

**Maximum Ratings**

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

Storage Temperature .....  $-65^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$

Ambient Temperature with

Power Applied .....  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

Supply Voltage to Ground Potential

(Pin 28 to Pin 14) .....  $-0.5\text{V}$  to  $+7.0\text{V}$

DC Voltage Applied to Outputs

in High Z State<sup>[2]</sup> .....  $-0.5\text{V}$  to  $+7.0\text{V}$

DC Input Voltage<sup>[2]</sup> .....  $-0.5\text{V}$  to  $+7.0\text{V}$

Output Current into Outputs (LOW) ..... 20 mA

Static Discharge Voltage .....  $>2001\text{V}$   
(per MIL-STD-883, Method 3015)

Latch-Up Current .....  $>200\text{ mA}$

**Operating Range**

| Range                   | Ambient Temperature                             | V <sub>CC</sub>      |
|-------------------------|-------------------------------------------------|----------------------|
| Military <sup>[3]</sup> | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ | $5\text{V} \pm 10\%$ |

**Electrical Characteristics Over the Operating Range<sup>[4]</sup>**

| Parameter        | Description                                           | Test Conditions                                                                                                                                                | 7C185A-15 |                 | 7C185A-20 |                 | Unit |
|------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------|-----------|-----------------|------|
|                  |                                                       |                                                                                                                                                                | Min.      | Max.            | Min.      | Max.            |      |
| V <sub>OH</sub>  | Output HIGH Voltage                                   | V <sub>CC</sub> = Min.,<br>I <sub>OH</sub> = -4.0 mA                                                                                                           | 2.4       |                 | 2.4       |                 | V    |
| V <sub>OL</sub>  | Output LOW Voltage                                    | V <sub>CC</sub> = Min.,<br>I <sub>OL</sub> = 8.0 mA                                                                                                            |           | 0.4             |           | 0.4             | V    |
| V <sub>IH</sub>  | Input HIGH Voltage                                    |                                                                                                                                                                | 2.2       | V <sub>CC</sub> | 2.2       | V <sub>CC</sub> | V    |
| V <sub>IL</sub>  | Input LOW Voltage <sup>[2]</sup>                      |                                                                                                                                                                | -0.5      | 0.8             | -0.5      | 0.8             | V    |
| I <sub>IX</sub>  | Input Load Current                                    | $\text{GND} \leq V_I \leq V_{\text{CC}}$                                                                                                                       | -10       | +10             | -10       | +10             | μA   |
| I <sub>OZ</sub>  | Output Leakage Current                                | $\text{GND} \leq V_I \leq V_{\text{CC}}$ , Output Disabled                                                                                                     | -10       | +10             | -10       | +10             | μA   |
| I <sub>OS</sub>  | Output Short Circuit Current <sup>[5]</sup>           | V <sub>CC</sub> = Max., V <sub>OUT</sub> = GND                                                                                                                 |           | -350            |           | -300            | mA   |
| I <sub>CC</sub>  | V <sub>CC</sub> Operating Supply Current              | V <sub>CC</sub> = Max. I <sub>OUT</sub> = 0 mA                                                                                                                 |           | 170             |           | 135             | mA   |
| I <sub>SB1</sub> | Automatic $\overline{\text{CE}}_1$ Power-Down Current | Max. V <sub>CC</sub> , $\overline{\text{CE}}_1 \geq V_{\text{IH}}$ ,<br>Min. Duty Cycle = 100%                                                                 |           | 40              |           | 40              | mA   |
| I <sub>SB2</sub> | Automatic $\overline{\text{CE}}_1$ Power-Down Current | Max. V <sub>CC</sub> ,<br>$\overline{\text{CE}}_1 \geq V_{\text{CC}} - 0.3\text{V}$ ,<br>V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.3V<br>or V <sub>IN</sub> ≥ 0.3V |           | 20              |           | 20              | mA   |

Shaded area contains advanced information.

