

**256Kx1 Static RAM**

**Features**

- **High speed**
  - 25 ns
- **CMOS for optimum speed/power**
- **Low active power**
  - 880 mW
- **Low standby power**
  - 220 mW
- **TTL-compatible inputs and outputs**
- **Automatic power-down when deselected**

**Functional Description**

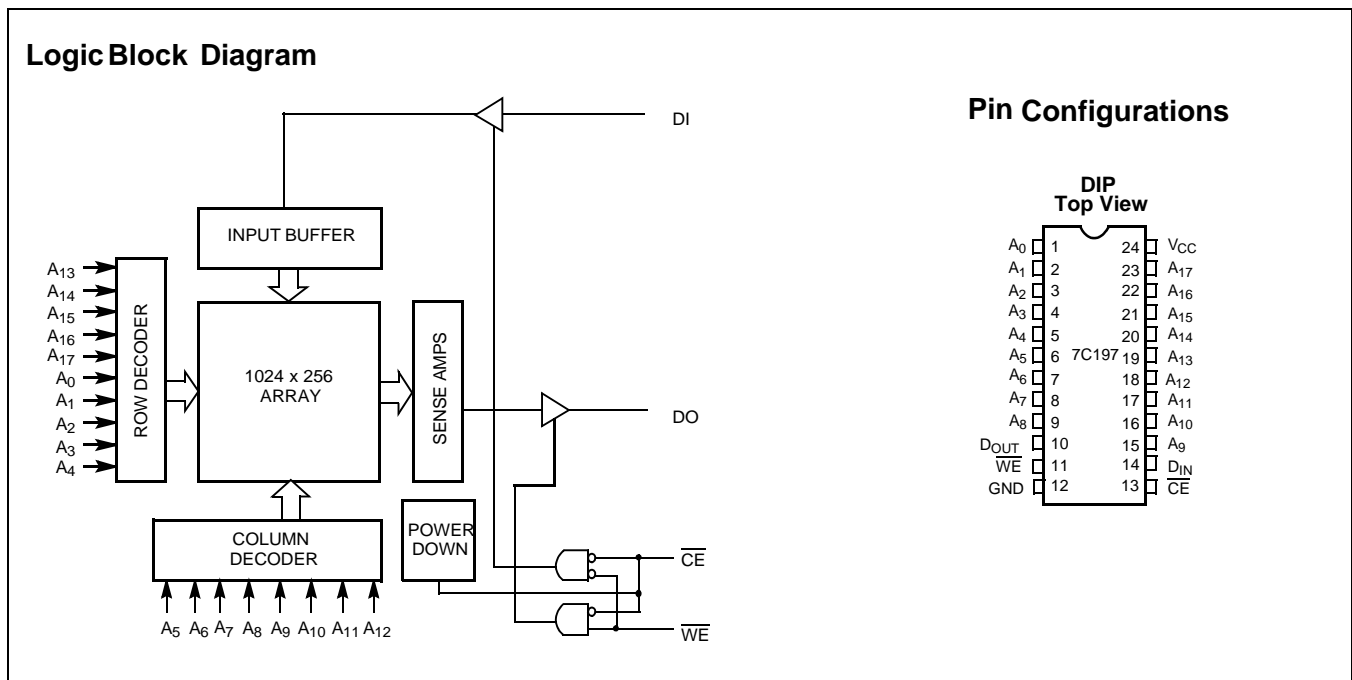
The CY7C197N is a high-performance CMOS static RAM organized as 256K words by 1 bit. Easy memory expansion is provided by an active LOW Chip Enable ( $\overline{CE}$ ) and three-state drivers. The CY7C197N has an automatic power-down feature, reducing the power consumption by 75% when deselected.

Writing to the device is accomplished when the Chip Enable ( $\overline{CE}$ ) and Write Enable ( $\overline{WE}$ ) inputs are both LOW. Data on the input pin ( $D_{IN}$ ) is written into the memory location specified on the address pins ( $A_0$  through  $A_{17}$ ).

Reading the device 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 on the address pins will appear on the data output ( $D_{OUT}$ ) pin.

The output pin stays in a high-impedance state when Chip Enable ( $\overline{CE}$ ) is HIGH or Write Enable ( $\overline{WE}$ ) is LOW.

The CY7C197N utilizes a die coat to insure alpha immunity.



