



# CY7C130/CY7C131 CY7C140/CY7C141

## 1K x 8 Dual-Port Static Ram

### Features

- True Dual-Ported memory cells which allow simultaneous reads of the same memory location
- 1K x 8 organization
- 0.65-micron CMOS for optimum speed/power
- High-speed access: 15 ns
- Low operating power:  $I_{CC} = 90$  mA (max.)
- Fully asynchronous operation
- Automatic power-down
- Master CY7C130/CY7C131 easily expands data bus width to 16 or more bits using slave CY7C140/CY7C141
- $\overline{BUSY}$  output flag on CY7C130/CY7C131;  $\overline{BUSY}$  input on CY7C140/CY7C141
- $\overline{INT}$  flag for port-to-port communication
- Available in 48-pin DIP (CY7C130/140), 52-pin PLCC and 52-pin TQFP
- Pin-compatible and functionally equivalent to IDT7130/IDT7140

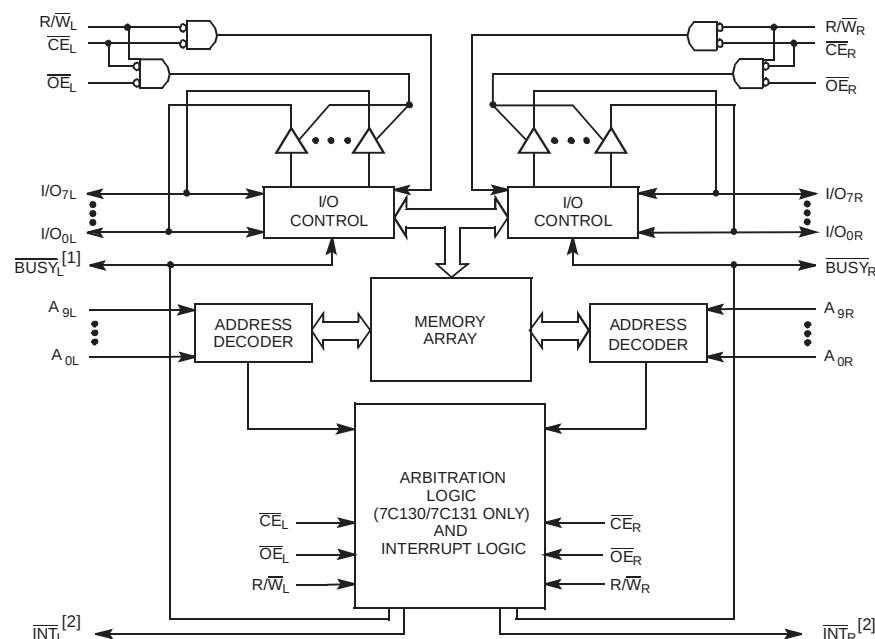
### Functional Description

The CY7C130/CY7C131/CY7C140 and CY7C141 are high-speed CMOS 1K by 8 dual-port static RAMs. Two ports are provided permitting independent access to any location in memory. The CY7C130/ CY7C131 can be utilized as either a standalone 8-bit dual-port static RAM or as a master dual-port RAM in conjunction with the CY7C140/CY7C141 slave dual-port device in systems requiring 16-bit or greater word widths. It is the solution to applications requiring shared or buffered data, such as cache memory for DSP, bit-slice, or multiprocessor designs.

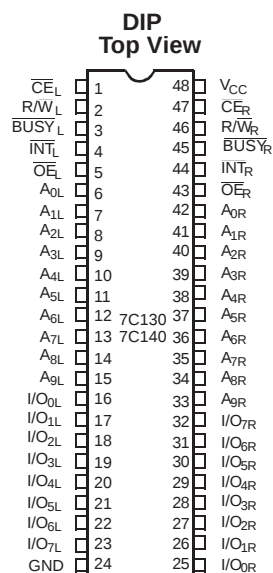
Each port has independent control pins; chip enable ( $\overline{CE}$ ), write enable ( $R/\overline{W}$ ), and output enable ( $\overline{OE}$ ). Two flags are provided on each port,  $\overline{BUSY}$  and  $\overline{INT}$ .  $\overline{BUSY}$  signals that the port is trying to access the same location currently being accessed by the other port.  $\overline{INT}$  is an interrupt flag indicating that data has been placed in a unique location (3FF for the left port and 3FE for the right port). An automatic power-down feature is controlled independently on each port by the chip enable ( $\overline{CE}$ ) pins.

