



# 2,048K x 32 3.3V Static RAM Module

## Features

- High-density 3.3V 64-megabit SRAM module
- 32-bit Standard Footprint supports densities from 16K x 32 through 2M x 32
- High-speed SRAMs
  - Access time of 20 ns
- 72 pins
- Available in SIMM format

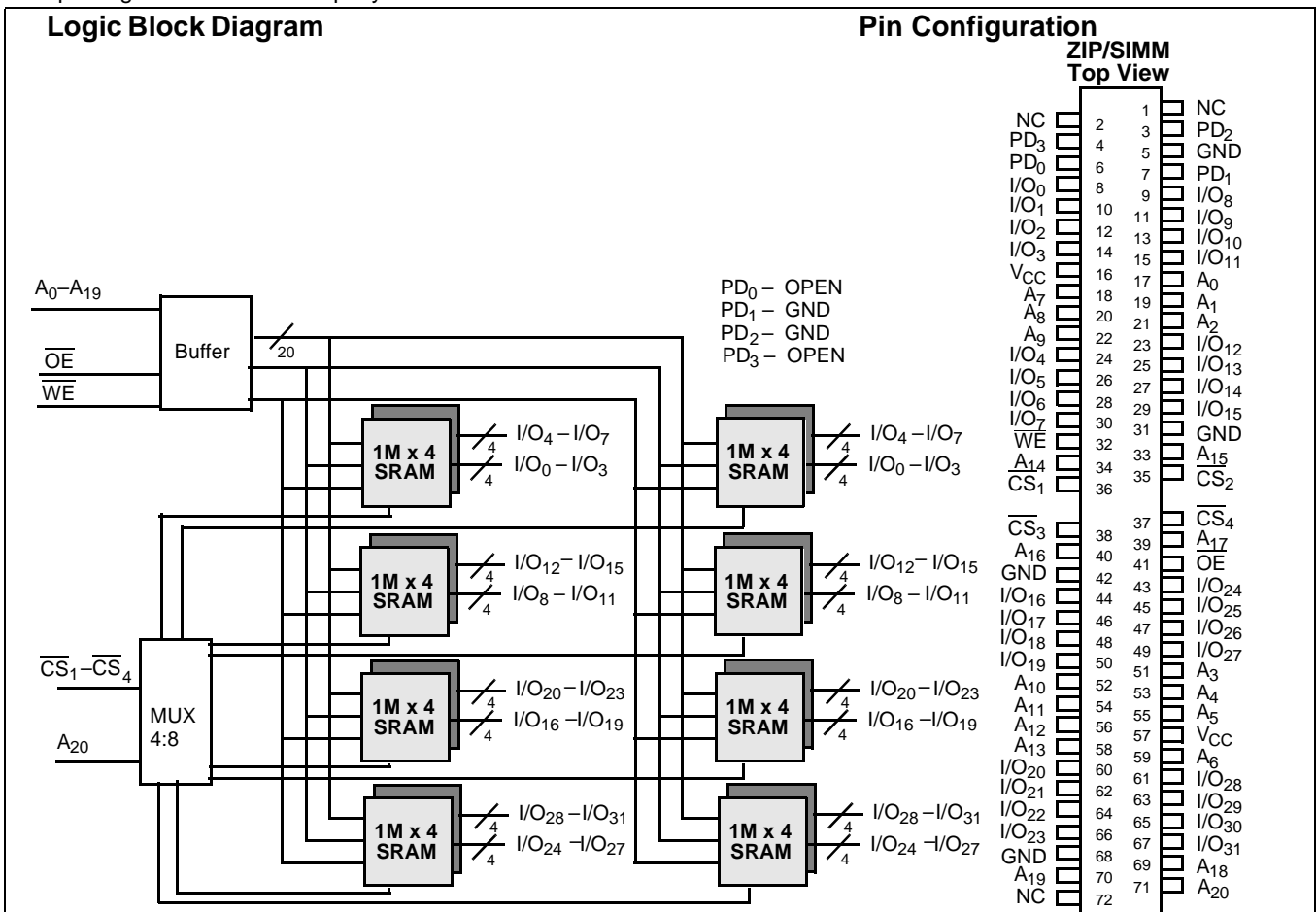
## Functional Description

The CYM1861AV33 is a high-performance 3.3V 64-megabit static RAM module organized as 2,048K words by 32 bits. This module is constructed from sixteen 1,024K x four SRAMs in SOJ packages mounted on an epoxy laminate substrate. Four

chip selects are used to independently enable the four bytes. Reading or writing can be executed on individual bytes or any combination of multiple bytes through proper use of selects.

