



CY7C107B CY7C1007B

1M x 1 Static RAM

Features

- High speed
— $t_{AA} = 12 \text{ ns}$
- CMOS for optimum speed/power
- Automatic power-down when deselected
- TTL-compatible inputs and outputs

Functional Description

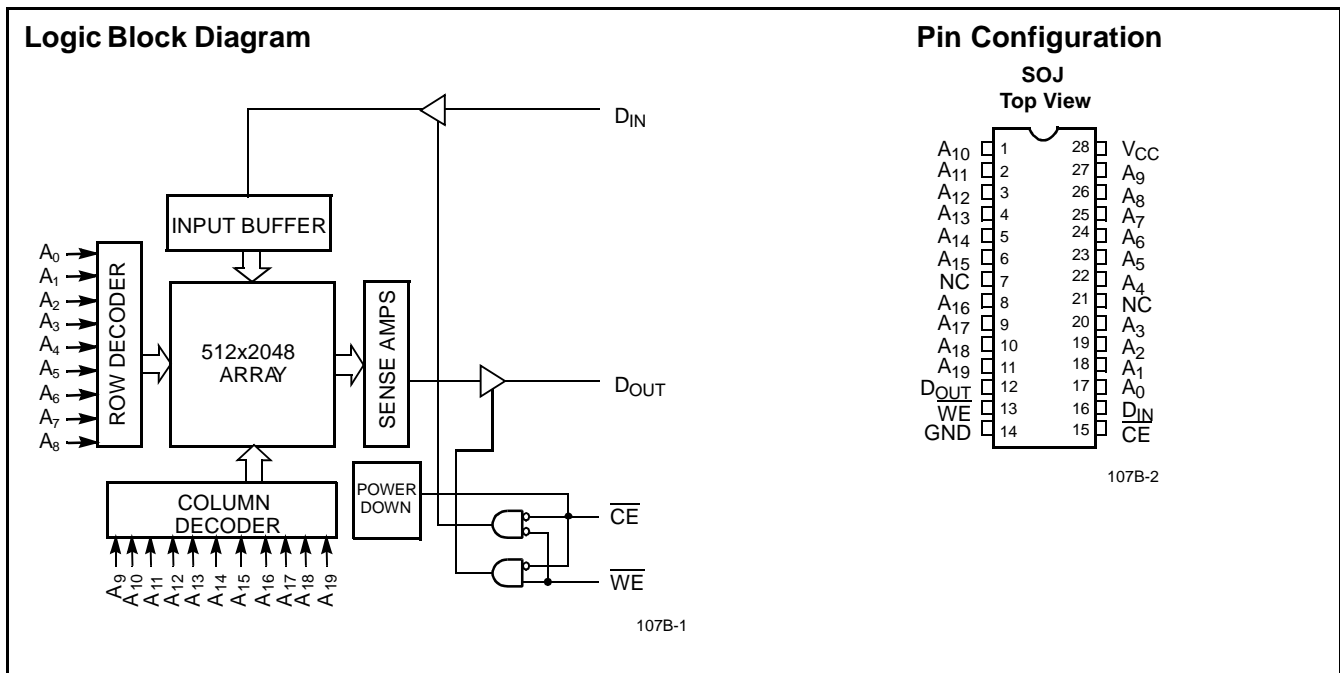
The CY7C107B and CY7C1007B are high-performance CMOS static RAMs organized as 1,048,576 words by 1 bit. Easy memory expansion is provided by an active LOW Chip Enable (\overline{CE}) and three-state drivers. These devices have an automatic power-down feature that reduces power consumption by more than 65% when deselected.

Writing to the devices is accomplished by taking Chip Enable (\overline{CE}) and Write Enable (\overline{WE}) inputs LOW. Data on the input pin (D_{IN}) is written into the memory location specified on the address pins (A_0 through A_{19}).

Reading from the devices is accomplished by taking Chip Enable (\overline{CE}) LOW while Write Enable (\overline{WE}) remains HIGH. Under these conditions, the contents of the memory location specified by the address pins will appear on the data output (D_{OUT}) pin.

The output pin (D_{OUT}) is placed in a high-impedance state when the device is deselected (\overline{CE} HIGH) or during a write operation (\overline{CE} and \overline{WE} LOW).

The CY7C107B is available in a standard 400-mil-wide SOJ; the CY7C1007B is available in a standard 300-mil-wide SOJ.



