

1M x 1 Static RAM

Features

- **High speed**
— $t_{AA} = 15 \text{ ns}$
- **CMOS for optimum speed/power**
- **Automatic power-down when deselected**
- **TTL-compatible inputs and outputs**

Functional Description

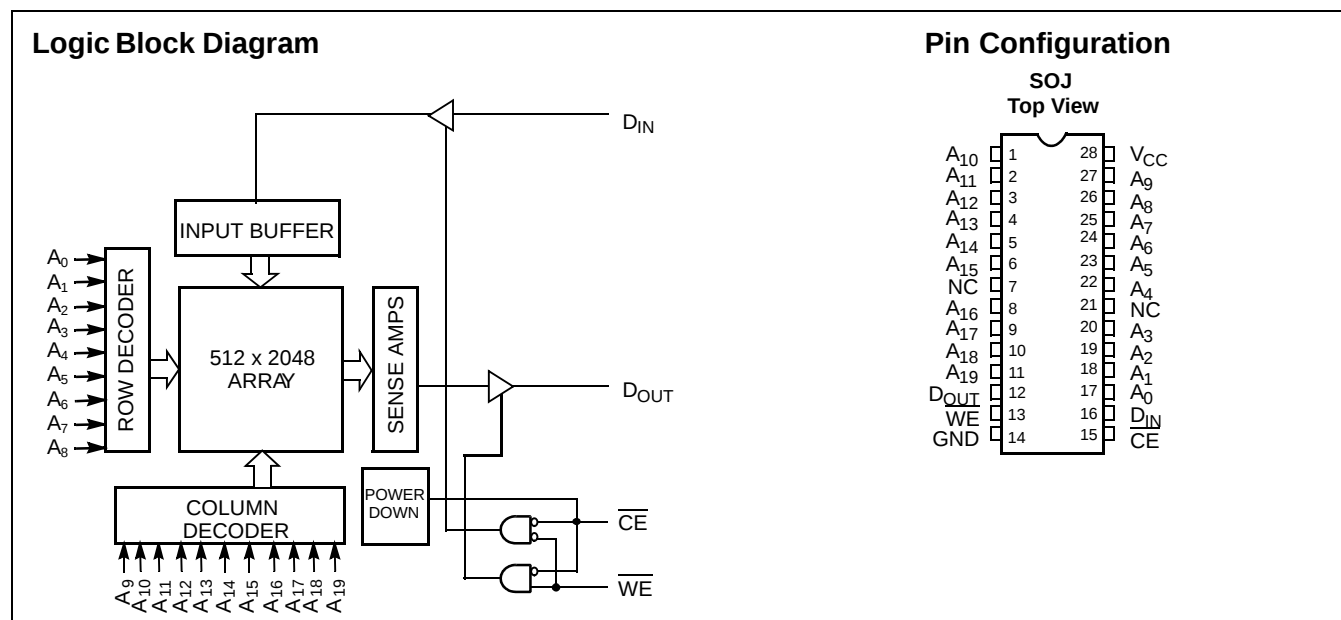
The CY7C107BN and CY7C1007BN are high-performance CMOS static RAMs organized as 1,048,576 words by 1 bit. Easy memory expansion is provided by an active LOW Chip Enable ($\overline{CE}$) and three-state drivers. These devices have an automatic power-down feature that reduces power consumption by more 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 CY7C107BN is available in a standard 400-mil-wide SOJ; the CY7C1007BN is available in a standard 300-mil-wide SOJ.



