

CYPRESS
SEMICONDUCTOR

7-46-23-14

CYM1420

128K x 8 Static RAM Module

Features

- High-density 1-megabit SRAM module
- High-speed CMOS SRAMs
— Access time of 20 ns
- 32-pin, 0.6-inch-wide DIP package
- Low active power
— 1.2W (max.)
- Hermetic or plastic SMD technology
- TTL-compatible inputs and outputs
- JEDEC-compatible pinout
- Commercial and military temperature ranges

Functional Description

The CYM1420 is a very high performance 1-megabit static RAM module organized as 128K words by 8 bits. The module is constructed using four 32K x 8 static RAMs mounted onto a substrate. A decoder is used to interpret the higher-order addresses A_{15} and A_{16} and to select one of the four RAMs.

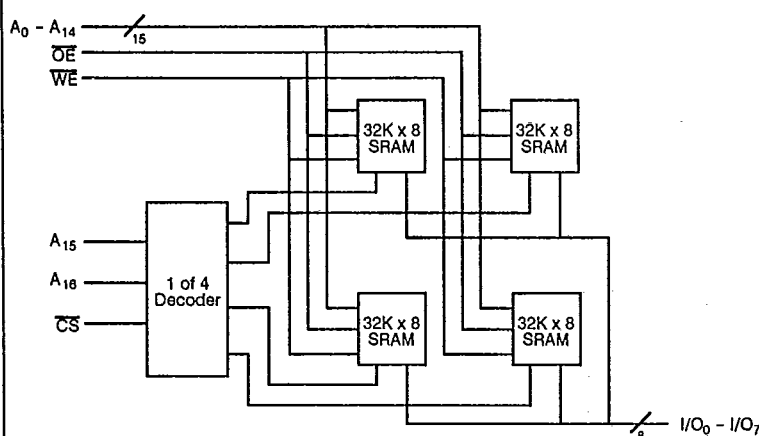
Writing to the memory module is accomplished when the chip select ($\overline{CS}$) and write enable ($\overline{WE}$) inputs are both LOW. Data on the eight input/output pins ($I/O_0 - I/O_7$)

is written into the memory locations specified on the address pins ($A_0 - A_{16}$).

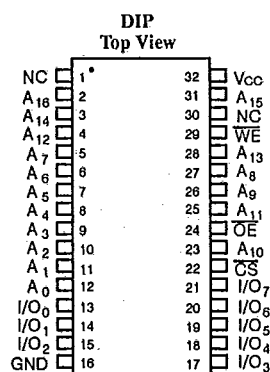
Reading the device is accomplished by taking chip select ($\overline{CS}$) and output enable ($\overline{OE}$) LOW while $\overline{WE}$ remains inactive or HIGH. Under these conditions, the contents of the memory location specified on the address pins will appear on the eight input/output pins.

The input/output pins remain in a high-impedance state unless the module is selected, outputs are enabled, and write enable ($\overline{WE}$) is HIGH.

Logic Block Diagram



Pin Configuration



1420-1

1420-2

Selection Guide

		1420-20	1420-25	1420-30	1420-35	1420-45	1420-55
Maximum Access Time (ns)		20	25	30	35	45	55
Maximum Operating Current (mA)	Commercial	210	210	210	210	210	210
	Military			210	210	210	210
Maximum Standby Current (mA)	Commercial	140	140	140	140	140	140
	Military			140	140	140	140

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Maximum Ratings

(Above which the useful life may be impaired.)

Storage Temperature -65°C to +150°C

Ambient Temperature with

Power Applied -10°C to +85°C (Commercial)
-55°C to +125°C (Military)