Selection Guide

	7C107B-12 7C1007B-12	7C107B-15 7C1007B-15	7C107B-20 7C1007B-20	7C107B-25 7C1007B-25	7C107B-35 7C1007B-35
Maximum Access Time (ns)	12	15	20	25	35
Maximum Operating Current (mA)	90	80	75	70	60
Maximum CMOS Standby Current SB2 (mA)	2	2	2	2	2



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 on V_{CC} Relative to GND^[1] -0.5V to +7.0V
- DC Voltage Applied to Outputs in High Z State^[1] -0.5V to V_{CC} + 0.5V
- DC Input Voltage^[1]..... -0.5V to V_{CC} + 0.5V

- Current into Outputs (LOW) 20 mA
- Static Discharge Voltage >2001V (per MIL-STD-883, Method 3015)
- Latch-Up Current..... >200 mA

Operating Range

Range	Ambient Temperature ^[2]	V _{CC}
Commercial	0°C to +70°C	5V ± 10%
Industrial	-40°C to +85°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	7C107B-12 7C1007B-12		7C107B-15 7C1007B-15		7C107B-20 7C1007B-20		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -4.0 mA	2.4		2.4		2.4		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 8.0 mA		0.4		0.4		0.4	V
V _{IH}	Input HIGH Voltage		2.2	V _{CC} +0.3	2.2	V _{CC} +0.3	2.2	V _{CC} +0.3	V
V _{IL}	Input LOW Voltage ^[1]		-0.3	0.8	-0.3	0.8	-0.3	0.8	V
I _{IX}	Input Load Current	GND ≤ V _I ≤ V _{CC}	-1	+1	-1	+1	-1	+1	μA
I _{OZ}	Output Leakage Current	GND ≤ V _I ≤ V _{CC} , Output Disabled	-5	+5	-5	+5	-5	+5	μA
I _{OS}	Output Short Circuit Current ^[3]	V _{CC} = Max., V _{OUT} = GND		-300		-300		-300	mA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA, f = f _{MAX} = 1/t _{RC}		90		80		75	mA
I _{SB1}	Automatic \overline{CE} Power-Down Current— TTL Inputs	Max. V _{CC} , $\overline{CE} \geq V_{IH}$, V _{IN} ≥ V _{IH} or V _{IN} ≤ V _{IL} , f = f _{MAX}		20		20		20	mA
I _{SB2}	Automatic \overline{CE} Power-Down Current— CMOS Inputs	Max. V _{CC} , $\overline{CE} \geq V_{CC} - 0.3V$, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≤ 0.3V, f = 0		2		2		2	mA

Notes:

1. V_{IL} (min.) = -2.0V for pulse durations of less than 20 ns.
2. T_A is the "Instant On" case temperature.
3. Not more than 1 output should be shorted at one time. Duration of the short circuit should not exceed 30 seconds.

Electrical Characteristics Over the Operating Range (continued)

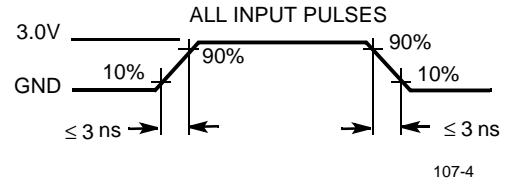
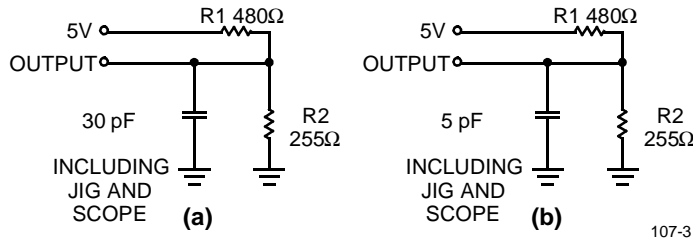
Parameter	Description	Test Conditions	7C107B-25 7C1007B-25		7C107B-35 7C1007B-35		Unit
			Min.	Max.	Min.	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -4.0 mA	2.4		2.4		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 8.0 mA		0.4		0.4	V
V _{IH}	Input HIGH Voltage		2.2	V _{CC} + 0.3	2.2	V _{CC} + 0.3	V
V _{IL}	Input LOW Voltage ^[1]		-0.3	0.8	-0.3	0.8	V
I _{IX}	Input Load Current	GND ≤ V _I ≤ V _{CC}	-1	+1	-1	+1	μA
I _{OZ}	Output Leakage Current	GND ≤ V _I ≤ V _{CC} , Output Disabled	-5	+5	-5	+5	μA
I _{OS}	Output Short Circuit Current ^[3]	V _{CC} = Max., V _{OUT} = GND		-300		-300	mA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA, f = f _{MAX} = 1/t _{RC}		70		60	mA
I _{SB1}	Automatic \overline{CE} Power-Down Current—TTL Inputs	Max. V _{CC} , $\overline{CE} \geq V_{IH}$, V _{IN} ≥ V _{IH} or V _{IN} ≤ V _{IL} , f = f _{MAX}		20		20	mA
I _{SB2}	Automatic \overline{CE} Power-Down Current—CMOS Inputs	Max. V _{CC} , $\overline{CE} \geq V_{CC} - 0.3V$, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≤ 0.3V, f = 0		2		2	mA

