CYPRESS SEMICONDUCTOR

16K x 16 Power Switched and Reprogrammable PROM

Features

- 0.8-micron CMOS for optimum speed/power
- High speed
  - 40 ns access time
- 16-bit-wide words
- 40-pin, 600-mil-wide DIP packages
- 44-pin PLCC and 44-pin LCC packages
- Direct replacement for EPROMs
- 100% reprogrammable in windowed packages
- TTL-compatible I/O
- Capable of withstanding greater than 2001V static discharge

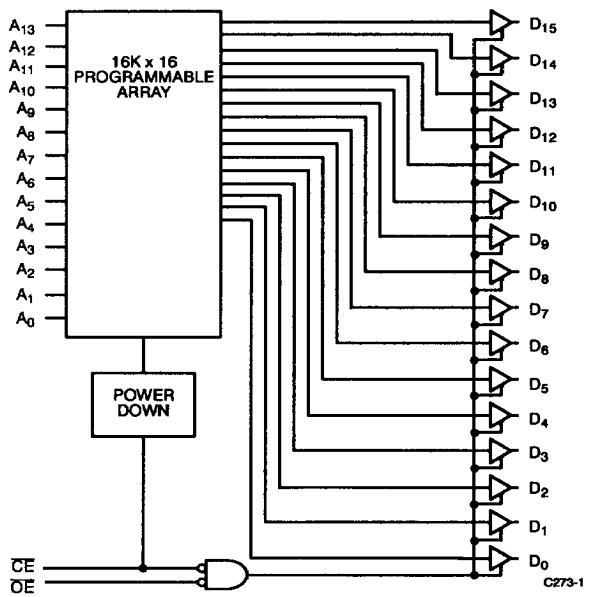
Functional Description

The CY7C273 is a high-performance 16K-word by 16-bit CMOS PROM. It is available in 40-pin, 600-mil-wide DIP packages and 44-pin PLCC and LCC packages. The CY7C273 is 100% reprogrammable in windowed packages. The memory cells utilize proven EPROM floating-gate technology and word-wide programming algorithms.

The CY7C273 is a plug-in replacement for EPROM devices. When deselected, the CY7C273 automatically powers down into a low-power standby mode.

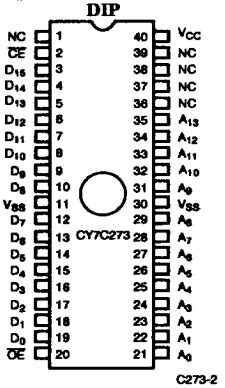
Reading is accomplished by placing an active LOW signal on $\overline{OE}$ and $\overline{CE}$. The contents of the memory location addressed by the address lines ($A_{13} - A_{10}$) will become available on the output lines ($D_{15} - D_0$). The data will remain on the outputs until the address changes or the outputs are disabled.

Logic Block Diagram

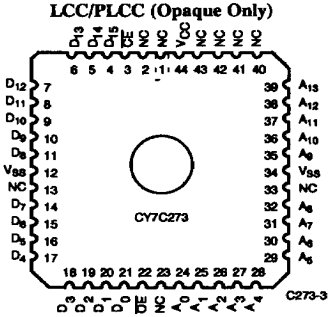


Pin Configurations

DIP



LCC/PLCC (Opaque Only)



Selection Guide

		CY7C273–40	CY7C273–45
Maximum Access Time (ns)		40	45
Maximum Operating Current (mA)	Commercial	200	200
	Military		250
Maximum Standby Current (mA)	Commercial	40	40
	Military		50

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

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

Static Discharge Voltage ..... >2001V (per MIL-STD-883, Method 3015)

Latch-Up Current ..... >200 mA

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[3,4]

Parameter	Description	Test Conditions		CY7C273–40 Min.	CY7C273–40 Max.	CY7C273–45 Min.	CY7C273–45 Max.	Units
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = – 2.0 mA	Com'l	2.4		2.4		V
			Mil			2.4		
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8.0 mA	Com'l		0.4		0.4	V
		V_{CC} = Min., I_{OL} = 6.0 mA	Mil				0.4	
V_{IH}	Input HIGH Voltage	Guaranteed Input Logical HIGH Voltage for All Inputs		2.0		2.0		V
V_{IL}	Input LOW Voltage	Guaranteed Input Logical LOW Voltage for All Inputs			0.8		0.8	V
I_{IX}	Input Leakage Current	GND ≤ V_{IN} ≤ V_{CC}		– 10	+10	– 10	+10	µA
I_{OZ}	Output Leakage Current	V_{CC} = Max., V_{OL} ≤ V_{OUT} ≤ V_{OH}, Output Disabled		– 40	+40	– 40	+40	µA
I_{OS}	Output Short Circuit Current[5]	V_{CC} = Max., V_{OUT} = 0.0V		– 20	– 90	– 20	– 90	mA
I_{CC}	Power Supply Current	V_{CC} = Max., V_{IN} = 2.0V, I_{OUT} = 0 mA	Com'l		200		200	mA
			Mil				250	
I_{SB}	Standby Supply Current	Chip Enable Inactive, $\overline{CE}$ ≥ V_{IH}, I_{OUT} = 0.0 mA	Com'l		40		40	mA
			Mil				50	

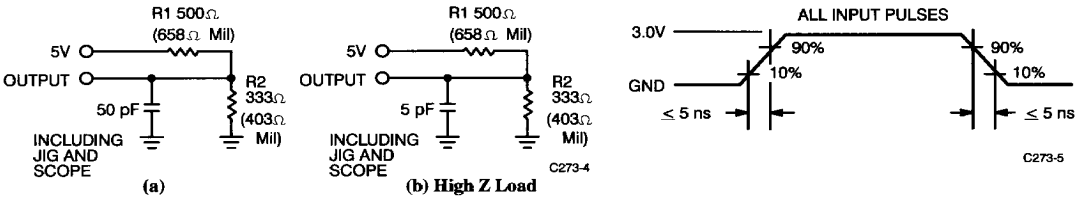
Capacitance[4]