The CYM1861AV33 is designed for use with standard 72-pin SIMM sockets. The pinout is downward compatible with the 64-pin JEDEC SIMM module family (CYM1821, CYM1831, CYM1836, and CYM1841). Thus, a single motherboard design can be used to accommodate memory depth ranging from 16K words (CYM1821) to 2,048K words (CYM1861AV33). The CYM1861AV33 is offered in vertical SIMM configuration and is available with tin-lead edge contacts.

Presence detect pins (PD<sub>0</sub>–PD<sub>3</sub>) are used to identify module memory density in applications where modules with alternate word depths can be interchanged.



## Selection Guide

	CYM1861AV33-20	CYM1861AV33-25	Unit
Maximum Access Time	20	25	ns
Maximum Operating Current	2400	2400	mA
Maximum Standby Current	1050	1050	mA

**Maximum Ratings**

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

Storage Temperature .....-55°C to +125°C  
 Ambient Temperature with Power Applied.....-10°C to +85°C  
 Supply Voltage to Ground Potential .....-0.5V to +4.6V

DC Voltage Applied to Outputs in High-Z State.....-0.5V to +V<sub>CC</sub>  
 DC Input Voltage .....-0.5V to +4.6V

**Operating Range**

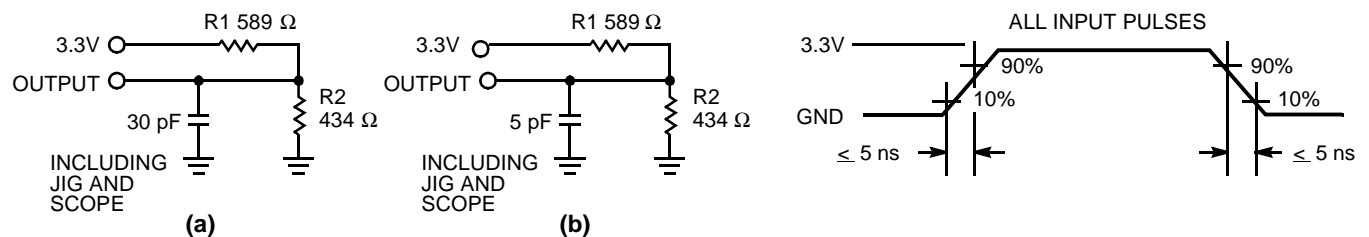
Range	Ambient Temperature	V <sub>CC</sub>
Commercial	0°C to +70°C	3.3 V + 10% -5%

**Electrical Characteristics** Over the Operating Range

Parameter	Description	Test Conditions	Min.	Max.	Unit
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = Min., I <sub>OH</sub> = -4.0 mA	2.4		V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = Min., I <sub>OL</sub> = 4.0 mA		0.4	V
V <sub>IH</sub>	Input HIGH Voltage		2.2	V <sub>CC</sub> + 0.3	V
V <sub>IL</sub>	Input LOW Voltage		-0.3V	0.8	V
I <sub>IX</sub>	Input Load Current	GND ≤ V <sub>I</sub> ≤ V <sub>CC</sub>	-10	+10	μA
I <sub>OZ</sub>	Output Leakage Current	GND ≤ V <sub>O</sub> ≤ V <sub>CC</sub> , Output Disabled	-20	+20	μA
I <sub>CC</sub>	V <sub>CC</sub> Operating Supply Current	V <sub>CC</sub> = Max., I <sub>OUT</sub> = 0 mA, CS <sub>N</sub> ≤ V <sub>IL</sub>		2400	mA
I <sub>SB1</sub>	Automatic CS Power-down Current <sup>[1]</sup>	Max. V <sub>CC</sub> , CS ≥ V <sub>IH</sub> , Min. Duty Cycle = 100%		1050	mA
I <sub>SB2</sub>	Automatic CS Power-down Current <sup>[1]</sup>	Max. V <sub>CC</sub> , CS ≥ V <sub>CC</sub> - 0.2V, V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2V, or V <sub>IN</sub> ≤ 0.2V		500	mA