The CY7C130 and CY7C140 are available in 48-pin DIP. The CY7C131 and CY7C141 are available in 52-pin PLCC and PQFP.

### Logic Block Diagram



### Pin Configurations



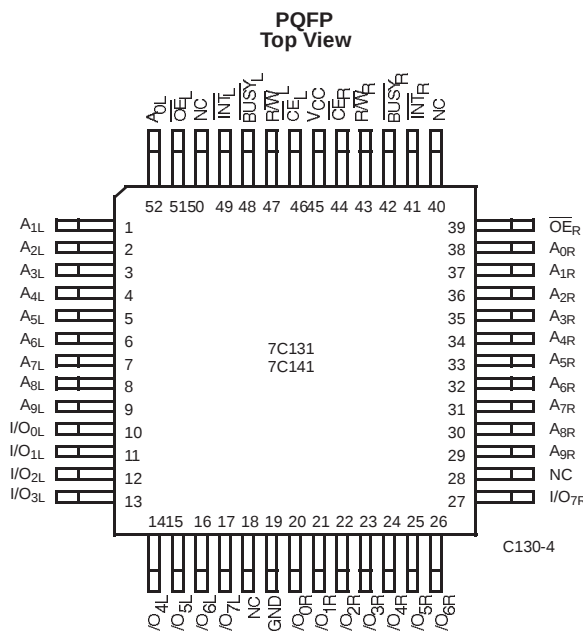
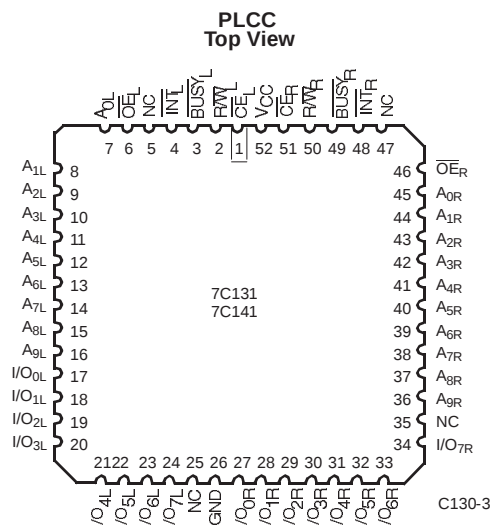
C130-2

C130-1

#### Notes:

1. CY7C130/CY7C131 (Master):  $\overline{BUSY}$  is open drain output and requires pull-up resistor  
CY7C140/CY7C141 (Slave):  $\overline{BUSY}$  is input.
2. Open drain outputs: pull-up resistor required

## Pin Configuration (continued)



## Selection Guide

|                                |           | <b>7C131-15<sup>[3,4]</sup></b><br><b>7C141-15</b> | <b>7C131-25<sup>[3]</sup></b><br><b>7C141-25</b> | <b>7C130-30</b><br><b>7C131-30</b><br><b>7C140-30</b><br><b>7C141-30</b> | <b>7C130-35</b><br><b>7C131-35</b><br><b>7C140-35</b><br><b>7C141-35</b> | <b>7C130-45</b><br><b>7C131-45</b><br><b>7C140-45</b><br><b>7C141-45</b> | <b>7C130-55</b><br><b>7C131-55</b><br><b>7C140-55</b><br><b>7C141-55</b> |
|--------------------------------|-----------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Maximum Access Time (ns)       |           | 15                                                 | 25                                               | 30                                                                       | 35                                                                       | 45                                                                       | 55                                                                       |
| Maximum Operating Current (mA) | Com'l/Ind | 190                                                | 170                                              | 170                                                                      | 120                                                                      | 90                                                                       | 90                                                                       |
|                                | Military  |                                                    |                                                  |                                                                          | 170                                                                      | 120                                                                      | 120                                                                      |
| Maximum Standby Current (mA)   | Com'l/Ind | 75                                                 | 65                                               | 65                                                                       | 45                                                                       | 35                                                                       | 35                                                                       |
|                                | Military  |                                                    |                                                  |                                                                          | 65                                                                       | 45                                                                       | 45                                                                       |

## 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 48 to Pin 24) ..... -0.5V to +7.0V

DC Voltage Applied to Outputs  
in High Z State ..... -0.5V to +7.0V

DC Input Voltage..... -3.5V to +7.0V

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

### Notes:

- 15 and 25-ns version available only in PLCC/PQFP packages.
- Shaded area contains preliminary information.
- T<sub>A</sub> is the "instant on" case temperature