Selection Guide

	7C107BN-15 7C1007BN-15
Maximum Access Time (ns)	15
Maximum Operating Current (mA)	80
Maximum CMOS Standby Current I_{SB2} (mA)	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	7C107BN-15 7C1007BN-15		Unit
			Min.	Max.	
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}, I_{OH} = -4.0 \text{ mA}$	2.4		V
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}, I_{OL} = 8.0 \text{ mA}$		0.4	V
V_{IH}	Input HIGH Voltage		2.2	$V_{CC} + 0.3$	V
V_{IL}	Input LOW Voltage ^[1]		-0.3	0.8	V
I_{IX}	Input Leakage Current	$GND \leq V_I \leq V_{CC}$	-1	+1	mA
I_{OZ}	Output Leakage Current	$GND \leq V_I \leq V_{CC}$, Output Disabled	-5	+5	mA
I_{OS}	Output Short Circuit Current ^[3]	$V_{CC} = \text{Max.}, V_{OUT} = GND$		-300	mA
I_{CC}	V_{CC} Operating Supply Current	$V_{CC} = \text{Max.}, I_{OUT} = 0 \text{ mA}$, $f = f_{MAX} = 1/t_{RC}$		80	mA
I_{SB1}	Automatic $\overline{CE}$ Power-Down Current— TTL Inputs	Max. V_{CC} , $\overline{CE} \geq V_{IH}$, $V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}$, $f = f_{MAX}$		20	mA
I_{SB2}	Automatic $\overline{CE}$ Power-Down Current — CMOS Inputs	Max. V_{CC} , $\overline{CE} \geq V_{CC} - 0.3V$, $V_{IN} \geq V_{CC} - 0.3V$ or $V_{IN} \leq 0.3V$, $f = 0$		2	mA

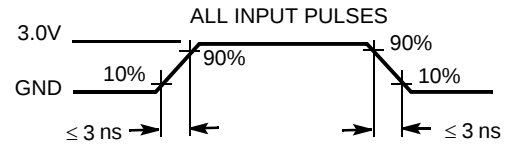
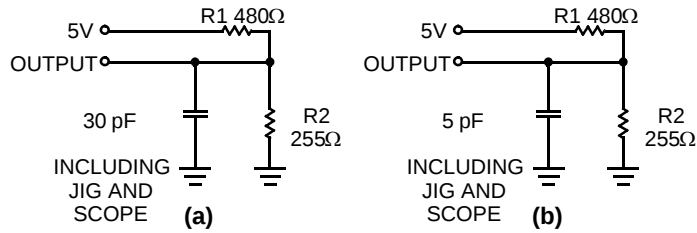
Capacitance^[4]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN} : Addresses	Input Capacitance	$T_A = 25 \times C$, $f = 1 \text{ MHz}$, $V_{CC} = 5.0V$	7	pF
C_{IN} : Controls			10	pF
C_{OUT}	Output Capacitance		10	pF

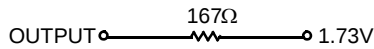
Notes:

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

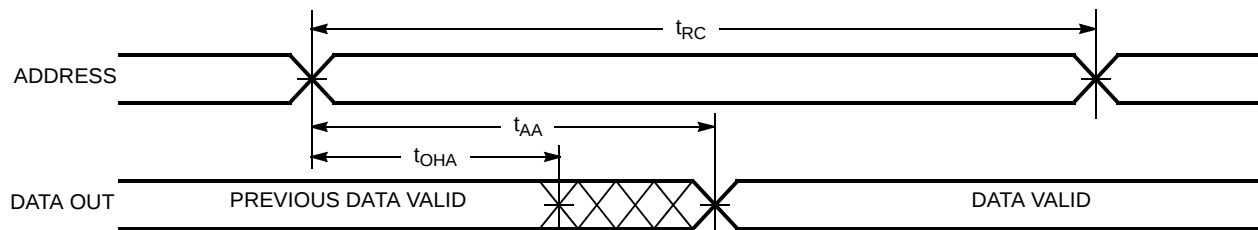
Parameter	Description	7C107BN-15 7C1007BN-15		Unit
		Min.	Max.	
READ CYCLE				
t _{RC}	Read Cycle Time	15		ns
t _{AA}	Address to Data Valid		15	ns
t _{OHA}	Data Hold from Address Change	3		ns
t _{ACE}	$\overline{CE}$ LOW to Data Valid		15	ns
t _{LZCE}	$\overline{CE}$ LOW to Low Z ^[6]	3		ns
t _{HZCE}	$\overline{CE}$ HIGH to High Z ^[6, 7]		7	ns
t _{PU}	$\overline{CE}$ LOW to Power-Up	0		ns
t _{PD}	$\overline{CE}$ HIGH to Power-Down		15	ns
WRITE CYCLE ^[8]				
t _{WC}	Write Cycle Time	15		ns
t _{SCE}	$\overline{CE}$ LOW to Write End	12		ns
t _{AW}	Address Set-Up to Write End	12		ns
t _{HA}	Address Hold from Write End	0		ns
t _{SA}	Address Set-Up to Write Start	0		ns
t _{PWE}	$\overline{WE}$ Pulse Width	12		ns
t _{SD}	Data Set-Up to Write End	8		ns
t _{HD}	Data Hold from Write End	0		ns
t _{LZWE}	$\overline{WE}$ HIGH to Low Z ^[6]	3		ns
t _{HZWE}	$\overline{WE}$ LOW to High Z ^[6, 7]		7	ns