**Notes:**

2. V<sub>IL</sub> (min.) = -3.0V for pulse durations less than 30 ns.

3. T<sub>A</sub> is the "instant on" case temperature.

4. See the last page of this specification for Group A subgroup testing information.

5. 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<sup>[4]</sup> (continued)

| Parameter        | Description                                    | Test Conditions                                                                                                                       | 7C185A-25 |                 | 7C185A-35, 45 |                 | Unit |
|------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------|---------------|-----------------|------|
|                  |                                                |                                                                                                                                       | Min.      | Max.            | Min.          | Max.            |      |
| V <sub>OH</sub>  | Output HIGH Voltage                            | V <sub>CC</sub> = Min., I <sub>OH</sub> = -4.0 mA                                                                                     | 2.4       |                 | 2.4           |                 | V    |
| V <sub>OL</sub>  | Output LOW Voltage                             | V <sub>CC</sub> = Min., I <sub>OL</sub> = 8.0 mA                                                                                      |           | 0.4             |               | 0.4             | V    |
| V <sub>IH</sub>  | Input HIGH Voltage                             |                                                                                                                                       | 2.2       | V <sub>CC</sub> | 2.2           | V <sub>CC</sub> | V    |
| V <sub>IL</sub>  | Input LOW Voltage <sup>[2]</sup>               |                                                                                                                                       | -0.5      | 0.8             | -0.5          | 0.8             | V    |
| I <sub>IX</sub>  | Input Load Current                             | GND ≤ V <sub>I</sub> ≤ V <sub>CC</sub>                                                                                                | -10       | +10             | -10           | +10             | μA   |
| I <sub>OZ</sub>  | Output Leakage Current                         | GND ≤ V <sub>I</sub> ≤ V <sub>CC</sub> , Output Disabled                                                                              | -10       | +10             | -10           | +10             | μA   |
| I <sub>OS</sub>  | Output Short Circuit Current <sup>[5]</sup>    | V <sub>CC</sub> = Max., V <sub>OUT</sub> = GND                                                                                        |           | -300            |               | -300            | mA   |
| I <sub>CC</sub>  | V <sub>CC</sub> Operating Supply Current       | V <sub>CC</sub> = Max., I <sub>OUT</sub> = 0 mA                                                                                       | Military  | 125             |               | 125             | mA   |
| I <sub>SB1</sub> | Automatic $\overline{CE}_1$ Power-Down Current | Max. V <sub>CC</sub> , $\overline{CE}_1 \geq V_{IH}$ ,<br>Min. Duty Cycle = 100%                                                      | Military  | 40              |               | 30              | mA   |
| I <sub>SB2</sub> | Automatic $\overline{CE}_1$ Power-Down Current | Max. V <sub>CC</sub><br>$\overline{CE}_1 \geq V_{CC} - 0.3V$<br>V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.3V<br>or V <sub>IN</sub> ≥ 0.3V | Military  | 20              |               | 20              | mA   |

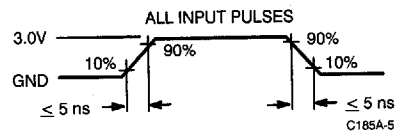
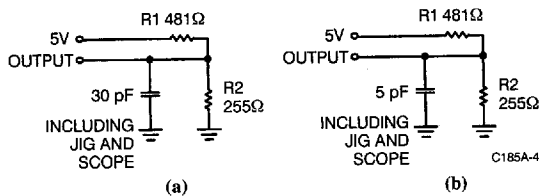
Capacitance<sup>[6]</sup>

| Parameter        | Description        | Test Conditions                                             | Max. | Unit |
|------------------|--------------------|-------------------------------------------------------------|------|------|
| C <sub>IN</sub>  | Input Capacitance  | T <sub>A</sub> = 25°C, f = 1 MHz,<br>V <sub>CC</sub> = 5.0V | 10   | pF   |
| C <sub>OUT</sub> | Output Capacitance |                                                             | 10   | pF   |

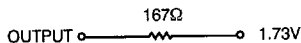
## Note:

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

## AC Test Loads and Waveforms



Equivalent to: THÉVENIN EQUIVALENT



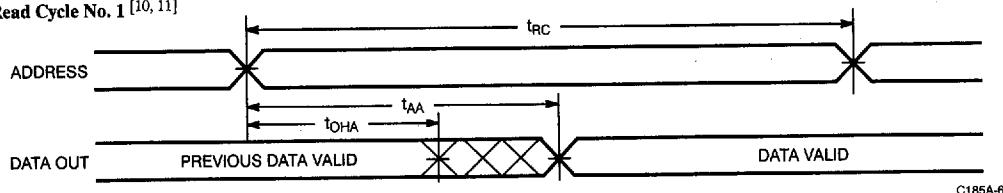
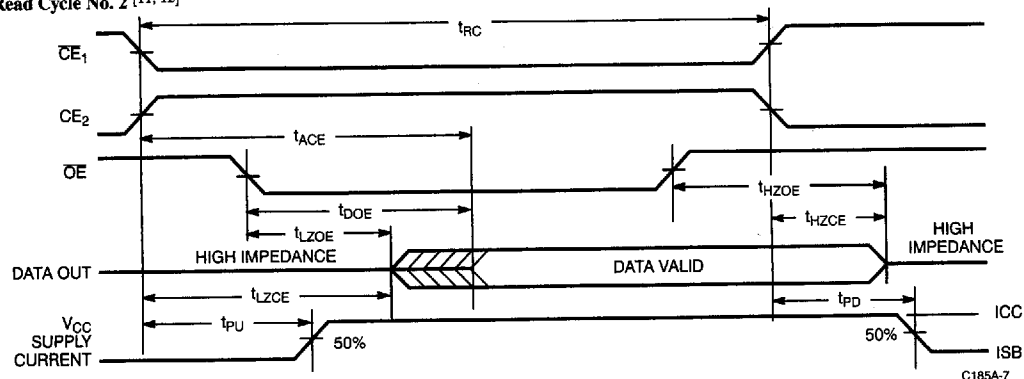
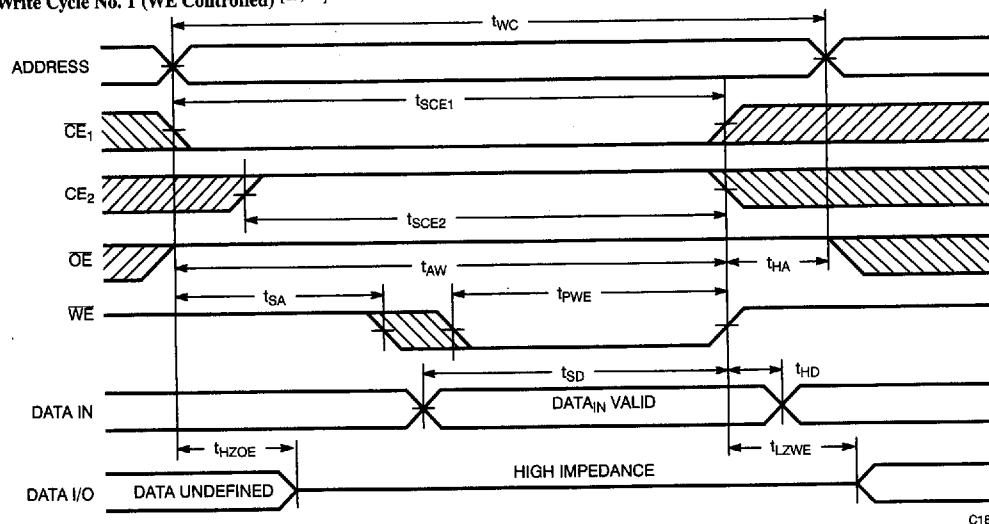
**Switching Characteristics** Over the Operating Range<sup>[3, 7]</sup>