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 -0.5V to +7.0V

Output Current into Outputs (LOW) 20 mA

Operating Range

Range	Ambient Temperature	V _{CC}
Commercial	0°C to +70°C	5V ± 10%
Military	-55°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameters	Description	Test Conditions	1420		Units
			Min.	Max.	
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} = 8.0 mA		0.4	V
V _{IH}	Input HIGH Voltage		2.2	V _{CC}	V
V _{IL}	Input LOW Voltage		-0.5	0.8	V
I _{IX}	Input Load Current	GND ≤ V _I ≤ V _{CC}	-10	+10	μA
I _{OZ}	Output Leakage Current	GND ≤ V _O ≤ V _{CC} , Output Disabled	-10	+10	μA
I _{OS}	Output Short Circuit Current ⁽¹⁾	V _{CC} = Max., V _{OUT} = GND		-300	mA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA, CS ≤ V _{IL}		210	mA
I _{SB1}	Automatic CS Power-Down Current ⁽²⁾	Max. V _{CC} ; CS > V _{IH} Min. Duty Cycle = 100%		140	mA
I _{SB2}	Automatic CS Power-Down Current ⁽²⁾	Max. V _{CC} ; CS > V _{CC} - 0.3V, V _{IN} > V _{CC} - 0.3V or V _{IN} < 0.3V		80	mA

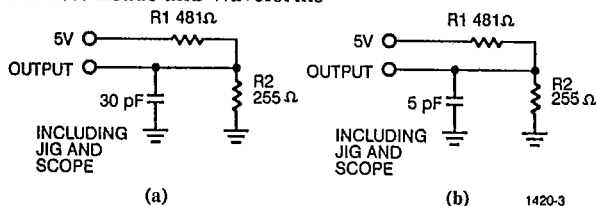
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Capacitance⁽³⁾

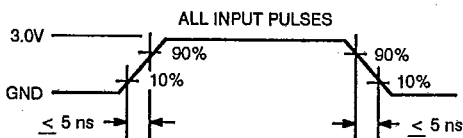
Parameters	Description	Test Conditions	Max.	Units
C _{IN}	Input Capacitance	T _A = 25°C, f = 1 MHz, V _{CC} = 5.0V	35	pF
C _{OUT}	Output Capacitance		40	pF

Notes:

- Not more than 1 output should be shorted at one time. Duration of the short circuit should not exceed 30 seconds.
- A pull-up resistor to V_{CC} on the CS input is required to keep the device deselected during V_{CC} power-up, otherwise I_{SB} will exceed values given.
- Tested on a sample basis.

AC Test Loads and Waveforms

Equivalent to: THEVENIN EQUIVALENT
OUTPUT — 167Ω — 1.73V



Switching Characteristics Over the Operating Range⁽⁴⁾

Parameters		1420-20		1420-25		1420-30		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE								
t _{RC}	Read Cycle Time	20		25		30		ns
t _{AA}	Address to Data Valid		20		25		30	ns
t _{OHA}	Data Hold from Address Change	3		3		3		ns
t _{ACS}	$\overline{\text{CS}}$ LOW to Data Valid		20		25		30	ns
t _{DOE}	$\overline{\text{OE}}$ LOW to Data Valid		10		10		15	ns
t _{LZOE}	$\overline{\text{OE}}$ LOW to Low Z	0		0		0		ns
t _{HZOE}	$\overline{\text{OE}}$ HIGH to High Z		10		10		20	ns
t _{LZCS}	$\overline{\text{CS}}$ LOW to Low Z ^[5]	3		3		5		ns
t _{HZCS}	$\overline{\text{CS}}$ HIGH to High Z ^[5, 6]		20		20		20	ns
WRITE CYCLE ^[7]								
t _{WC}	Write Cycle Time	20		25		30		ns
t _{SCS}	$\overline{\text{CS}}$ LOW to Write End	15		20		25		ns
t _{AW}	Address Set-Up to Write End	15		20		25		ns
t _{HA}	Address Hold from Write End	2		2		5		ns
t _{SA}	Address Set-Up to Write Start	5		5		5		ns
t _{PWE}	$\overline{\text{WE}}$ Pulse Width	15		20		25		ns
t _{SD}	Data Set-Up to Write End	10		12		18		ns
t _{HD}	Data Hold from Write End	2		2		3		ns
t _{LZWE}	$\overline{\text{WE}}$ HIGH to Low Z ^[5]	0		0		5		ns
t _{HZWE}	$\overline{\text{WE}}$ LOW to High Z ^[5, 6]	0	8	0	10	0	15	ns

