



Reprogrammable 64K x 16 Power-Down PROM

Features

- BiFAMOSSM for optimum speed/power
 - $t_{AA} = 25$ ns max. (commercial)
 - $t_{AA} = 30$ ns max. (military)
- High speed
 - 1320 mW max.
 - 275 mW stand-by
- Word-wide memory organization
- 100% reprogrammable in the windowed package
- Capable of withstanding >2001V static discharge
- User-programmable output enable (OE)
- Available in
 - 40-pin, 600-mil plastic or hermetic DIP
 - 44-pin hermetic LCC

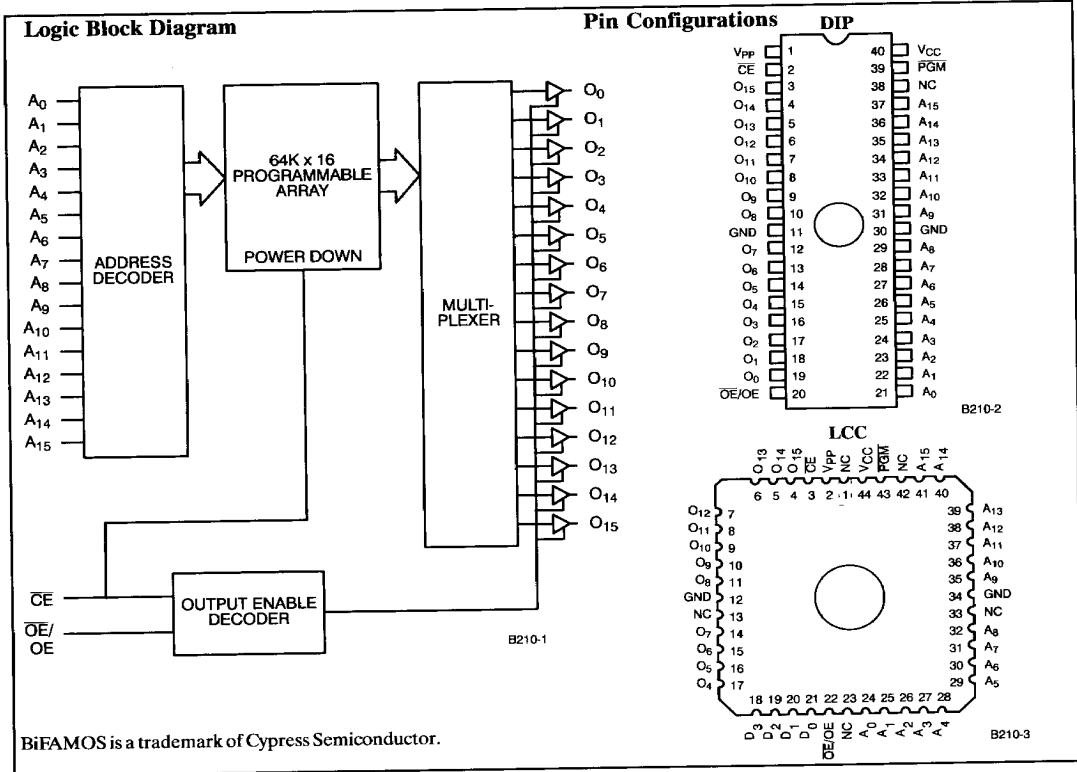
Product Characteristics

The CY7B210 is a high-performance 1-megabit BiFAMOS PROM organized in 64K words by 16 bits wide. It is available in 40-pin, 600-mil DIP and 44-pin LCC packages. These devices offer high-density storage combined with 40-MHz performance. Windowed packages allow the device to be erased with UV light for 100% reprogrammability.

The CY7B210 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 word-wide intelligent programming algorithms. The EPROM cell requires only 12.5V for the supervoltage and low programming current allows gang programming. The EPROM allows 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 CY7B210 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 $A_{15} - A_0$ will appear at the outputs $O_{15} - O_0$.