**Capacitance<sup>[2]</sup>**

Parameter	Description	Test Conditions	Max.	Unit
C <sub>IN</sub>	Input Capacitance	T <sub>A</sub> = 25°C, f = 1 MHz, V <sub>CC</sub> = 3.3V	7	pF
C <sub>OUT</sub>	Output Capacitance		14	pF

**AC Test Loads and Waveforms**


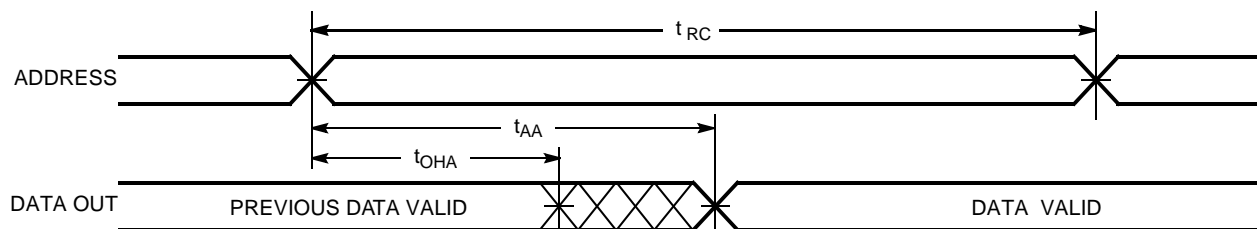
Equivalent to: THÉVENIN EQUIVALENT