| Parameter                   | Description                                                                       | 7C185A-15 |      | 7C185A-20 |      | 7C185A-25 |      | 7C185A-35 |      | 7C185A-45 |      | Unit |
|-----------------------------|-----------------------------------------------------------------------------------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|------|
|                             |                                                                                   | Min.      | Max. | Min.      | Max. | Min.      | Max. | Min.      | Max. | Min.      | Max. |      |
| READ CYCLE                  |                                                                                   |           |      |           |      |           |      |           |      |           |      |      |
| t <sub>RC</sub>             | Read Cycle Time                                                                   | 15        |      | 20        |      | 25        |      | 35        |      | 45        |      | ns   |
| t <sub>AA</sub>             | Address to Data Valid                                                             |           | 15   |           | 20   |           | 25   |           | 35   |           | 45   | ns   |
| t <sub>OHA</sub>            | Data Hold from Address Change                                                     | 3         |      | 3         |      | 3         |      | 3         |      | 3         |      | ns   |
| t <sub>ACE1</sub>           | CE <sub>1</sub> LOW to Data Valid                                                 |           | 15   |           | 20   |           | 25   |           | 35   |           | 45   | ns   |
| t <sub>ACE2</sub>           | CE <sub>2</sub> HIGH to Data Valid                                                |           | 15   |           | 20   |           | 25   |           | 35   |           | 30   | ns   |
| t <sub>DOE</sub>            | OE LOW to Data Valid                                                              |           | 7    |           | 10   |           | 12   |           | 15   |           | 20   | ns   |
| t <sub>LZOE</sub>           | OE LOW to Low Z                                                                   | 0         |      | 3         |      | 3         |      | 3         |      | 3         |      | ns   |
| t <sub>HZOE</sub>           | OE HIGH to High Z <sup>[8]</sup>                                                  |           | 8    |           | 8    |           | 10   |           | 12   |           | 15   | ns   |
| t <sub>LZCE1</sub>          | CE <sub>1</sub> LOW to Low Z <sup>[9]</sup>                                       | 3         |      | 5         |      | 5         |      | 5         |      | 5         |      | ns   |
| t <sub>LZCE2</sub>          | CE <sub>2</sub> HIGH to Low Z                                                     | 3         |      | 3         |      | 3         |      | 3         |      | 3         |      | ns   |
| t <sub>HZCE</sub>           | CE <sub>1</sub> HIGH to High Z <sup>[8, 9]</sup><br>CE <sub>2</sub> LOW to High Z |           | 8    |           | 8    |           | 10   |           | 15   |           | 15   | ns   |
| t <sub>PU</sub>             | CE <sub>1</sub> LOW to Power-Up                                                   | 0         |      | 0         |      | 0         |      | 0         |      | 0         |      | ns   |
| t <sub>PD</sub>             | CE <sub>1</sub> HIGH to Power-Down                                                |           | 15   |           | 20   |           | 20   |           | 20   |           | 25   | ns   |
| WRITE CYCLE <sup>[10]</sup> |                                                                                   |           |      |           |      |           |      |           |      |           |      |      |
| t <sub>WC</sub>             | Write Cycle Time                                                                  | 15        |      | 20        |      | 20        |      | 25        |      | 40        |      | ns   |
| t <sub>SCE1</sub>           | CE <sub>1</sub> LOW to Write End                                                  | 10        |      | 15        |      | 20        |      | 25        |      | 30        |      | ns   |
| t <sub>SCE2</sub>           | CE <sub>2</sub> HIGH to Write End                                                 | 10        |      | 15        |      | 20        |      | 25        |      | 30        |      | ns   |
| t <sub>AW</sub>             | Address Set-Up to Write End                                                       | 10        |      | 15        |      | 20        |      | 25        |      | 30        |      | ns   |
| t <sub>HA</sub>             | Address Hold from Write End                                                       | 0         |      | 0         |      | 0         |      | 0         |      | 0         |      | ns   |
| t <sub>SA</sub>             | Address Set-Up to Write Start                                                     | 0         |      | 0         |      | 0         |      | 0         |      | 0         |      | ns   |
| t <sub>PWE</sub>            | WE Pulse Width                                                                    | 10        |      | 15        |      | 15        |      | 20        |      | 20        |      | ns   |
| t <sub>SD</sub>             | Data Set-Up to Write End                                                          | 7         |      | 10        |      | 10        |      | 15        |      | 15        |      | ns   |
| t <sub>HD</sub>             | Data Hold from Write End                                                          | 0         |      | 0         |      | 0         |      | 0         |      | 0         |      | ns   |
| t <sub>LZWE</sub>           | WE HIGH to Low Z                                                                  | 3         |      | 3         |      | 5         |      | 5         |      | 5         |      | ns   |
| t <sub>HZWE</sub>           | WE LOW to High Z <sup>[8]</sup>                                                   |           | 7    |           | 7    |           | 7    |           | 10   |           | 15   | ns   |