Capacitance^[4]

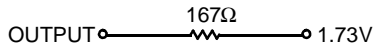
Parameter	Description	Test Conditions	Max.	Unit
C _{IN} : Addresses	Input Capacitance	T _A = 25°C, f = 1 MHz, V _{CC} = 5.0V	7	pF
C _{IN} : Controls			10	pF
C _{OUT}	Output Capacitance		10	pF

Note:

4. Tested initially and after any design or process changes that may affect these parameters.

AC Test Loads and Waveforms


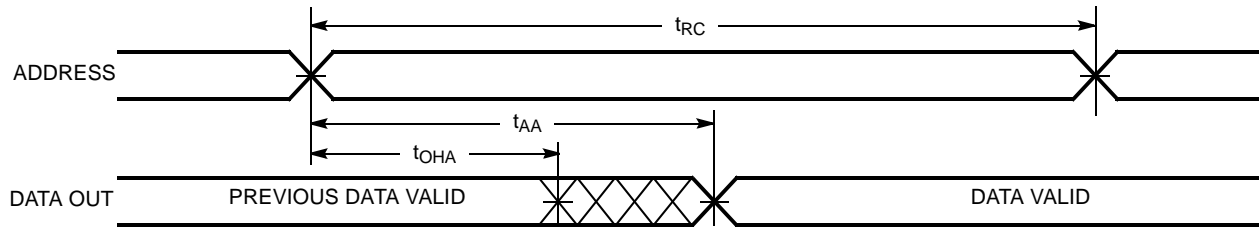
Equivalent to: THÉVENIN EQUIVALENT


Switching Characteristics^[5] Over the Operating Range

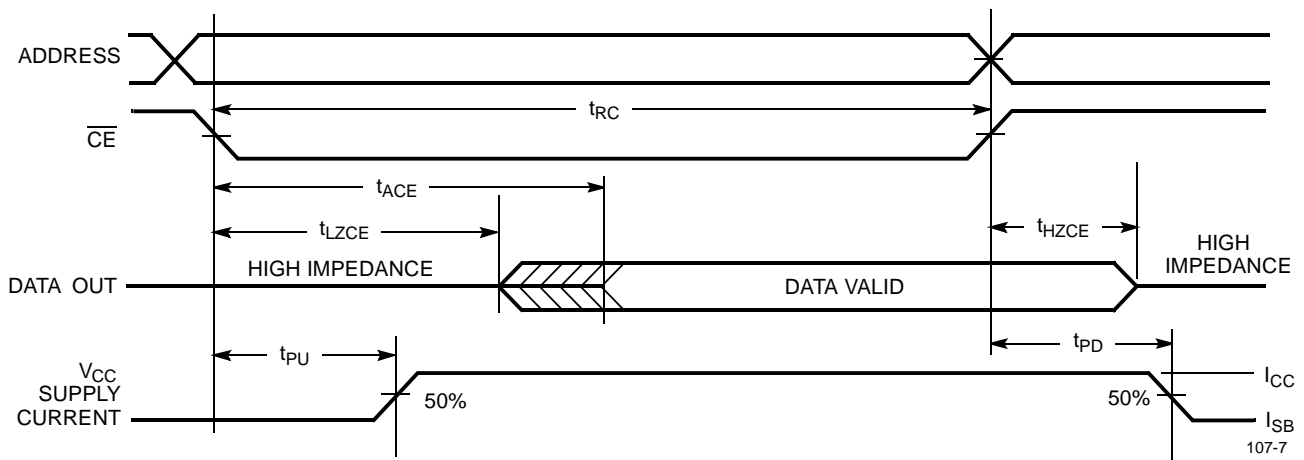
Parameter	Description	7C107B-12 7C1007B-12		7C107B-15 7C1007B-15		7C107B-20 7C1007B-20		7C107B-25 7C1007B-25		7C107B-35 7C1007B-35		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE												
t_{RC}	Read Cycle Time	12		15		20		25		35		ns
t_{AA}	Address to Data Valid		12		15		20		25		35	ns
t_{OHA}	Data Hold from Address Change	3		3		3		3		3		ns
t_{ACE}	\overline{CE} LOW to Data Valid		12		15		20		25		35	ns
t_{LZCE}	\overline{CE} LOW to Low Z ^[6]	3		3		3		3		3		ns
t_{HZCE}	\overline{CE} HIGH to High Z ^[6, 7]		6		7		8		10		10	ns
t_{PU}	\overline{CE} LOW to Power-Up	0		0		0		0		0		ns
t_{PD}	\overline{CE} HIGH to Power-Down		12		15		20		25		35	ns
WRITE CYCLE^[8]												
t_{WC}	Write Cycle Time	12		15		20		25		35		ns
t_{SCE}	\overline{CE} LOW to Write End	10		12		15		20		25		ns
t_{AW}	Address Set-Up to Write End	10		12		15		20		25		ns
t_{HA}	Address Hold from Write End	0		0		0		0		0		ns
t_{SA}	Address Set-Up to Write Start	0		0		0		0		0		ns
t_{PWE}	\overline{WE} Pulse Width	10		12		15		20		25		ns
t_{SD}	Data Set-Up to Write End	7		8		10		15		20		ns
t_{HD}	Data Hold from Write End	0		0		0		0		0		ns
t_{LZWE}	\overline{WE} HIGH to Low Z ^[6]	3		3		3		3		3		ns
t_{HZWE}	\overline{WE} LOW to High Z ^[6, 7]		6		7		8		10		10	ns