**Notes:**

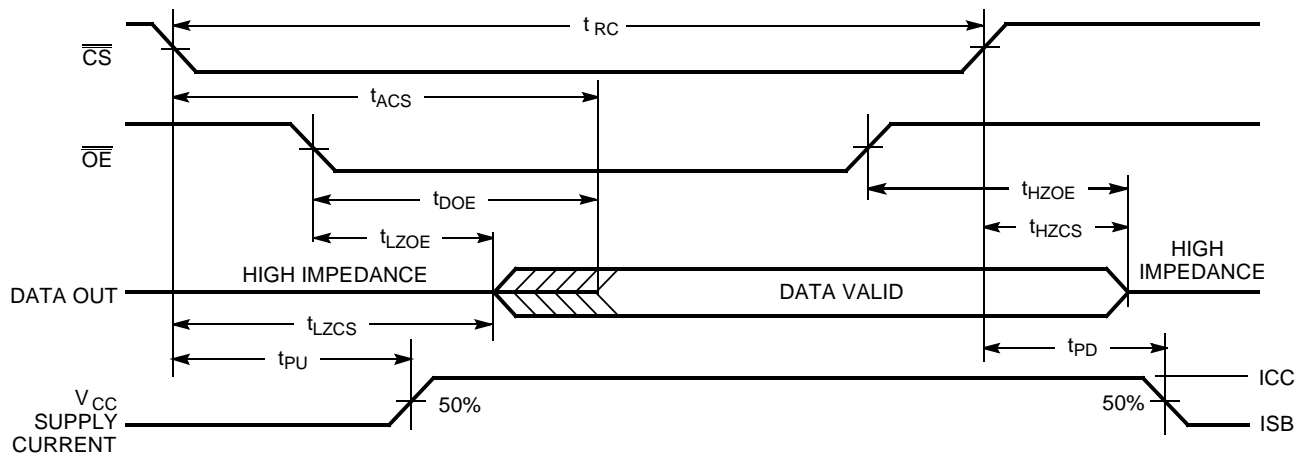
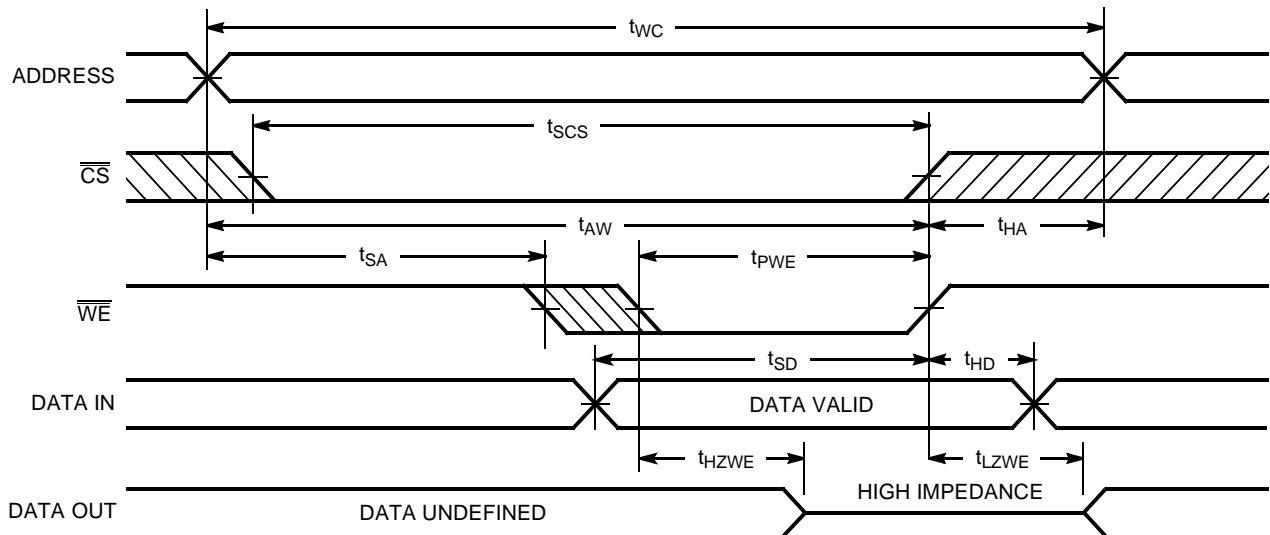
1. A pull-up resistor to V<sub>CC</sub> on the  $\overline{\text{CS}}$  input is required to keep the device deselected during V<sub>CC</sub> power-up, otherwise I<sub>SB</sub> will exceed values given.
2. Tested on a sample basis.