**Selection Guide**

	<b>-25</b>	<b>-45</b>
Maximum Access Time (ns)	25	45
Maximum Operating Current (mA)	95	
Maximum Standby Current (mA)	30	30

**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 (Pin 24 to Pin 12) ..... -0.5V to +7.0V
- DC Voltage Applied to Outputs in High Z State<sup>[1]</sup> .....-0.5V to V<sub>CC</sub> + 0.5V

- DC Input Voltage<sup>[1]</sup> .....-0.5V to V<sub>CC</sub> + 0.5V
- Output 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	V <sub>CC</sub>
Commercial	0°C to +70°C	5V ± 10%

**Electrical Characteristics** Over the Operating Range

Parameter	Description	Test Conditions	-25, -45		Unit
			Min.	Max.	
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> = 12.0 mA		0.4	V
V <sub>IH</sub>	Input HIGH Voltage		2.2	V <sub>CC</sub> + 0.3V	V
V <sub>IL</sub>	Input LOW Voltage <sup>[1]</sup>		-0.5	0.8	V
I <sub>Ix</sub>	Input Load Current	GND ≤ V <sub>I</sub> ≤ V <sub>CC</sub>	-5	+5	mA
I <sub>OZ</sub>	Output Leakage Current	GND ≤ V <sub>O</sub> ≤ V <sub>CC</sub> , Output Disabled	-5	+5	mA
I <sub>OS</sub>	Output Short Circuit Current <sup>[2]</sup>	V <sub>CC</sub> = Max., V <sub>OUT</sub> = GND		-300	mA
I <sub>CC</sub>	V <sub>CC</sub> Operating Supply Current	V <sub>CC</sub> = Max., I <sub>OUT</sub> = 0 mA, f = f <sub>MAX</sub> = 1/t <sub>RC</sub>		95	mA
I <sub>SB1</sub>	Automatic $\overline{CE}$ Power-Down Current—TTL Inputs <sup>[3]</sup>	Max. V <sub>CC</sub> , $\overline{CE} \geq V_{IH}$ , V <sub>IN</sub> ≥ V <sub>IH</sub> or V <sub>IN</sub> ≤ V <sub>IL</sub> ; f = f <sub>MAX</sub>		30	mA
I <sub>SB2</sub>	Automatic $\overline{CE}$ Power-Down Current—CMOS Inputs <sup>[3]</sup>	Max. V <sub>CC</sub> , $\overline{CE} \geq V_{CC} - 0.3V$ , V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.3V or V <sub>IN</sub> < 0.3V		15	mA

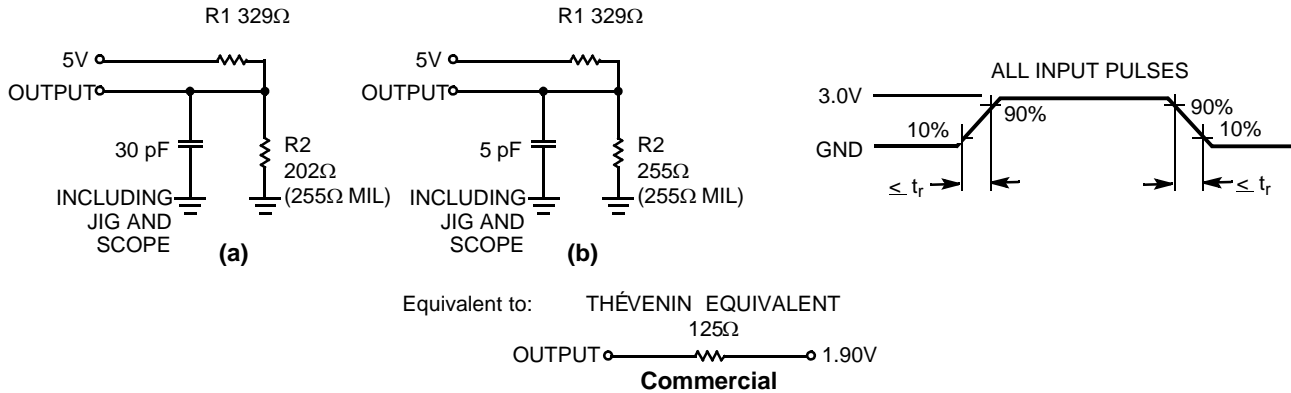
**Capacitance<sup>[4]</sup>**

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> = 5.0V	8	pF
C <sub>OUT</sub>	Output Capacitance		10	pF