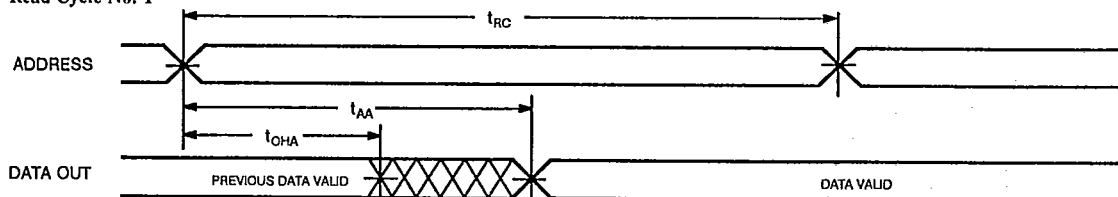
Parameters	Description	1420-35		1420-45		1420-55		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE								
t _{RC}	Read Cycle Time	35		45		55		ns
t _{AA}	Address to Data Valid		35		45		55	ns
t _{OHA}	Data Hold from Address Change	3		5		5		ns
t _{ACS}	CS LOW to Data Valid		35		45		55	ns
t _{DOE}	OE LOW to Data Valid		18		25		30	ns
t _{LZOE}	OE LOW to Low Z	0		0		0		ns
t _{HZOE}	OE HIGH to High Z		20		20		25	ns
t _{LZCS}	CS LOW to Low Z ^[5]	3		5		5		ns
t _{HZCS}	CS HIGH to High Z ^[5, 6]		20		20		25	ns
WRITE CYCLE ^[7]								
t _{WC}	Write Cycle Time	35		45		55		ns
t _{SCS}	CS LOW to Write End	30		40		45		ns
t _{AW}	Address Set-Up to Write End	30		40		45		ns
t _{HA}	Address Hold from Write End	5		5		5		ns
t _{SA}	Address Set-Up to Write Start	5		5		5		ns
t _{PWE}	WE Pulse Width	25		25		30		ns
t _{SD}	Data Set-Up to Write End	18		20		25		ns
t _{HD}	Data Hold from Write End	3		5		5		ns
t _{LZWE}	WE HIGH to Low Z ^[5]	5		5		5		ns
t _{HZWE}	WE LOW to High Z ^[5, 6]	0	15	0	15	0	25	ns

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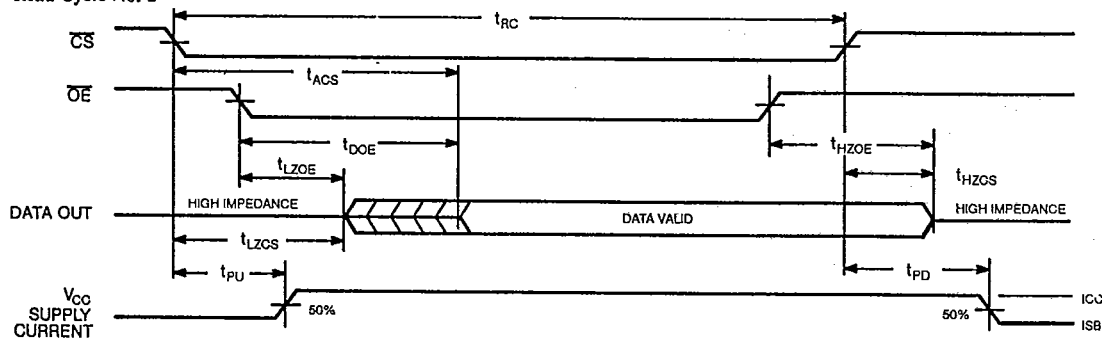