Selection Guide

		CY7B210-25	CY7B210-30
Maximum Access Time (ns)		25	30
Maximum Operating Current (mA)	Commercial	240	240
	Military		240
Maximum Operating 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	- 2.0V for <20 ns
DC Program Voltage	13.00V

UV Erasure	7258 Wsec/cm ²
Static Discharge Voltage (per MIL-STD-883, Method 3015)	>2001V
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	CY7B210-25		CY7B210-30		Units
			Min.	Max.	Min.	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = - 4.0 mA (- 3.0 mil)	2.4		2.4		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 8.0 mA (6.0 mil)		0.4		0.4	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	Commercial	240		240	mA
			Military			240	mA
I _{SB}	Stand-by Supply Current	V _{CC} = Max., CE = V _{IH}	Commercial	50		50	mA
			Military			60	mA

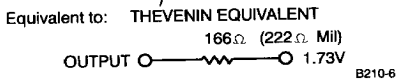
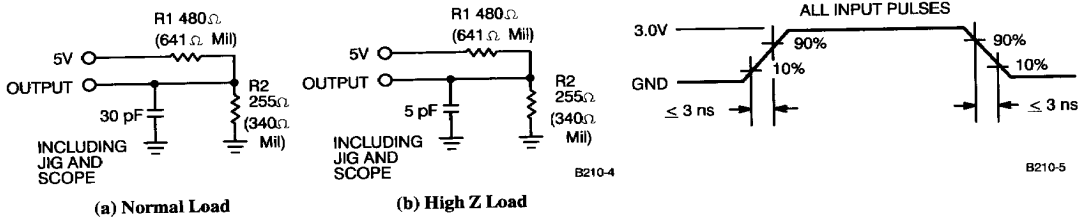
Capacitance⁴

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:

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

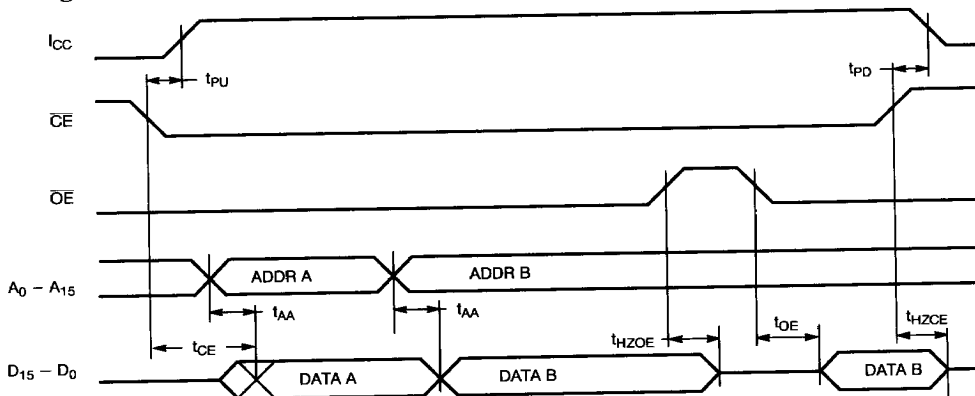
AC Test Loads and Waveforms^[4]



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

Parameters	Description	CY7B210-25		CY7B210-30		Units
		Min.	Max.	Min.	Max.	
t_{AA}	Address to Output Valid		25		30	ns
t_{OE}	\overline{OE}/OE Active to Output Valid		15		20	ns
t_{HZOE}	\overline{OE}/OE Inactive to High Z		15		20	ns
t_{CE}	\overline{CE} Active to Output Valid		30		35	ns
t_{HZCE}	\overline{CE} Inactive to High Z		15		20	ns
t_{PU}	\overline{CE} Active to Power Up	0		0		ns
t_{PD}	\overline{CE} Inactive to Power Down		30		35	ns

Switching Waveforms^[4]



B210-7

Erase Characteristics

Wavelengths of light less than 4000 Angstroms begin to erase the 7B210 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/cm². For an ultraviolet lamp with a 12 mW/cm² power rating the exposure time would be approximately 35 minutes. The 7B210 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/cm² 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	CY7B210-25		CY7B210-35		Units
		Min.	Max.	Min.	Max.	
V _{PP}	Programming Power Supply	12.5	13.0	12.5	13.0	V
I _{PP}	Programming Supply Current		100		100	ma
V _{IHP}	Programming Input Voltage HIGH	3.0	V _{CC}	3.0	V _{CC}	V
V _{ILP}	Programming Input Voltage LOW		0.4		0.4	V