**Note:**

1. V<sub>(min.)</sub> = -2.0V for pulse durations of less than 20 ns.
2. Not more than one output should be shorted at one time. Duration of the short circuit should not exceed 30 seconds.
3. A pull-up resistor to V<sub>CC</sub> on the  $\overline{CE}$  input is required to keep the device deselected during V<sub>CC</sub> power-up, otherwise I<sub>SB</sub> will exceed values given.
4. Tested initially and after any design or process changes that may affect these parameters.
5. t<sub>r</sub> = ≤ 5 ns for the -25 and slower speeds.

AC Test Loads and Waveforms<sup>[5]</sup>



Switching Characteristics Over the Operating Range<sup>[8]</sup>

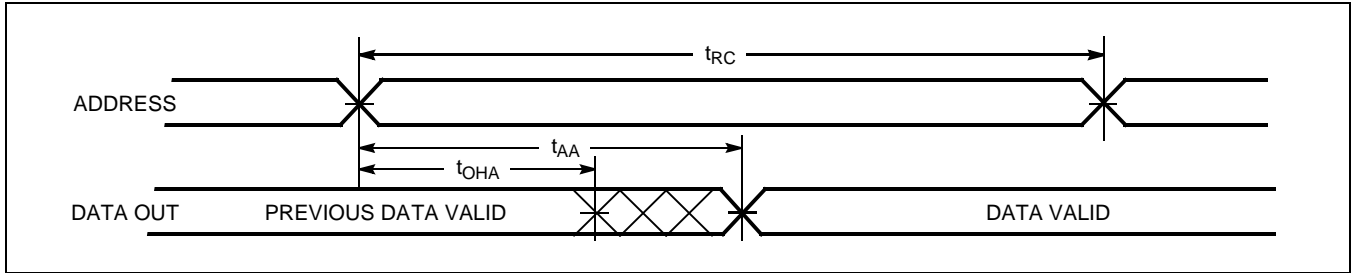
Parameter	Description	-25		-45		Unit
		Min.	Max.	Min.	Max.	
<b>READ CYCLE</b>						
t <sub>RC</sub>	Read Cycle Time	25		45		ns
t <sub>AA</sub>	Address to Data Valid		25		45	ns
t <sub>OHA</sub>	Output Hold from Address Change	3		3		ns
t <sub>ACE</sub>	$\overline{CE}$ LOW to Data Valid		25		45	ns
t <sub>LZCE</sub>	$\overline{CE}$ LOW to Low Z <sup>[9]</sup>	3		3		ns
t <sub>HZCE</sub>	$\overline{CE}$ HIGH to High Z <sup>[9, 10]</sup>	0	11	0	15	ns
t <sub>PU</sub>	$\overline{CE}$ LOW to Power-Up	0		0		ns
t <sub>PD</sub>	$\overline{CE}$ HIGH to Power-Down		20		30	ns
<b>WRITE CYCLE<sup>[11]</sup></b>						
t <sub>WC</sub>	Write Cycle Time	25		45		ns
t <sub>SCE</sub>	$\overline{CE}$ LOW to Write End	20		40		ns
t <sub>AW</sub>	Address Set-Up to Write End	20		40		ns
t <sub>HA</sub>	Address Hold from Write End	0		0		ns
t <sub>SA</sub>	Address Set-Up to Write Start	0		0		ns
t <sub>PWE</sub>	$\overline{WE}$ Pulse Width	20		30		ns
t <sub>SD</sub>	Data Set-Up to Write End	15		20		ns
t <sub>HD</sub>	Data Hold from Write End	0		0		ns
t <sub>LZWE</sub>	$\overline{WE}$ HIGH to Low Z <sup>[9]</sup>	3		3		ns
t <sub>HZWE</sub>	$\overline{WE}$ LOW to High Z <sup>[9, 10]</sup>	0	11	0	15	ns

Note:

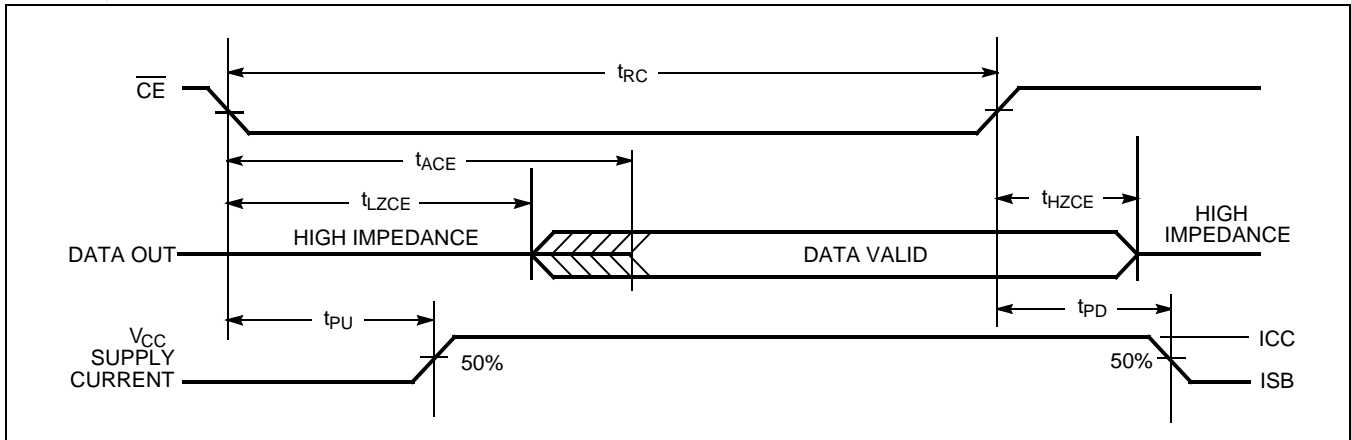
6. Tested initially and after any design or process changes that may affect these parameters.
7. t<sub>r</sub> = ≤ 5 ns for the -25 and slower speeds.
8. Test conditions assume signal transition time of 5 ns or less for -25 and slower speeds, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I<sub>OL</sub>/I<sub>OH</sub> and 30-pF load capacitance.
9. At any given temperature and voltage condition, t<sub>HZCE</sub> is less than t<sub>LZCE</sub> and t<sub>HZWE</sub> is less than t<sub>LZWE</sub> for any given device.
10. t<sub>HZCE</sub> and t<sub>HZWE</sub> are specified with C<sub>L</sub> = 5 pF as in part (b) in AC Test Loads and Waveforms. Transition is measured ±500 mV from steady-state voltage.
11. The internal write time of the memory is defined by the overlap of  $\overline{CE}$  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 referenced to the rising edge of the signal that terminates the write.