Notes:

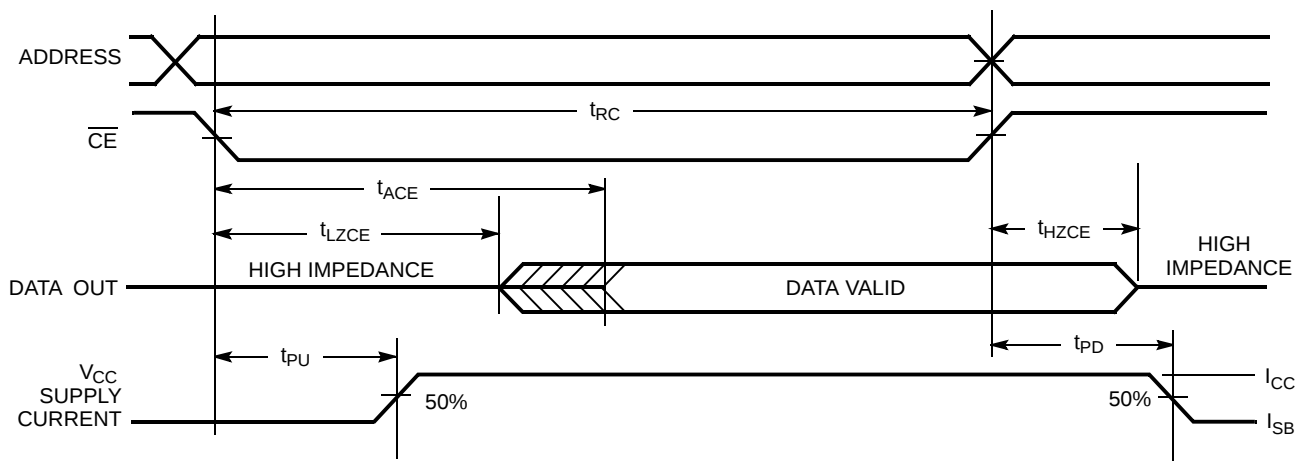
- Test conditions assume signal transition time of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
- At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} and t_{HZWE} 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

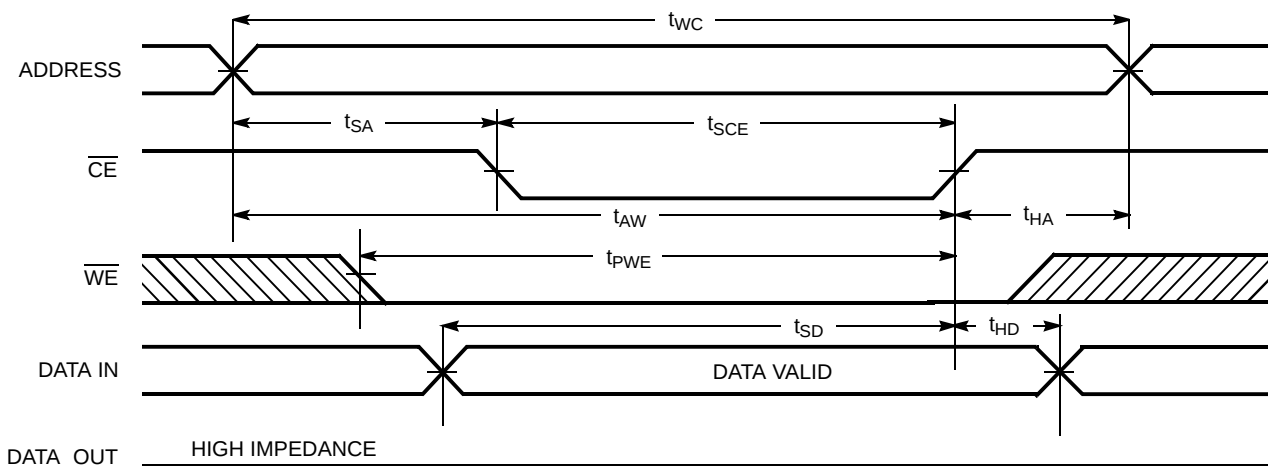
Read Cycle No. 1^[10, 11]