Shaded area contains advanced information.

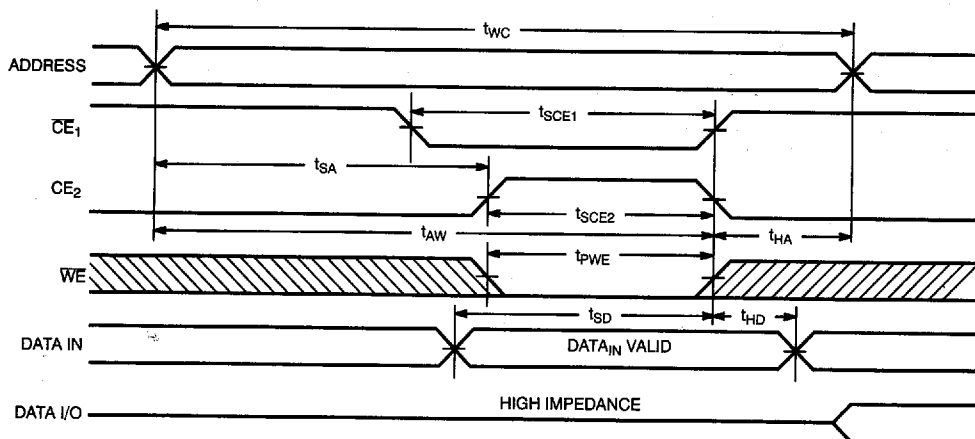
**Notes:**

- Test conditions assume signal transition time 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<sub>OL</sub>/I<sub>OH</sub> and 30-pF load capacitance.
- t<sub>HZO</sub>, t<sub>HZCE</sub>, and t<sub>HZWE</sub> are specified with C<sub>L</sub> = 5 pF as in part (b) of AC Test Loads. Transition is measured  $\pm 500$  mV from steady-state voltage.
- At any given temperature and voltage condition, t<sub>HZCE</sub> is less than t<sub>LZCE</sub> for any given device.
- Device is continuously selected.  $\overline{OE}$ ,  $\overline{CE} = V_{IL}$ . CE<sub>2</sub> = V<sub>IH</sub>.

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

**Read Cycle No. 2 [11, 12]**

**Write Cycle No. 1 ( $\overline{WE}$  Controlled) [13, 14]**

**Notes:**

11. Address valid prior to or coincident with  $\overline{CE}_1$  transition LOW.
12.  $\overline{WE}$  is HIGH for read cycle.
13. The internal write time of the memory is defined by the overlap of  $\overline{CE}_1$  LOW,  $\overline{CE}_2$  HIGH, and  $\overline{WE}$  LOW. Both signals must be LOW to initi-