Switching Waveforms

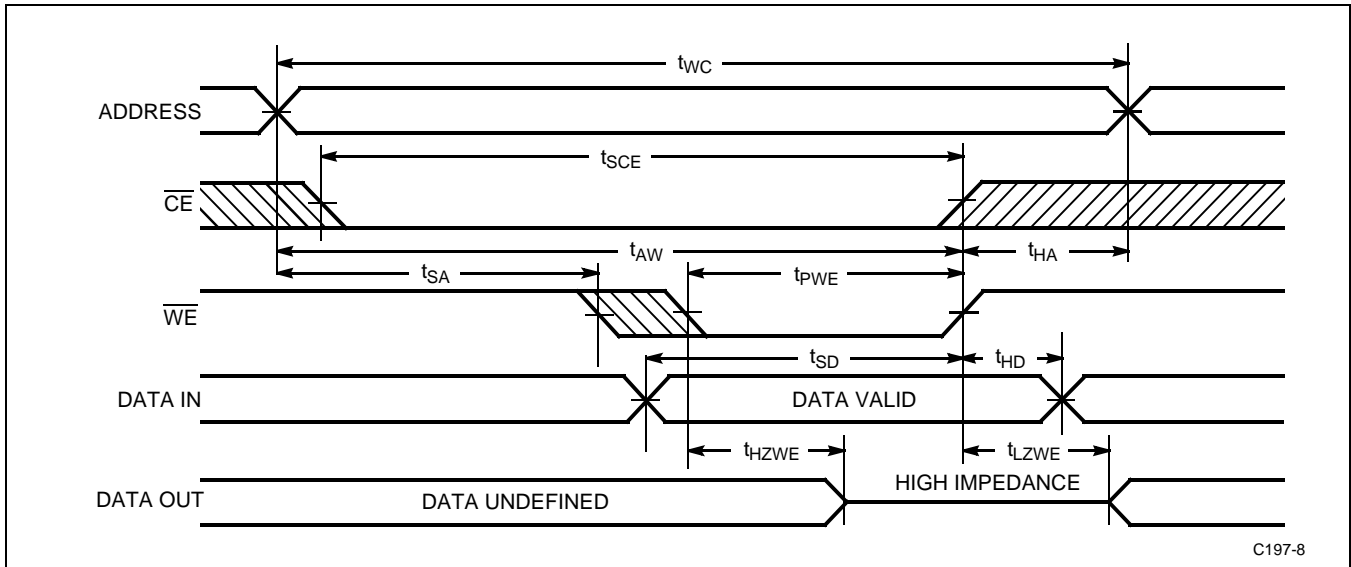
Read Cycle No. 1<sup>[12, 13]</sup>



Read Cycle No. 2<sup>[12]</sup>



Write Cycle No. 1 (WE Controlled)<sup>[11]</sup>



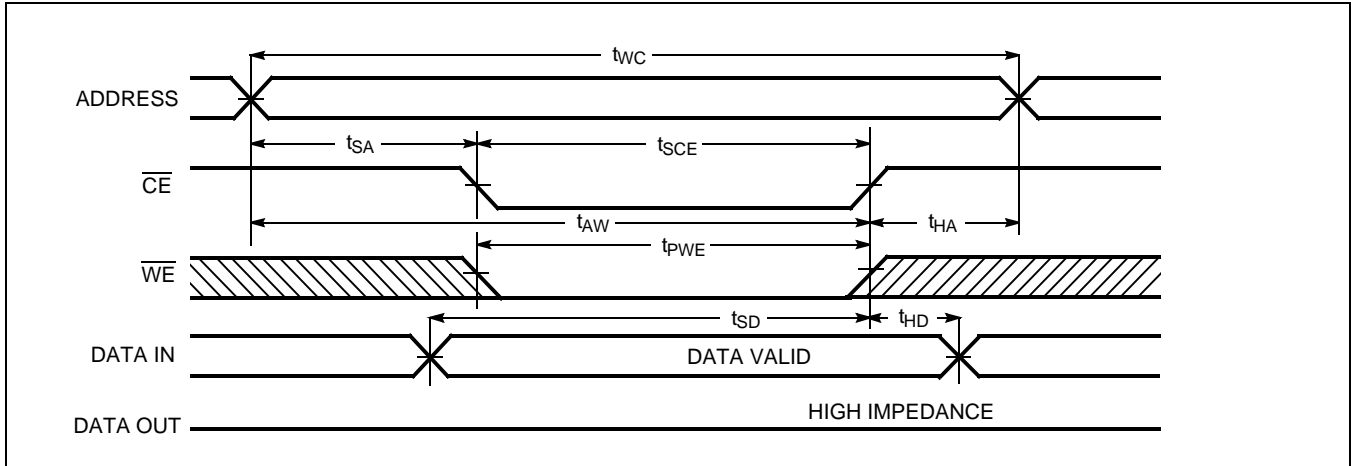
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Notes:

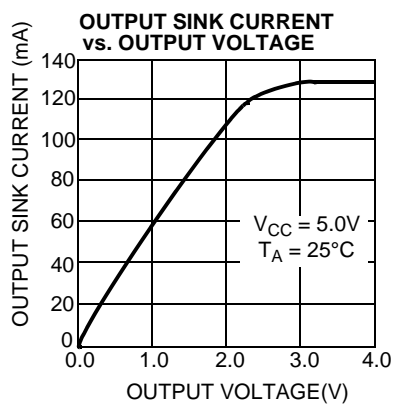
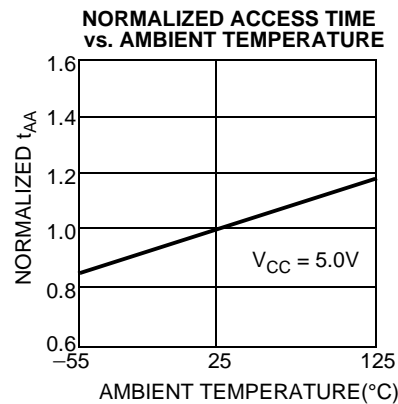
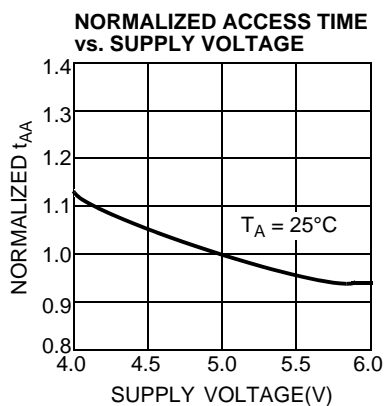
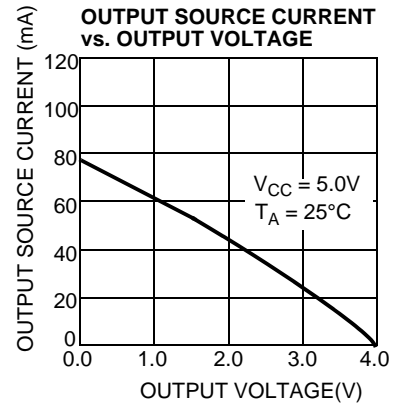
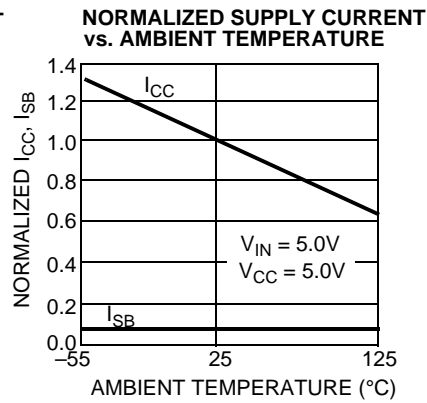
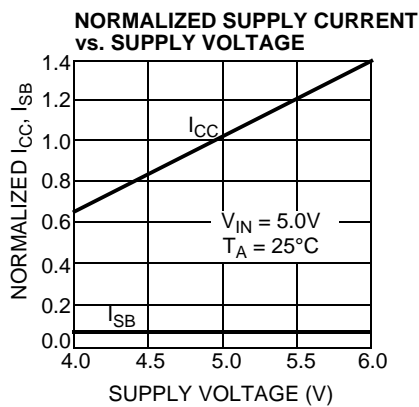
- 12.  $\overline{WE}$  is HIGH for read cycle.
- 13. Device is continuously selected,  $\overline{CE} = V_{II}$ .
- 14. If  $\overline{CE}$  goes HIGH simultaneously with  $\overline{WE}$  HIGH, the output remains in a high-impedance state.

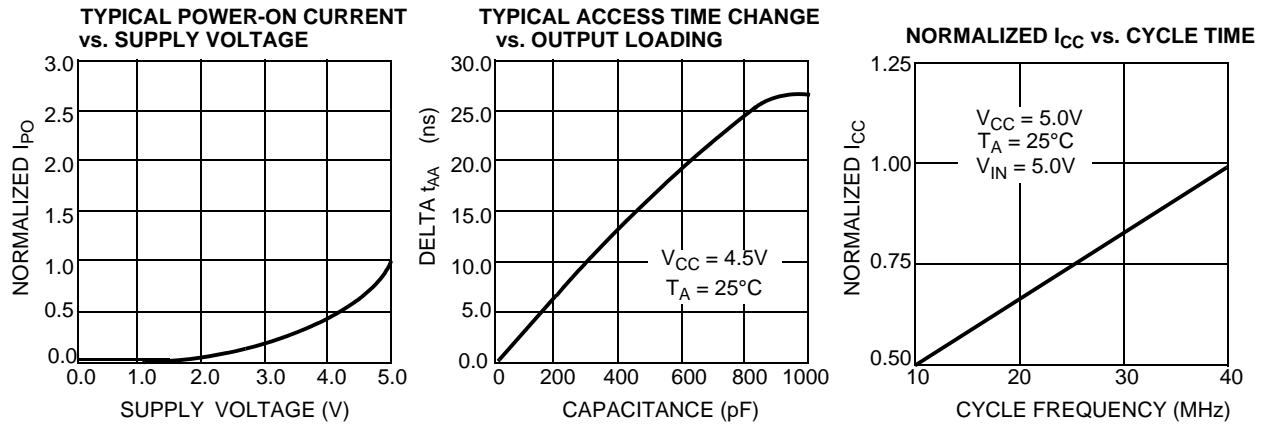
Switching Waveforms (continued)