Table 2. Mode Selection

Mode	Pin Function ^[6]										
	CE	OE	V _{PP}	PGM	A ₉	A ₇	A ₁₅	A ₁₄	A ₃	A ₀	Data
Read ^[7]	V _{IL}	V _{IL}	V _{IH}	X	A ₉	A ₇	A ₁₅	A ₁₄	A ₃	A ₀	O ₁₅ - O ₀
Output Disable ^[7]	V _{IL}	V _{IH}	V _{IH}	X	A ₉	A ₇	A ₁₅	A ₁₄	A ₃	A ₀	High Z
Stand-by Mode	V _{IH}	X	V _{IH}	X	X	X	X	X	X	X	High Z
Program Array	V _{ILP}	V _{IHP}	V _{PP}	V _{ILP}	A ₉	A ₇	A ₁₅	A ₁₄	A ₃	A ₀	D ₁₅ - D ₀
Program Verify	V _{ILP}	V _{ILP}	V _{PP}	V _{IHP}	A ₉	A ₇	A ₁₅	A ₁₄	A ₃	A ₀	O ₁₅ - O ₀
Program Inhibit	V _{ILP}	V _{IHP}	V _{PP}	V _{IHP}	X	X	X	X	X	X	High Z
Program OE/OE Active HIGH	V _{ILP}	V _{IHP}	V _{PP}	V _{ILP}	X	X	V _{IHP}	V _{IHP}	V _{PP}	X	High Z
Verify OE/OE Active HIGH	V _{ILP}	V _{IHP}	V _{IH}	X	X	V _{PP}	X	X	X	X	O ₀ = V _{OH}
Signature Read (MFG)	V _{IL}	V _{IL}	V _{IH}	X	V _{PP}	X	X	X	X	V _{IL}	0034H
Signature Read (DEV)	V _{IL}	V _{IL}	V _{IH}	X	V _{PP}	X	X	X	X	V _{IH}	0011H

Notes:

6. X = can be V_{IL} (V_{ILP}) or V_{IH} (V_{IHP}).

7. OE is assumed to be active LOW (default).

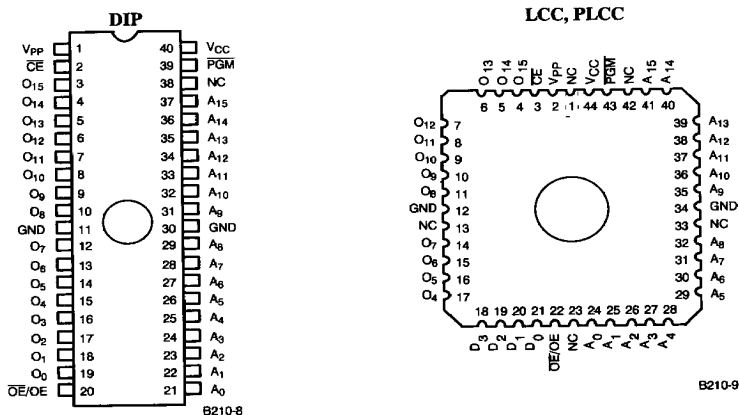


Figure 1. Programming Pinouts

Ordering Information^[8]

Speed (ns)	Ordering Code	Package Type	Operating Range
25	CY7B210-25DC	D18	Commercial
	CY7B210-25HC	H67	
	CY7B210-25PC	P17	
	CY7B210-25WC	W18	
30	CY7B210-30DC	D18	Commercial
	CY7B210-30HC	H67	
	CY7B210-30PC	P18	
	CY7B210-30WC	W18	
	CY7B210-30DMB	D18	Military
	CY7B210-30LMB	L67	
	CY7B210-30QMB	Q67	
	CY7B210-30WMB	W18	

Notes:

- 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

Document #: 38-00146-B