CYPRESS SEMICONDUCTOR

Reprogrammable 128K x 8 Power-Down PROM

Features

- **BiFAMOS™ for optimum speed/power**
- **High speed**
  - **— t_{AA} = 25 ns max. (commercial)**
  - **— t_{AA} = 30 ns max. (military)**
- **Low-power stand-by mode**
  - **— 1210 mW max.**
  - **— 275 mW stand-by**
- **Byte-wide memory organization**
- **100% reprogrammable in the windowed package**
- **Capable of withstanding >2001V static discharge**
- **User-programmable output enable (OE)**
- **Available in**
  - **— 32-pin, 600-mil plastic or hermetic DIP**
  - **— 32-pin hermetic LCC**

Functional Description

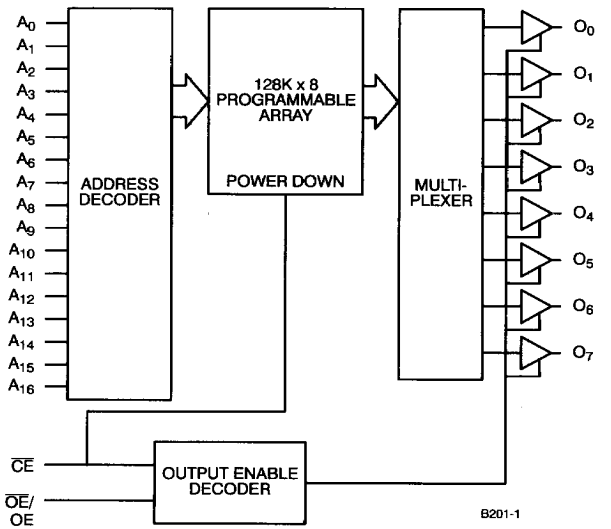
The CY7B201 is a high-performance 1-megabit BiFAMOS PROM organized in 128 Kbytes. It is available in 32-pin, 600-mil DIP and LCC packages. These devices offer high-density storage combined with 40-MHz performance. The CY7B201 is available in windowed and opaque packages. Windowed packages allow the device to be erased with UV light for 100% reprogrammability.

The CY7B201 is equipped with a power-down chip enable ($\overline{CE}$) input and an output enable ($\overline{OE}$/OE). When $\overline{CE}$ is deselected, the device powers down to a low-power stand-by mode. The $\overline{OE}$/OE pin is polarity programmable and three-states the outputs without putting the device into stand-by mode. While $\overline{CE}$ offers lower power, $\overline{OE}$/OE provides a more rapid transition to and from three-stated outputs.

The memory cells utilize proven EPROM floating-gate technology and byte-wide intelligent programming algorithms. The EPROM cell requires only 12.5V for the supervoltage and low programming current allows for gang programming. The EPROM allows for each memory location to be tested 100%, because each location is written to, erased, and repeatedly exercised prior to encapsulation. Each PROM is also tested for AC performance to guarantee that the product will meet DC and AC specification limits after customer programming.

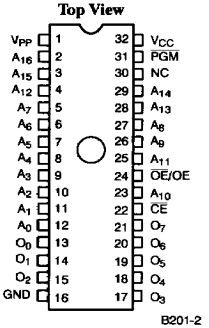
The CY7B201 is read by selecting both the $\overline{CE}$ and $\overline{OE}$/OE inputs. The contents of the memory location selected by the address on inputs $A_{16} - A_0$ will appear at the outputs $O_7 - O_0$.

Logic Block Diagram

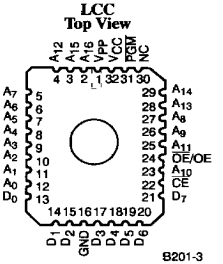


Pin Configurations

DIP
Top View



LCC
Top View



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Selection Guide

		CY7B201-25	CY7B201-30
Maximum Access Time (ns)		25	30
Maximum Operating Current (mA)	Commercial	220	220
	Military		220
Stand-by Current (mA)	Commercial	50	50
	Military		60