Notes:

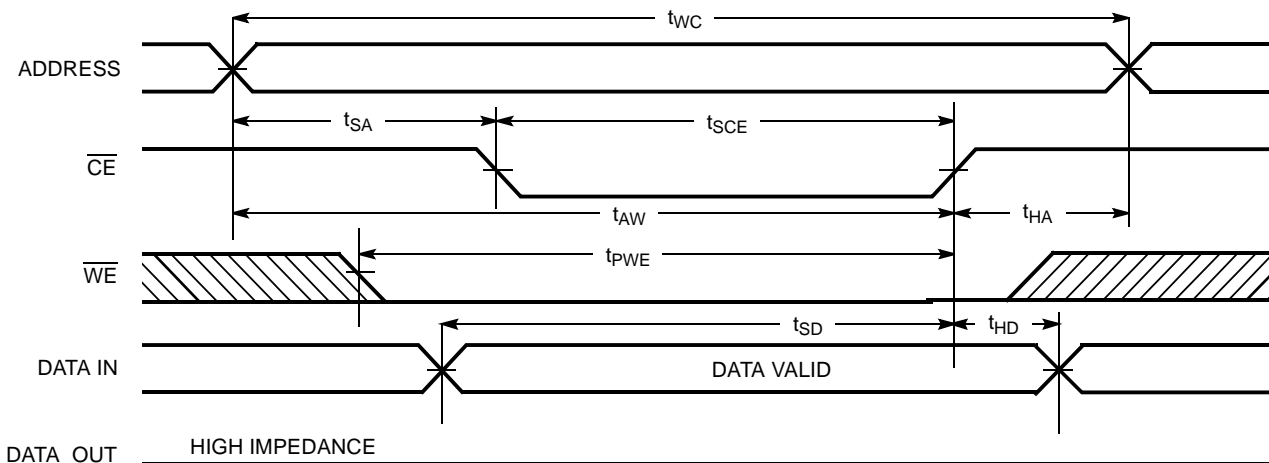
- Test conditions assume signal transition time of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
- At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} and t_{HZWE} is less than t_{LZWE} for any given device.
- t_{HZCE} and t_{HZWE} are specified with a load capacitance of 5 pF as in part (b) of AC Test Loads. Transition is measured ± 500 mV from steady-state voltage.
- The internal write time of the memory is defined by the overlap of \overline{CE} LOW and \overline{WE} LOW. \overline{CE} and \overline{WE} must be LOW to initiate a write, and the transition of any of these signals can terminate the write. The input data set-up and hold timing should be referenced to the leading edge of the signal that terminates the write.