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

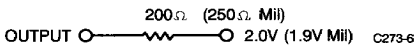
Notes:

1. Contact a Cypress representative for 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



Equivalent to: THÉVENIN EQUIVALENT

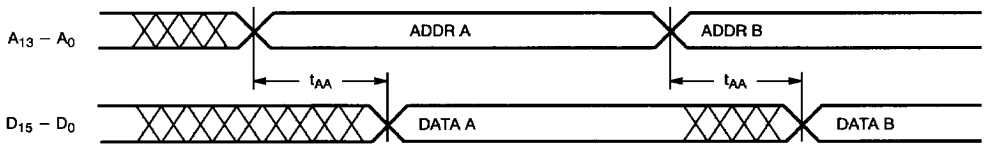


Switching Characteristics Over the Operating Range[3,4]

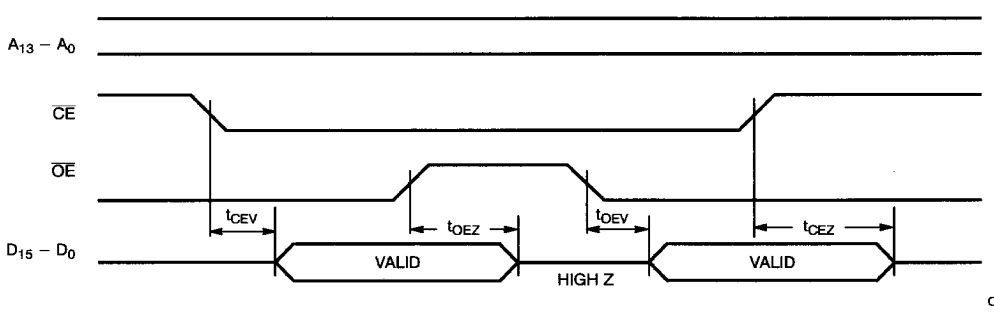
Parameters	Description	CY7C273–40		CY7C273–45		Units
		Min.	Max.	Min.	Max.	
t_{AA}	Address to Output Data Valid		40		45	ns
t_{CEV}	$\overline{CE}$ LOW to Output Valid		45		50	ns
t_{CEZ}	$\overline{CE}$ HIGH to High Z Output		45		50	ns
t_{OEV}	$\overline{OE}$ LOW to Output Valid		25		30	ns
t_{OEZ}	$\overline{OE}$ HIGH to High Z Output		25		30	ns

Switching Waveforms

Read Operation Timing Diagram[6]



Chip Enable and Output Enable Timing Diagrams



Notes:
6. $\overline{CE}$, $\overline{OE}$ assumed LOW.

Erasure Characteristics

Wavelengths of light less than 4000 Angstroms begin to erase the 7C273 in the windowed package. For this reason, an opaque label should be placed over the window if the EPROM 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) or 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 7C273 needs to be within 1 inch of the lamp during erasure. Permanent damage may result if the EPROM is exposed to high-intensity UV light for an extended period of time. 7258 Wsec/cm^2 is the recommended maximum dosage.

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.

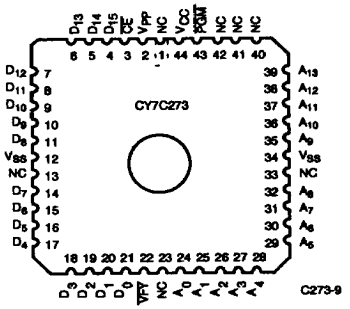
Table 1. Program Mode Table

Mode	V_{PP}	$\overline{PGM}$	$\overline{VFY}$	$D_0 - D_{15}$
Program Inhibit	V_{PP}	V_{IHP}	V_{IHP}	High Z
Program Enable	V_{PP}	V_{ILP}	V_{IHP}	Data
Program Verify	V_{PP}	V_{IHP}	V_{ILP}	Data

Table 2. Signature Mode Table

Signature Mode	A_0	A_9	$D_0 - D_{15}$
Cypress Code	V_{ILP}	V_{PP}	0034H
Device Code	V_{IHP}	V_{PP}	0017H

LCC, PLCC



DIP

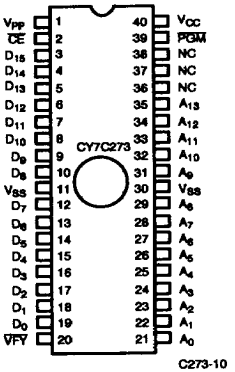


Figure 1. Programming Pinouts

Ordering Information[7]

Speed (ns)	Ordering Code	Package Type	Operating Range
40	CY7C273–40DC	D18	Commercial
	CY7C273–40HC	H67	
	CY7C273–40JC	J67	
	CY7C273–40PC	P17	
	CY7C273–40WC	W18	
45	CY7C273–45DC	D18	Commercial
	CY7C273–45HC	H67	
	CY7C273–45JC	J67	
	CY7C273–45PC	P17	
	CY7C273–45WC	W18	
	CY7C273–45DMB	D18	Military
	CY7C273–45HMB	H67	
	CY7C273–45LMB	L67	
	CY7C273–45QMB	Q67	
	CY7C273–45WMB	W18	

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

MILITARY SPECIFICATIONS
Group A Subgroup Testing

DC Characteristics

Parameters	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

Parameters	Subgroups
t_{AA}	7, 8, 9, 10, 11
t_{CEV}	7, 8, 9, 10, 11
t_{OEV}	7, 8, 9, 10, 11

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