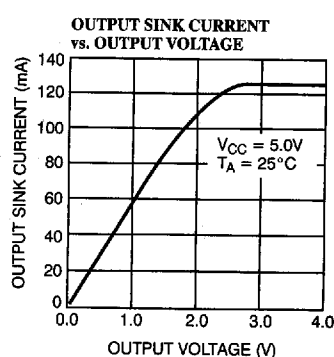
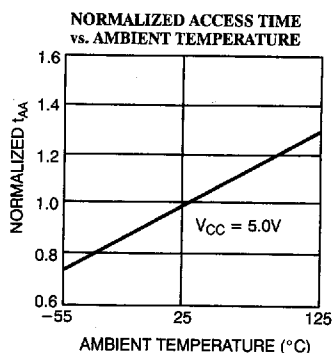
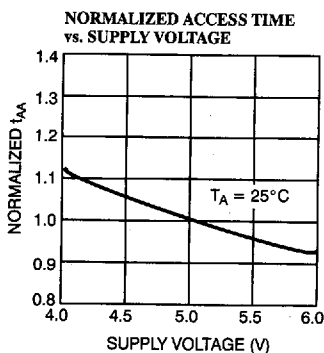
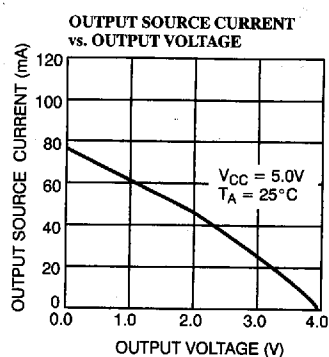
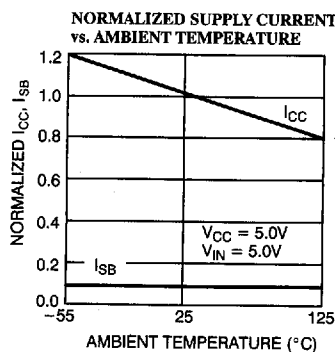
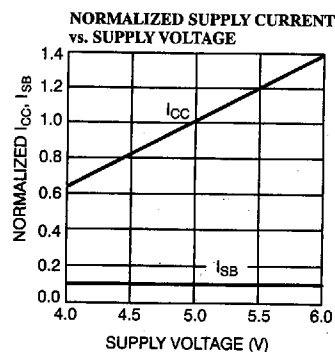
- ate a write and either signal can terminate a write by going HIGH. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the write.
14. Data I/O is high impedance if  $\overline{OE} = V_{IH}$ .

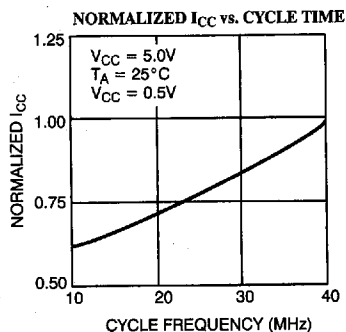
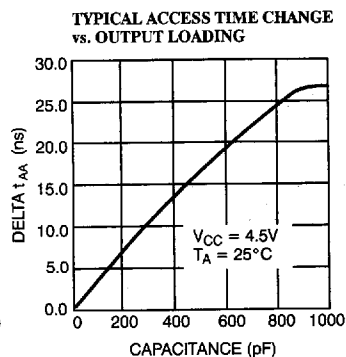
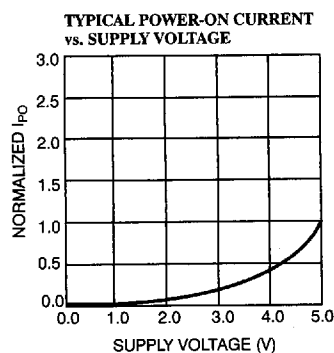
**Switching Waveforms (continued)**
**Write Cycle No. 2 ( $\overline{CE}$  Controlled) [13, 14, 15]**


C185A-9

**Note:**

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

**Typical DC and AC Characteristics**


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

**Truth Table**

| $\overline{CE}_1$ | $CE_2$ | $\overline{WE}$ | $\overline{OE}$ | Input/Output | Mode                |
|-------------------|--------|-----------------|-----------------|--------------|---------------------|
| H                 | X      | X               | X               | High Z       | Deselect/Power-Down |
| X                 | L      | X               | X               | High Z       | Deselect            |
| L                 | H      | H               | L               | Data Out     | Read                |
| L                 | H      | L               | X               | Data In      | Write               |
| L                 | H      | H               | H               | High Z       | Deselect            |

