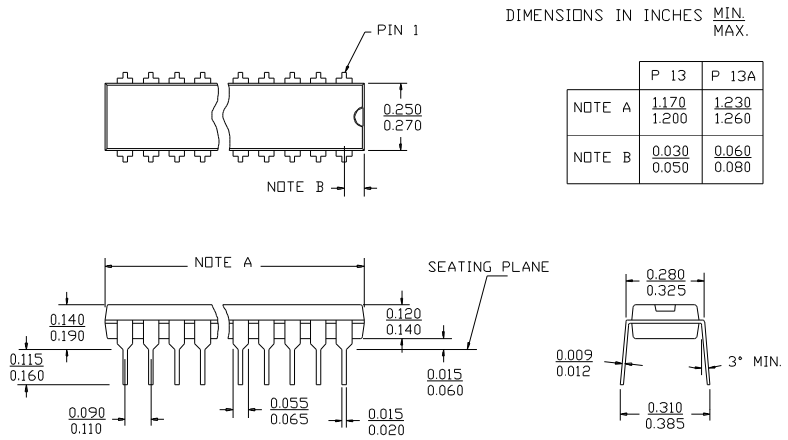


Package Diagrams (Continued)

24-Lead (600-Mil) Molded DIP P11



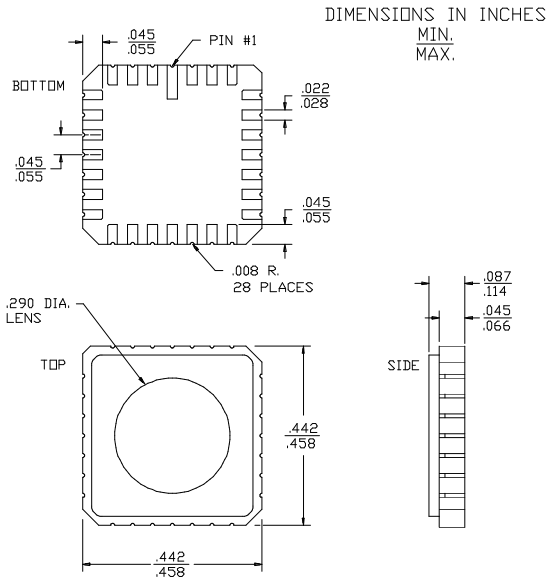
24-Lead (300-Mil) Molded DIP P13/P13A



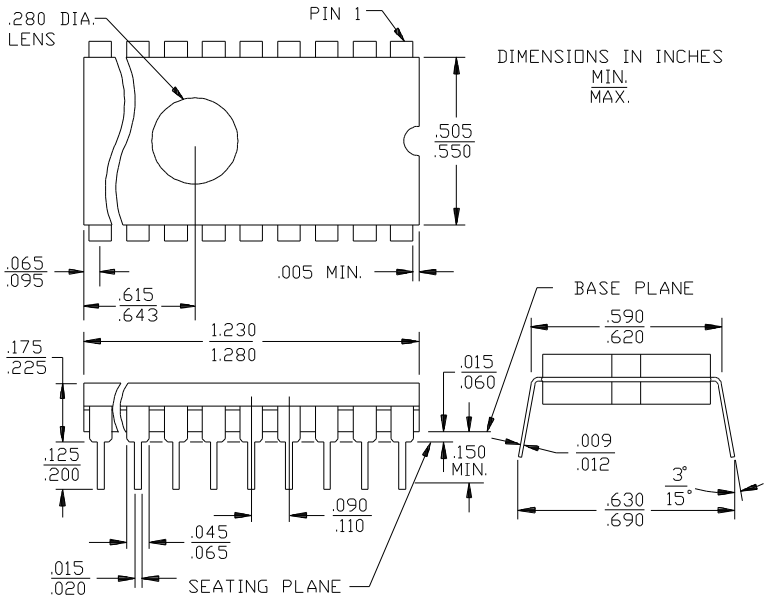
	P 13	P 13A
NOTE A	1.170 1.200	1.230 1.260
NOTE B	0.030 0.050	0.060 0.080

Package Diagrams (Continued)

28-Pin Windowed Leadless Chip Carrier Q64
MIL-STD-1835 C-4



24-Lead (600-Mil) Windowed CerDIP W12
MIL-STD-1835 D-3 Config.A



Package Diagrams (Continued)

24-Lead (300-Mil) Windowed CerDIP W14
MIL-STD-1835 D-9 Config.A