**Switching Characteristics** Over the Operating Range<sup>[3]</sup>

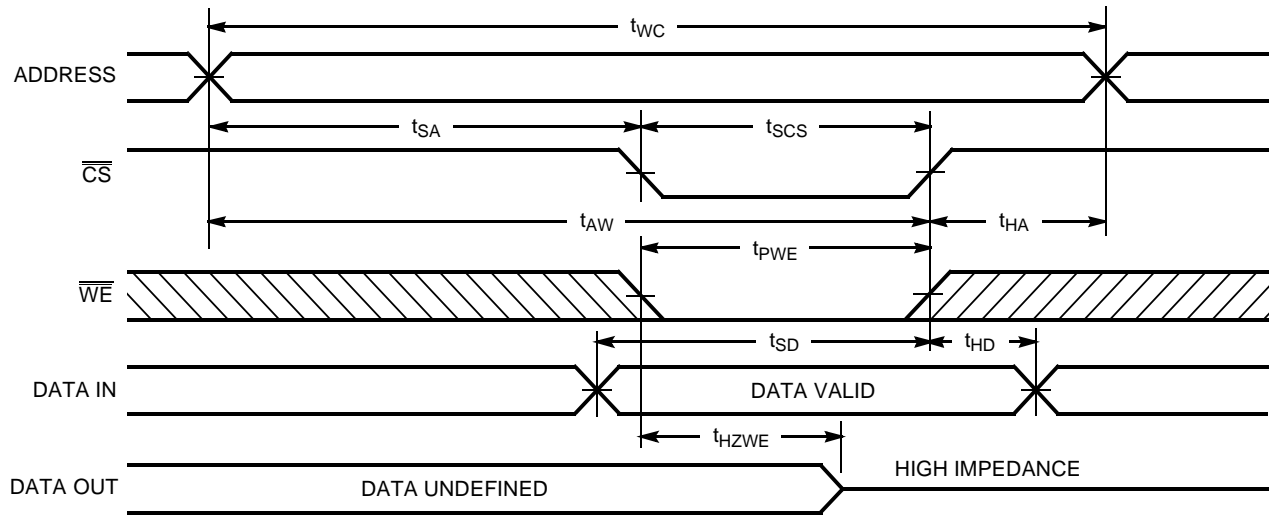
Parameter	Description	CY1861AV33-20		CY1861AV33-25		Unit
		Min.	Max.	Min.	Max.	
<b>Read Cycle</b>						
$t_{RC}$	Read Cycle Time	20		25		ns
$t_{AA}$	Address to Data Valid		20		25	ns
$t_{OHA}$	Data Hold from Address Change	3		3		ns
$t_{ACS}$	CS LOW to Data Valid		20		25	ns
$t_{DOE}$	OE LOW to Data Valid		12		15	ns
$t_{LZOE}$	OE LOW to Low-Z	0		4		ns
$t_{HZOE}$	OE HIGH to High-Z		10		12	ns
$t_{LZCS}$	CS LOW to Low-Z <sup>[4]</sup>	3		7		ns
$t_{HZCS}$	CS HIGH to High-Z <sup>[4, 5]</sup>		10		12	ns
$t_{PD}$	CS HIGH to Power-down		20		25	ns
<b>Write Cycle<sup>[6]</sup></b>						
$t_{WC}$	Write Cycle Time	20		25		ns
$t_{SCS}$	CS LOW to Write End	17		20		ns
$t_{AW}$	Address Set-up to Write End	17		20		ns
$t_{HA}$	Address Hold from Write End	3		3		ns
$t_{SA}$	Address Set-up to Write Start	2		2		ns
$t_{PWE}$	WE Pulse Width	15		20		ns
$t_{SD}$	Data Set-up to Write End	12		15		ns
$t_{HD}$	Data Hold from Write End	2		2		ns
$t_{LZWE}$	WE HIGH to Low-Z	3		3		ns
$t_{HZWE}$	WE LOW to High-Z <sup>[5]</sup>	0	12	0	12	ns

**Switching Waveforms**
**Read Cycle No. 1<sup>[7, 8]</sup>**

**Notes:**

3. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified  $I_{OL}/I_{OH}$  and 30-pF load capacitance.
4. At any given temperature and voltage condition,  $t_{HZCS}$  is less than  $t_{LZCS}$  for any given device. These parameters are guaranteed and not 100% tested.
5.  $t_{HZCS}$  and  $t_{HZWE}$  are specified with  $C_L = 5$  pF as in (b) of AC Test Loads and Waveforms. Transition is measured  $\pm 500$  mV from steady-state voltage.
6. The internal Write time of the memory is defined by the overlap of CS LOW and WE LOW. Both signals must be LOW to initiate a Write and either signal can terminate a Write by going HIGH. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the Write.
7. WE is HIGH for Read cycle.

**Switching Waveforms (continued)**
**Read Cycle No. 2 [7, 9]**

**Write Cycle No. 1 ( $\overline{WE}$  Controlled) [6]**

**Notes:**

8. Device is continuously selected,  $\overline{CS} = V_{IL}$  and  $\overline{OE} = V_{IL}$ .
9. Address valid prior to or coincident with  $\overline{CS}$  transition LOW.

**Switching Waveforms (continued)**
**Write Cycle No. 2 ( $\overline{\text{CS}}$  Controlled)<sup>[6,10]</sup>**

**Truth Table**

$\overline{\text{CS}}$	$\overline{\text{WE}}$	$\overline{\text{OE}}$	Inputs/Output	Mode
H	X	X	High-Z	Deselect/Power-down
L	H	L	Data Out	Read
L	L	X	Data In	Write
L	H	H	High-Z	Deselect