Write Cycle No. 2 ( $\overline{CE}$  Controlled)<sup>[11, 14]</sup>



Typical DC and AC Characteristics



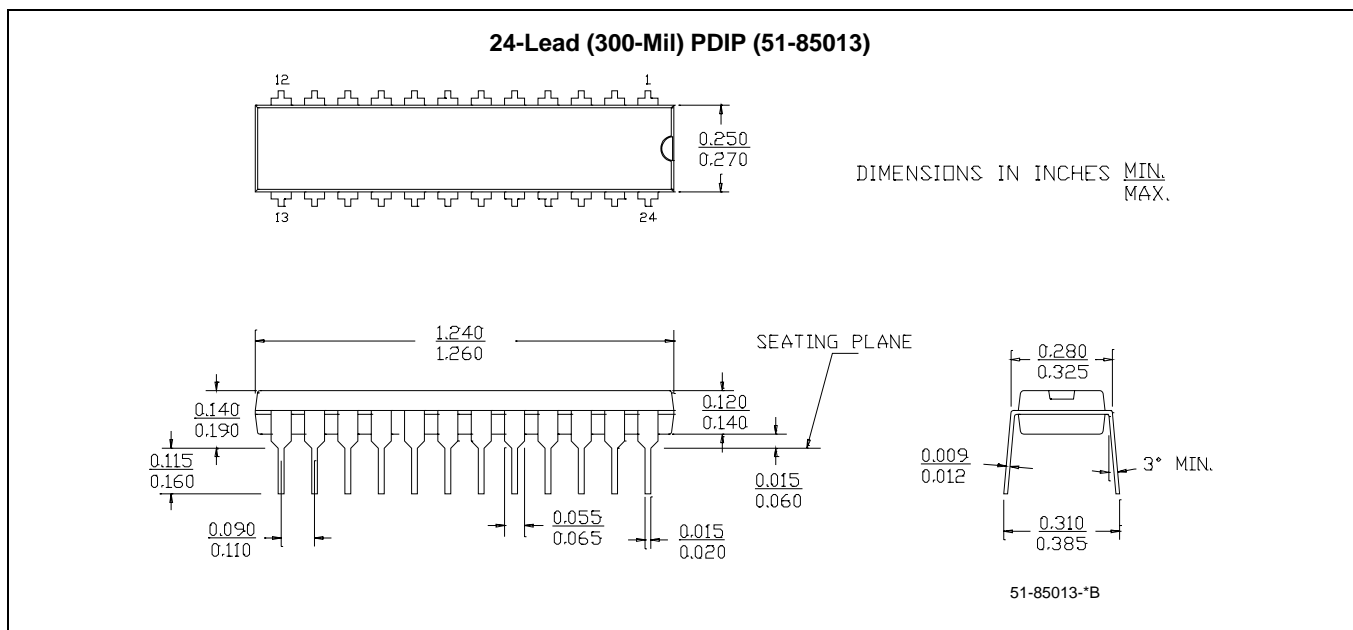
**Typical DC and AC Characteristics** (continued)

**CY7C197N Truth Table**

$\overline{CE}$	$\overline{WE}$	Input/Output	Mode
H	X	High Z	Deselect/Power-Down
L	H	Data Out	Read
L	L	Data In	Write

**Ordering Information**

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
25	CY7C197N-25PXC	51-85013	24-Lead (300-Mil) Molded DIP (Pb-free)	Commercial
45	CY7C197N-45PXC	51-85013	24-Lead (300-Mil) Molded DIP (Pb-free)	Commercial

Please contact local sales representative regarding availability of these parts.

**Package Diagram**


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**Document History Page**

<b>Document Title: CY7C197N 256Kx1 Static RAM</b> <b>Document Number: 001-06495</b>				
<b>REV.</b>	<b>ECN NO.</b>	<b>Issue Date</b>	<b>Orig. of Change</b>	<b>Description of Change</b>
**	424111	See ECN	NXR	New Data Sheet