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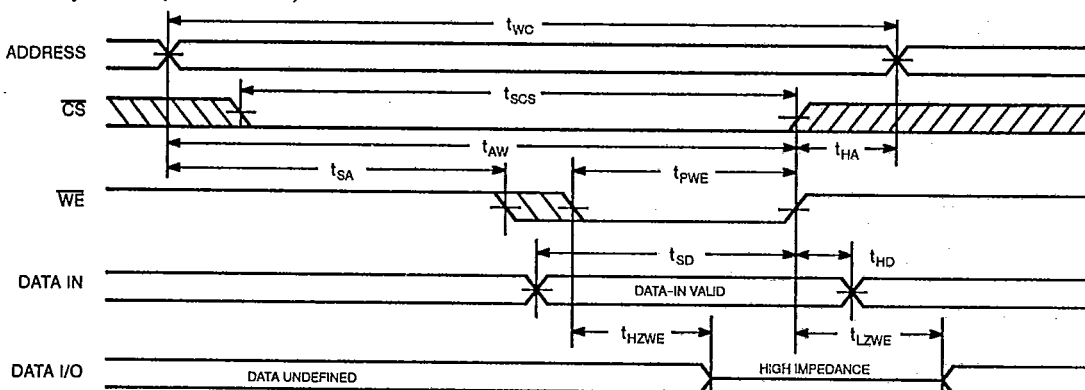
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Switching Waveforms^[10]Read Cycle No. 1^[8,9]

1420-5

Read Cycle No. 2^[8]

1420-6

Write Cycle No. 1 ($\overline{WE}$ Controlled)^[7, 11]

1420-7

Notes:

4. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
5. 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.
6. t_{HZCS} and t_{HZWE} are specified with $C_L = 5$ pF as in part (b) of AC Test Loads. Transition is measured ± 500 mV from steady state voltage.
7. The internal write time of the memory is defined by the overlap of $\overline{CS}$ LOW and $\overline{WE}$ 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 reference to the rising edge of the signal that terminates the write.

8. $\overline{WE}$ is HIGH for read cycle.
9. Device is continuously selected, $\overline{CS} = V_{IL}$ and $\overline{OE} = V_{IL}$.
10. Address valid prior to or coincident with $\overline{CS}$ transition LOW.
11. Data I/O will be high impedance if $\overline{OE} = V_{IH}$.
12. If $\overline{CS}$ goes HIGH simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.

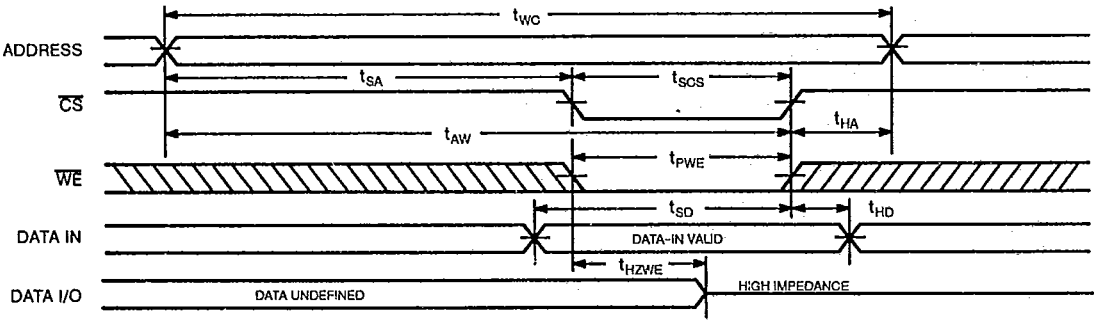


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Switching Waveforms (continued)

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Write Cycle No. 2 ($\overline{CS}$ Controlled) [7, 11, 12]



1420-8

Truth Table

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

Ordering Information

Speed (ns)	Ordering Code	Package Type	Operating Range
20	CYM1420PD-20C	PD05	Commercial
	CYM1420HD-20C	HD04	
25	CYM1420PD-25C	PD05	Commercial
	CYM1420HD-25C	HD04	
30	CYM1420PD-30C	PD05	Commercial
	CYM1420HD-30C	HD04	
	CYM1420HD-30MB	HD04	Military
35	CYM1420PD-35C	PD05	Commercial
	CYM1420HD-35C	HD04	
	CYM1420HD-30MB	HD04	Military
45	CYM1420PD-45C	PD05	Commercial
	CYM1420HD-45C	HD04	
	CYM1420HD-45MB	HD04	Military
55	CYM1420PD-55C	PD05	Commercial
	CYM1420HD-55C	HD04	
	CYM1420HD-55MB	HD04	Military

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