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%        |
| Industrial              | -40°C to +85°C      | 5V ± 10%        |
| Military <sup>[5]</sup> | -55°C to +125°C     | 5V ± 10%        |

**Electrical Characteristics** Over the Operating Range<sup>[6]</sup>

| Parameter        | Description                                    | Test Conditions                                                                                                                                                                                                   | 7C131-15 <sup>[3,4]</sup><br>7C141-15 |      | 7C130-30 <sup>[3]</sup><br>7C131-25,30<br>7C140-30<br>7C141-25,30 |      | 7C130-35<br>7C131-35<br>7C140-35<br>7C141-35 |      | 7C130-45,55<br>7C131-45,55<br>7C140-45,55<br>7C141-45,55 |      | Unit |
|------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------|-------------------------------------------------------------------|------|----------------------------------------------|------|----------------------------------------------------------|------|------|
|                  |                                                |                                                                                                                                                                                                                   | Min.                                  | Max. | Min.                                                              | Max. | 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                                                               |      | 2.4                                          |      | 2.4                                                      |      | V    |
| V <sub>OL</sub>  | Output LOW Voltage                             | I <sub>OL</sub> = 4.0 mA                                                                                                                                                                                          |                                       | 0.4  |                                                                   | 0.4  |                                              | 0.4  |                                                          | 0.4  | V    |
|                  |                                                | I <sub>OL</sub> = 16.0 mA <sup>[7]</sup>                                                                                                                                                                          |                                       | 0.5  |                                                                   | 0.5  |                                              | 0.5  |                                                          | 0.5  |      |
| V <sub>IH</sub>  | Input HIGH Voltage                             |                                                                                                                                                                                                                   | 2.2                                   |      | 2.2                                                               |      | 2.2                                          |      | 2.2                                                      |      | V    |
| V <sub>IL</sub>  | Input LOW Voltage                              |                                                                                                                                                                                                                   |                                       | 0.8  |                                                                   | 0.8  |                                              | 0.8  |                                                          | 0.8  | V    |
| I <sub>Ix</sub>  | Input Leakage Current                          | GND ≤ V <sub>I</sub> ≤ V <sub>CC</sub>                                                                                                                                                                            | -5                                    | +5   | -5                                                                | +5   | -5                                           | +5   | -5                                                       | +5   | μA   |
| I <sub>OZ</sub>  | Output Leakage Current                         | GND ≤ V <sub>O</sub> ≤ V <sub>CC</sub> ,<br>Output Disabled                                                                                                                                                       | -5                                    | +5   | -5                                                                | +5   | -5                                           | +5   | -5                                                       | +5   | μA   |
| I <sub>OS</sub>  | Output Short Circuit Current <sup>[8, 9]</sup> | V <sub>CC</sub> = Max.,<br>V <sub>OUT</sub> = GND                                                                                                                                                                 |                                       | -350 |                                                                   | -350 |                                              | -350 |                                                          | -350 | mA   |
| I <sub>CC</sub>  | V <sub>CC</sub> Operating Supply Current       | CE = V <sub>IL</sub> ,<br>Outputs Open,<br>f = f <sub>MAX</sub> <sup>[10]</sup>                                                                                                                                   | Com'l                                 | 190  |                                                                   | 170  |                                              | 120  |                                                          | 90   | mA   |
|                  |                                                |                                                                                                                                                                                                                   | Mil                                   |      |                                                                   |      |                                              | 170  |                                                          | 120  |      |
| I <sub>SB1</sub> | Standby Current Both Ports, TTL Inputs         | CE <sub>L</sub> and CE <sub>R</sub> ≥ V <sub>IH</sub> ,<br>f = f <sub>MAX</sub> <sup>[10]</sup>                                                                                                                   | Com'l                                 | 75   |                                                                   | 65   |                                              | 45   |                                                          | 35   | mA   |
|                  |                                                |                                                                                                                                                                                                                   | Mil                                   |      |                                                                   |      |                                              | 65   |                                                          | 45   |      |
| I <sub>SB2</sub> | Standby Current One Port, TTL Inputs           | CE <sub>L</sub> or CE <sub>R</sub> ≥ V <sub>IH</sub> ,<br>Active Port Outputs Open,<br>f = f <sub>MAX</sub> <sup>[10]</sup>                                                                                       | Com'l                                 | 135  |                                                                   | 115  |                                              | 90   |                                                          | 75   | mA   |
|                  |                                                |                                                                                                                                                                                                                   | Mil                                   |      |                                                                   |      |                                              | 115  |                                                          | 90   |      |
| I <sub>SB3</sub> | Standby Current Both Ports, CMOS Inputs        | Both Ports CE <sub>L</sub> and CE <sub>R</sub> ≥ V <sub>CC</sub> - 0.2V,<br>V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2V or V <sub>IN</sub> ≤ 0.2V, f = 0                                                             | Com'l                                 | 15   |                                                                   | 15   |                                              | 15   |                                                          | 15   | mA   |
|                  |                                                |                                                                                                                                                                                                                   | Mil                                   |      |                                                                   |      |                                              | 15   |                                                          | 15   |      |
| I <sub>SB4</sub> | Standby Current One Port, CMOS Inputs          | One Port CE <sub>L</sub> or CE <sub>R</sub> ≥ V <sub>CC</sub> - 0.2V,<br>V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2V or V <sub>IN</sub> ≤ 0.2V,<br>Active Port Outputs Open,<br>f = f <sub>MAX</sub> <sup>[10]</sup> | Com'l                                 | 125  |                                                                   | 105  |                                              | 85   |                                                          | 70   | mA   |
|                  |                                                |                                                                                                                                                                                                                   | Mil                                   |      |                                                                   |      |                                              | 105  |                                                          | 85   |      |