Read Cycle No. 2^[11, 12]



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

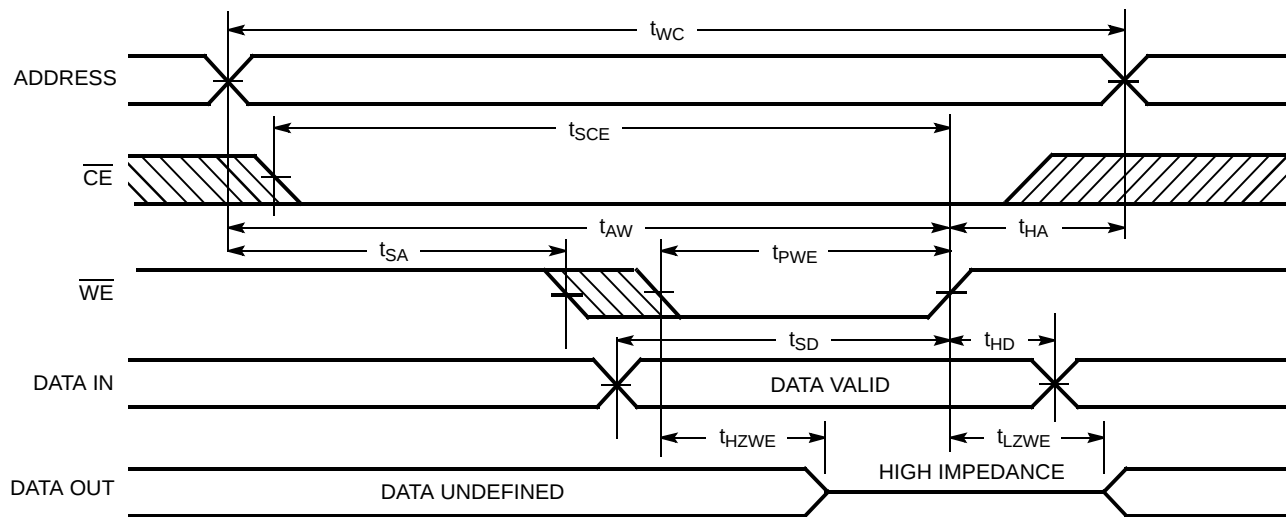


Notes:

9. No input may exceed $V_{CC} + 0.5V$.
10. Device is continuously selected, $\overline{CE} = V_{IL}$.
11. WE is HIGH for read cycle.
12. Address valid prior to or coincident with $\overline{CE}$ transition LOW.
13. If CE goes HIGH simultaneously with WE going HIGH, the output remains in a high-impedance state.

Switching Waveforms (continued)

Write Cycle No. 2 ($\overline{\text{WE}}$ Controlled)^[13]