**Ordering Information**

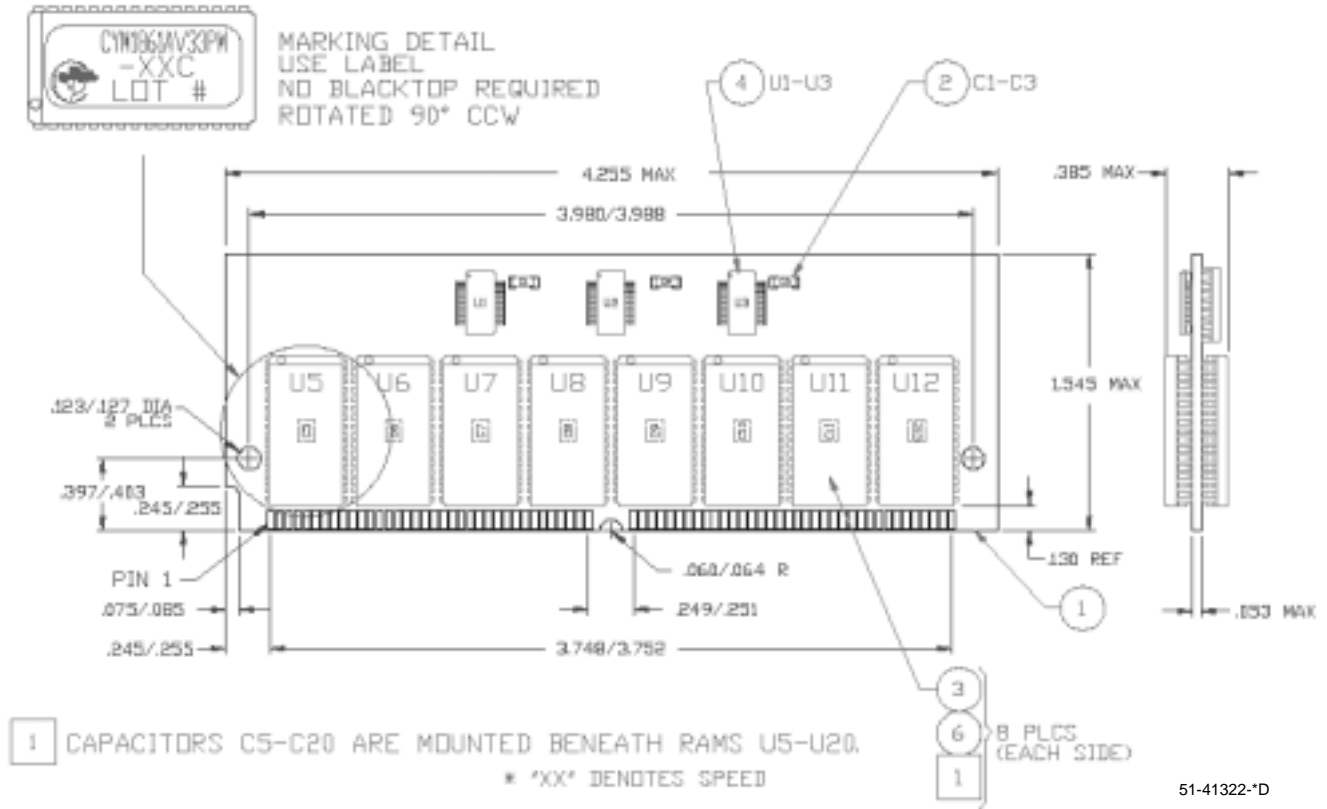
Speed (ns)	Ordering Code	Package Type	Package Type	Operating Range
20	CYM1861AV33PM-20C	PM48	72-pin Plastic SIMM Module	Commercial
25	CYM1861AV33PM-25C	PM48	72-pin Plastic SIMM Module	Commercial

**Note:**

10. If  $\overline{\text{CS}}$  goes HIGH simultaneously with  $\overline{\text{WE}}$  HIGH, the output remains in a high-impedance state.

Package Diagram

72-pin Plastic SIMM Module



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**Document Title: CYM1861AV33 2,048K x 32 3.3V Static RAM Module**  
**Document Number: 38-05297**

<b>REV.</b>	<b>ECN NO.</b>	<b>Issue Date</b>	<b>Orig. of Change</b>	<b>Description of Change</b>
**	117909	08/22/02	MEG	New Data Sheet