**Address Designators**

| Address Name | Address Function | Pin Number |
|--------------|------------------|------------|
| A4           | X3               | 2          |
| A5           | X4               | 3          |
| A6           | X5               | 4          |
| A7           | X6               | 5          |
| A8           | X7               | 6          |
| A9           | Y1               | 7          |
| A10          | Y4               | 8          |
| A11          | Y3               | 9          |
| A12          | Y0               | 10         |
| A0           | Y2               | 21         |
| A1           | X0               | 23         |
| A2           | X1               | 24         |

**Ordering Information**

| Speed (ns) | Ordering Code  | Package Name | Package Type                             | Operating Range |
|------------|----------------|--------------|------------------------------------------|-----------------|
| 15         | CY7C185A-15DMB | D22          | 28-Lead (300-Mil) CerDIP                 | Military        |
|            | CY7C185A-15LMB | L54          | 28-Pin Rectangular Leadless Chip Carrier |                 |
| 20         | CY7C185A-20DMB | D22          | 28-Lead (300-Mil) CerDIP                 | Military        |
|            | CY7C185A-20LMB | L54          | 28-Pin Rectangular Leadless Chip Carrier |                 |
| 25         | CY7C185A-25DMB | D22          | 28-Lead (300-Mil) CerDIP                 | Military        |
|            | CY7C185A-25LMB | L54          | 28-Pin Rectangular Leadless Chip Carrier |                 |
| 35         | CY7C185A-35DMB | D22          | 28-Lead (300-Mil) CerDIP                 | Military        |
|            | CY7C185A-35LMB | L54          | 28-Pin Rectangular Leadless Chip Carrier |                 |
| 45         | CY7C185A-45DMB | D22          | 28-Lead (300-Mil) CerDIP                 | Military        |
|            | CY7C185A-45LMB | L54          | 28-Pin Rectangular Leadless Chip Carrier |                 |

Shaded area contains advanced information.

**MILITARY SPECIFICATIONS**  
**Group A Subgroup Testing**
**DC Characteristics**

| Parameter            | Subgroups |
|----------------------|-----------|
| V <sub>OH</sub>      | 1, 2, 3   |
| V <sub>OL</sub>      | 1, 2, 3   |
| V <sub>IH</sub>      | 1, 2, 3   |
| V <sub>IL</sub> Max. | 1, 2, 3   |
| I <sub>Ix</sub>      | 1, 2, 3   |
| I <sub>OZ</sub>      | 1, 2, 3   |
| I <sub>OS</sub>      | 1, 2, 3   |
| I <sub>CC</sub>      | 1, 2, 3   |
| I <sub>SB1</sub>     | 1, 2, 3   |
| I <sub>SB2</sub>     | 1, 2, 3   |

**Switching Characteristics**

| Parameter          | Subgroups       |
|--------------------|-----------------|
| <b>READ CYCLE</b>  |                 |
| t <sub>RC</sub>    | 7, 8, 9, 10, 11 |
| t <sub>AA</sub>    | 7, 8, 9, 10, 11 |
| t <sub>OHA</sub>   | 7, 8, 9, 10, 11 |
| t <sub>ACE1</sub>  | 7, 8, 9, 10, 11 |
| t <sub>ACE2</sub>  | 7, 8, 9, 10, 11 |
| t <sub>DOE</sub>   | 7, 8, 9, 10, 11 |
| <b>WRITE CYCLE</b> |                 |
| t <sub>WC</sub>    | 7, 8, 9, 10, 11 |
| t <sub>SCE1</sub>  | 7, 8, 9, 10, 11 |
| t <sub>SCE2</sub>  | 7, 8, 9, 10, 11 |
| t <sub>AW</sub>    | 7, 8, 9, 10, 11 |
| t <sub>HA</sub>    | 7, 8, 9, 10, 11 |
| t <sub>SA</sub>    | 7, 8, 9, 10, 11 |
| t <sub>PWE</sub>   | 7, 8, 9, 10, 11 |
| t <sub>SD</sub>    | 7, 8, 9, 10, 11 |
| t <sub>HD</sub>    | 7, 8, 9, 10, 11 |

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