Switching Waveforms
Read Cycle No. 1^[10, 11]


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Read Cycle No. 2^[11, 12]


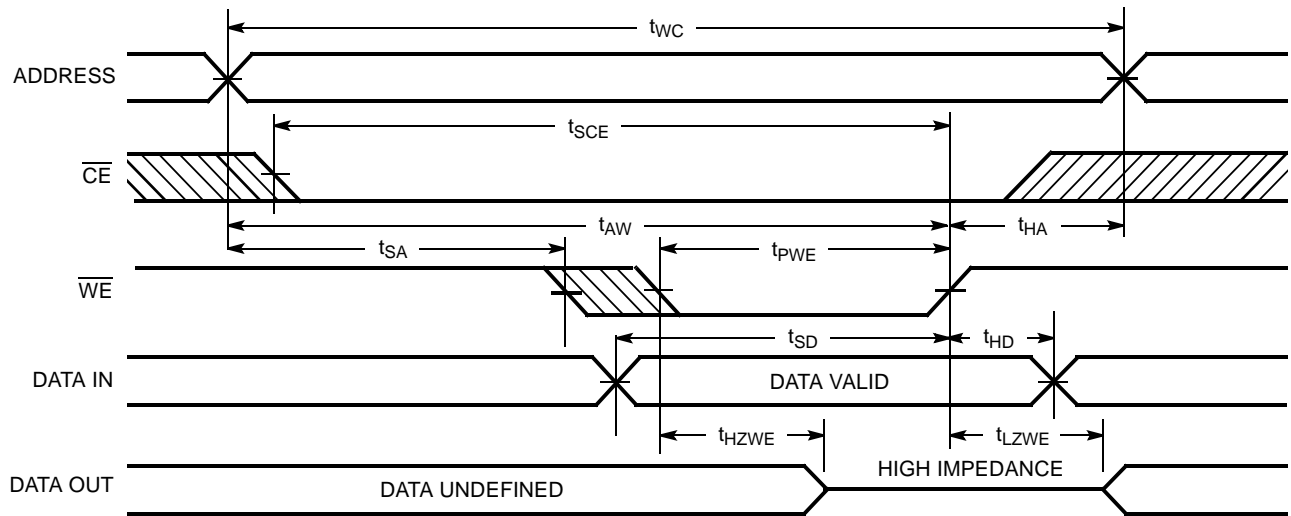
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Write Cycle No. 1 (CE Controlled)^[13]


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Notes:

9. No input may exceed $V_{CC} + 0.5V$.
10. Device is continuously selected, $\overline{CE} = V_{IL}$.
11. \overline{WE} is HIGH for read cycle.
12. Address valid prior to or coincident with \overline{CE} transition LOW.

Switching Waveforms (continued)
Write Cycle No. 2 (WE Controlled)^[13]


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Note:

13. If \overline{CE} goes HIGH simultaneously with \overline{WE} going HIGH, the output remains in a high-impedance state.