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 +5.5V

DC Input Voltage ..... − 0.5V to +7.0V

Transient Input Voltage ..... − 3.0V for <20 ns

DC Program Voltage 13.00V

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		CY7B201-25 Min.	CY7B201-25 Max.	CY7B201-30 Min.	CY7B201-30 Max.	Units
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = −4.0 mA		2.4		2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 12.0 mA			0.45		0.45	V
V_{IH}	Input HIGH Level	Guaranteed Input Logical HIGH Voltage for All Inputs		2.0		2.0		V
V_{IL}	Input LOW Level	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_{OL} ≤ V_{OUT} ≤ V_{OH}, Output Disabled		−40	+40	−40	+40	µA
I_{OS}	Output Short Circuit Current	V_{CC} = Max., V_{OUT} = 0.0V[5]		−20	−180	−20	−180	mA
I_{CC}	Power Supply Current	V_{CC} = Max., I_{OUT} = 0.0 mA			220		220	mA
I_{SB}	Stand-by Current	V_{CC} = Max., CE = V_{IH}	Commercial		50		50	mA
			Military				60	

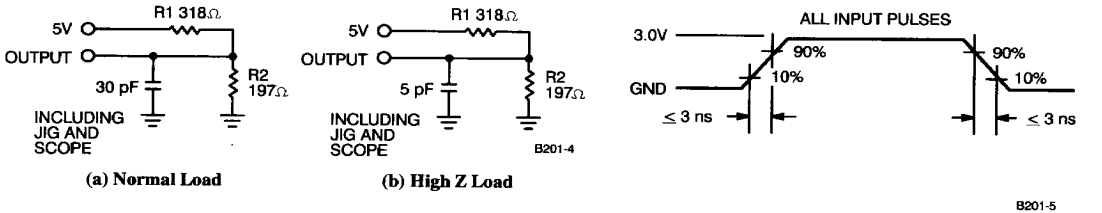
Capacitance[4]

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		12	pF

Notes:

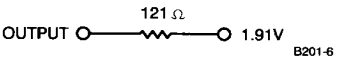
1. Contact a Cypress representative for industrial temperature range specification.
2. T_A is the "instant on" case temperature
3. See the last page of this specification for group A subgroup testing information.
4. See Introduction to CMOS PROMs in this Data Book for general information on testing.
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

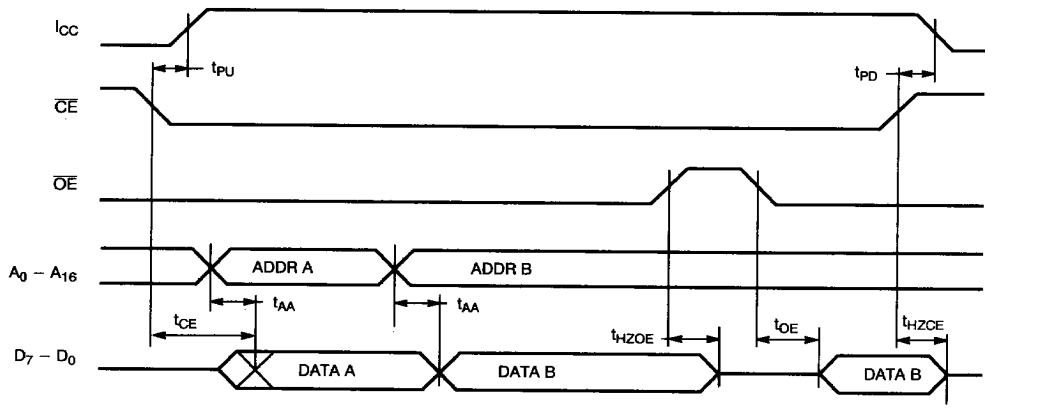
Equivalent to: THEVENIN EQUIVALENT



Switching Characteristics Over the Operating Range[3, 4]