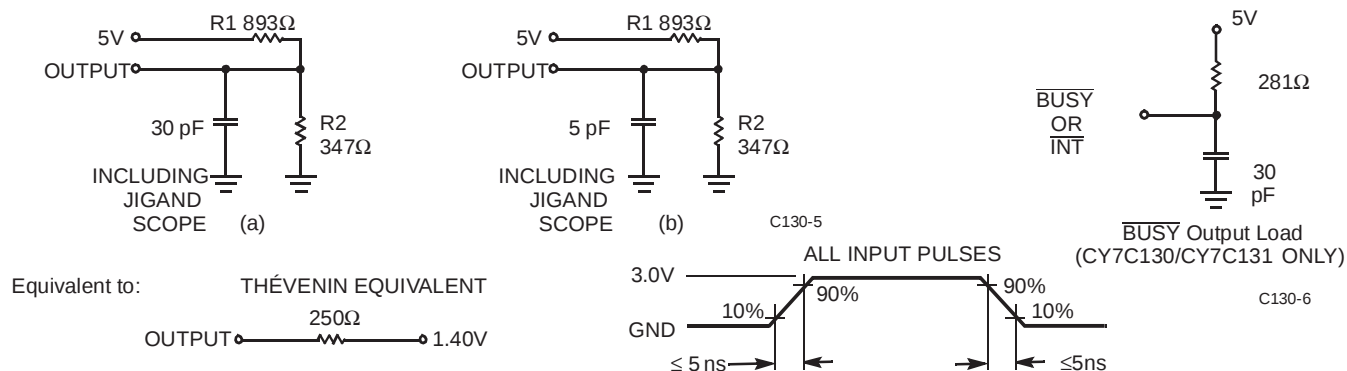
**Notes:**

6. See the last page of this specification for Group A subgroup testing information.
7. BUSY and INT pins only.
8. Duration of the short circuit should not exceed 30 seconds.
9. This parameter is guaranteed but not tested.
10. At f = f<sub>MAX</sub>, address and data inputs are cycling at the maximum frequency of read cycle of 1/t<sub>RC</sub> and using AC Test Waveforms input levels of GND to 3V.

**Capacitance<sup>[9]</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 | 15   | pF   |
| C <sub>OUT</sub> | Output Capacitance |                                                             | 10   | pF   |