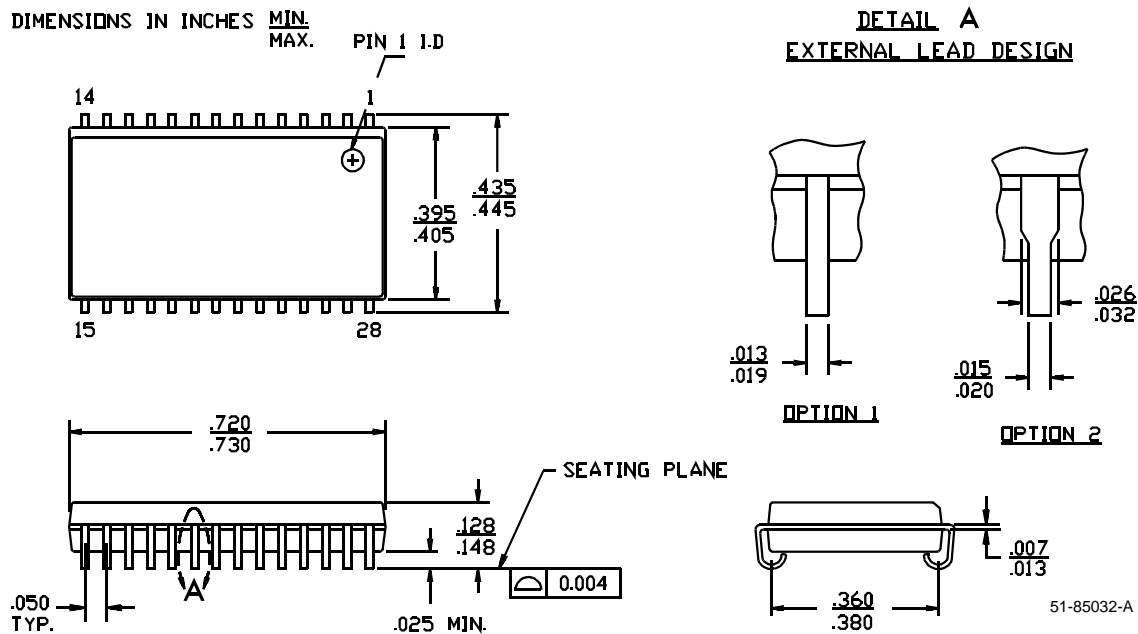
Truth Table

\overline{CE}	\overline{WE}	D_{OUT}	Mode	Power
H	X	High Z	Power-Down	Standby (I_{SB})
L	H	Data Out	Read	Active (I_{CC})
L	L	High Z	Write	Active (I_{CC})

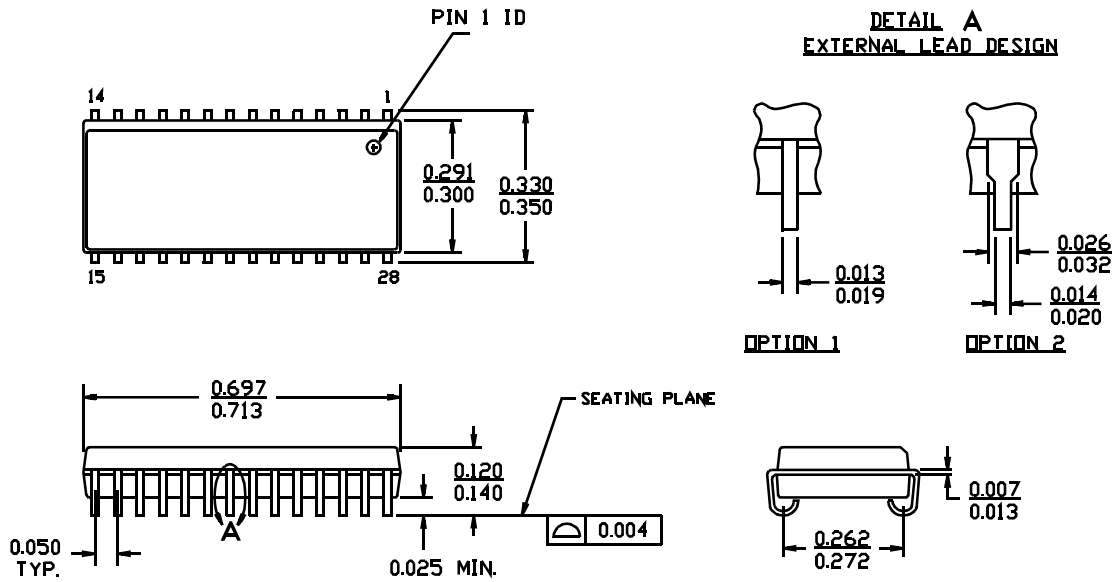
Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
12	CY7C107B-12VC	V28	28-Lead (400-Mil) Molded SOJ	Commercial
	CY7C1007B-12VC	V28	28-Lead (300-Mil) Molded SOJ	Commercial
15	CY7C107B-15VC	V28	28-Lead (400-Mil) Molded SOJ	Commercial
	CY7C1007B-15VC	V28	28-Lead (300-Mil) Molded SOJ	Commercial
15	CY7C107B-15VI	V28	28-Lead (400-Mil) Molded SOJ	Industrial
	CY7C1007B-15VI	V28	28-Lead (300-Mil) Molded SOJ	Industrial
20	CY7C107B-20VC	V28	28-Lead (400-Mil) Molded SOJ	Commercial
	CY7C1007B-20VC	V28	28-Lead (300-Mil) Molded SOJ	Commercial
25	CY7C107B-25VC	V28	28-Lead (400-Mil) Molded SOJ	Commercial
	CY7C1007B-25VC	V28	28-Lead (300-Mil) Molded SOJ	Commercial

Contact factory for "L" version availability.

Package Diagrams
28-Lead (400-Mil) Molded SOJ V28


28-Lead (300-Mil) Molded SOJ V21

 DIMENSIONS IN INCHES **MIN.**
MAX.




Document Title: CY7C107B/CY7C1007B 1M x 1 Static RAM Document Number: 38-05030				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	109950	12/02/01	SZV	Change from Spec number: 38-01116 to 38-05030