Truth Table

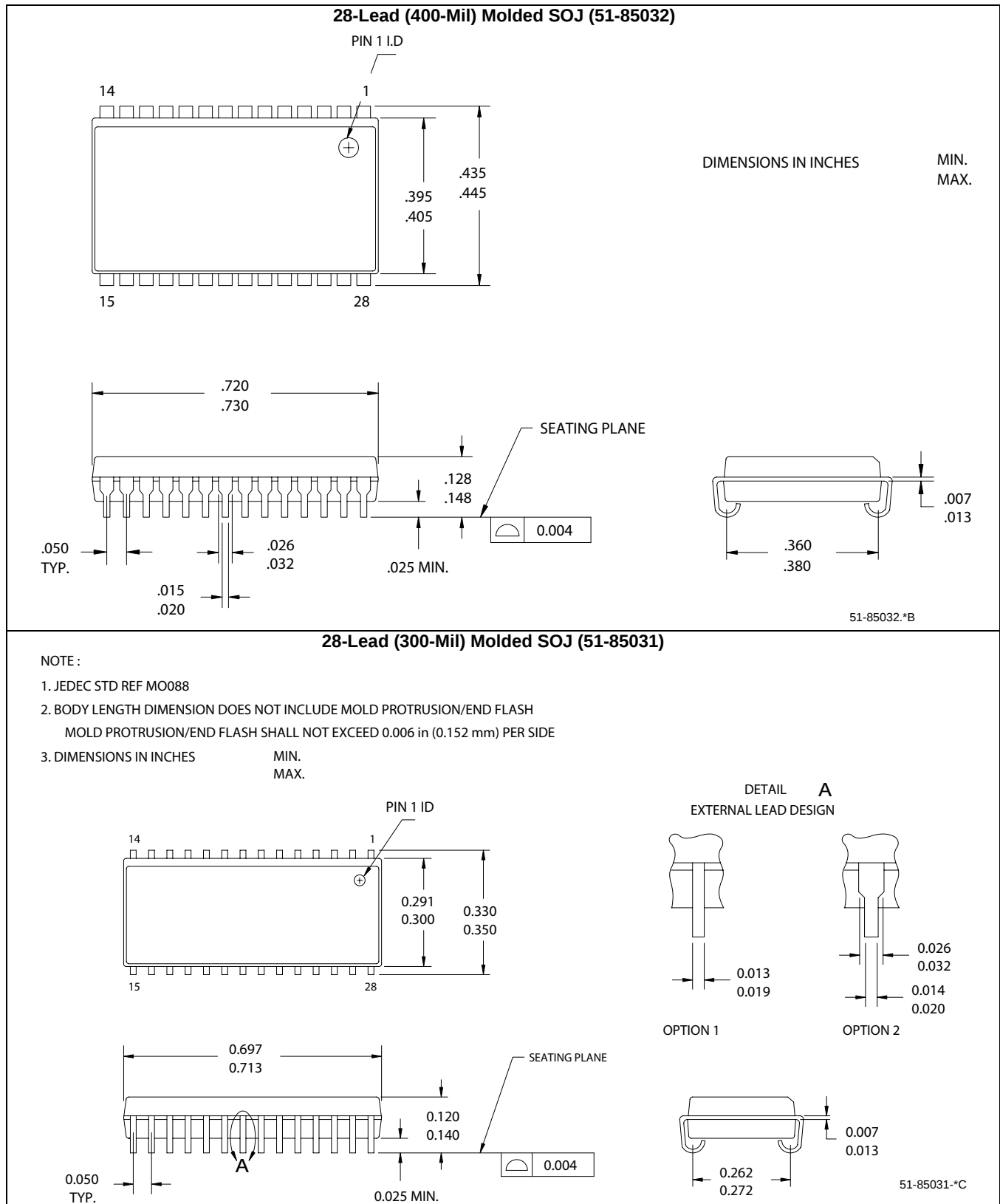
$\overline{\text{CE}}$	$\overline{\text{WE}}$	D _{OUT}	Mode	Power
H	X	High Z	Power-Down	Standby (I_{SB})
L	H	Data Out	Read	Active (I_{CC})
L	L	High Z	Write	Active (I_{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
15	CY7C107BN-15VC	51-85032	28-Lead (400-Mil) Molded SOJ	Commercial
	CY7C1007BN-15VC	51-85031	28-Lead (300-Mil) Molded SOJ	
	CY7C1007BN-15VXC	51-85031	28-Lead (300-Mil) Molded SOJ (Pb-free)	
	CY7C107BN-15VI	51-85032	28-Lead (400-Mil) Molded SOJ	Industrial

Please contact local sales representative regarding availability of these parts

Package Diagrams



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Document History Page

Document Title: CY7C107BN/CY7C1007BN 1M x 1 Static RAM Document Number: 001-06426				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	423847	See ECN	NXR	New Data Sheet