Parameters	Description	CY7B201–25		CY7B201–30		Units
		Min.	Max.	Min.	Max.	
t_{AA}	Address to Output Valid		25		30	ns
t_{OE}	$\overline{OE}$/OE Active to Output Valid		15		15	ns
t_{HZOE}	$\overline{OE}$/OE Inactive to High Z		15		15	ns
t_{CE}	$\overline{CE}$ Active to Output Valid		30		35	ns
t_{HZCE}	$\overline{CE}$ Inactive to High Z		15		15	ns
t_{PU}	$\overline{CE}$ Active to Power-Up	0		0		ns
t_{PD}	$\overline{CE}$ Inactive to Power-Down		30		35	ns

Switching Waveform[4]



Erasure Characteristics

Wavelengths of light less than 4000 Angstroms begin to erase the 7B201 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 7B201 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 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

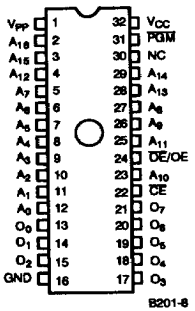
Parameter	Description	Min.	Max.	Units
V_{PP}	Programming Power Supply	12.5	13.0	V
I_{PP}	Programming Supply Current		100	mA
V_{IHP}	Programming Input Voltage HIGH	3.0	V_{CC}	V
V_{ILP}	Programming Input Voltage LOW		0.4	V

Table 2. Mode Selection

Mode	Pin Function[6]										
	$\overline{CE}$	$\overline{OE}$	$\overline{PGM}$	V_{PP}	A_{14}	A_6	A_5	A_{11}	A_0	A_9	Data
Read[7]	V_{IL}	V_{IL}	X	V_{IH}	A_{14}	A_6	A_5	A_{11}	A_0	A_9	$O_7 - O_0$
Output Disable[7]	V_{IL}	V_{IH}	X	V_{IH}	A_{14}	A_6	A_5	A_{11}	A_0	A_9	High Z
Stand-by	V_{IH}	X	X	V_{IH}	X	X	X	X	X	X	High Z
Program Array	V_{ILP}	V_{IHP}	V_{ILP}	V_{PP}	A_{14}	A_6	A_5	A_{11}	A_0	A_9	$D_7 - D_0$
Program Verify	V_{ILP}	V_{ILP}	V_{IHP}	V_{PP}	A_{14}	A_6	A_5	A_{11}	A_0	A_9	$O_7 - O_0$
Program $\overline{OE}$/OE HIGH	V_{ILP}	V_{IHP}	V_{ILP}	V_{PP}	X	V_{IHP}	V_{IHP}	V_{PP}	X	X	High Z
Program Verify $\overline{OE}$/OE	V_{ILP}	V_{ILP}	X	V_{IHP}	V_{PP}	X	X	X	X	X	$D_0 = V_{OH}$
Signature Read (MFG)	V_{IL}	V_{IL}	X	V_{IH}	X	X	X	X	V_{IL}	V_{PP}	34H
Signature Read (DEV)	V_{IL}	V_{IL}	X	V_{IH}	X	X	X	X	V_{IH}	V_{PP}	10H

Notes:
6. X = can be V_{IL} (V_{ILP}) or V_{IH} (V_{IHP}).
7. $\overline{OE}$/OE is assumed to be active LOW (default).

DIP



LCC

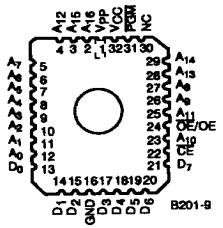


Figure 1. Programming Pinouts

Ordering Information[8]

Speed (ns)	Ordering Code	Package Type	Operating Range
25	CY7B201–25DC	D32	Commercial
	CY7B201–25HC	H65	
	CY7B201–25PC	P32	
	CY7B201–25WC	W32	
30	CY7B201–30DC	D32	Commercial
	CY7B201–30HC	H65	
	CY7B201–30PC	P32	
	CY7B201–30WC	W32	
	CY7B201–30DMB	D32	Military
	CY7B201–30LMB	L65	
	CY7B201–30QMB	Q65	
	CY7B201–30WMB	W32	

Notes:
8. 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
I_{SB}	1, 2, 3

Switching Characteristics

Parameters	Subgroups
t_{AA}	7, 8, 9, 10, 11
t_{OE}	7, 8, 9, 10, 11
t_{CE}	7, 8, 9, 10, 11