## AC Test Loads and Waveforms



## Switching Characteristics Over the Operating Range<sup>[6,11]</sup>

| Parameter                   | Description                                          | 7C131-15 <sup>[3,4]</sup><br>7C141-15 |      | 7C130-25 <sup>[3]</sup><br>7C131-25<br>7C140-25<br>7C141-25 |      | 7C130-30<br>7C131-30<br>7C140-30<br>7C141-30 |      | Unit |
|-----------------------------|------------------------------------------------------|---------------------------------------|------|-------------------------------------------------------------|------|----------------------------------------------|------|------|
|                             |                                                      | Min.                                  | Max. | Min.                                                        | Max. | Min.                                         | Max. |      |
| READ CYCLE                  |                                                      |                                       |      |                                                             |      |                                              |      |      |
| t <sub>RC</sub>             | Read Cycle Time                                      | 15                                    |      | 25                                                          |      | 30                                           |      | ns   |
| t <sub>AA</sub>             | Address to Data Valid <sup>[12]</sup>                |                                       | 15   |                                                             | 25   |                                              | 30   | ns   |
| t <sub>OHA</sub>            | Data Hold from Address Change                        | 0                                     |      | 0                                                           |      | 0                                            |      | ns   |
| t <sub>ACE</sub>            | $\overline{CE}$ LOW to Data Valid <sup>[12]</sup>    |                                       | 15   |                                                             | 25   |                                              | 30   | ns   |
| t <sub>DOE</sub>            | $\overline{OE}$ LOW to Data Valid <sup>[12]</sup>    |                                       | 10   |                                                             | 15   |                                              | 20   | ns   |
| t <sub>LZOE</sub>           | $\overline{OE}$ LOW to Low Z <sup>[9,13, 14]</sup>   | 3                                     |      | 3                                                           |      | 3                                            |      | ns   |
| t <sub>HZOE</sub>           | $\overline{OE}$ HIGH to High Z <sup>[9,13, 14]</sup> |                                       | 10   |                                                             | 15   |                                              | 15   | ns   |
| t <sub>LZCE</sub>           | $\overline{CE}$ LOW to Low Z <sup>[9,13, 14]</sup>   | 3                                     |      | 5                                                           |      | 5                                            |      | ns   |
| t <sub>HZCE</sub>           | $\overline{CE}$ HIGH to High Z <sup>[9,13, 14]</sup> |                                       | 10   |                                                             | 15   |                                              | 15   | ns   |
| t <sub>PU</sub>             | $\overline{CE}$ LOW to Power-Up <sup>[9]</sup>       | 0                                     |      | 0                                                           |      | 0                                            |      | ns   |
| t <sub>PD</sub>             | $\overline{CE}$ HIGH to Power-Down <sup>[9]</sup>    |                                       | 15   |                                                             | 25   |                                              | 25   | ns   |
| WRITE CYCLE <sup>[15]</sup> |                                                      |                                       |      |                                                             |      |                                              |      |      |
| t <sub>WC</sub>             | Write Cycle Time                                     | 15                                    |      | 25                                                          |      | 30                                           |      | ns   |
| t <sub>SCE</sub>            | $\overline{CE}$ LOW to Write End                     | 12                                    |      | 20                                                          |      | 25                                           |      | ns   |
| t <sub>AW</sub>             | Address Set-Up to Write End                          | 12                                    |      | 20                                                          |      | 25                                           |      | ns   |
| t <sub>HA</sub>             | Address Hold from Write End                          | 2                                     |      | 2                                                           |      | 2                                            |      | ns   |
| t <sub>SA</sub>             | Address Set-Up to Write Start                        | 0                                     |      | 0                                                           |      | 0                                            |      | ns   |
| t <sub>PWE</sub>            | R $\overline{W}$ Pulse Width                         | 12                                    |      | 15                                                          |      | 25                                           |      | ns   |
| t <sub>SD</sub>             | Data Set-Up to Write End                             | 10                                    |      | 15                                                          |      | 15                                           |      | ns   |
| t <sub>HD</sub>             | Data Hold from Write End                             | 0                                     |      | 0                                                           |      | 0                                            |      | ns   |
| t <sub>HZWE</sub>           | R $\overline{W}$ LOW to High Z <sup>[14]</sup>       |                                       | 10   |                                                             | 15   |                                              | 15   | ns   |
| t <sub>LZWE</sub>           | R $\overline{W}$ HIGH to Low Z <sup>[14]</sup>       | 0                                     |      | 0                                                           |      | 0                                            |      | ns   |

### Notes:

- Test conditions assume signal transition times 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>/O<sub>H</sub> and 30-pF load capacitance.
- AC Test Conditions use V<sub>OH</sub> = 1.6V and V<sub>OL</sub> = 1.4V.
- At any given temperature and voltage condition for any given device, t<sub>HZCE</sub> is less than t<sub>LZCE</sub> and t<sub>HZOE</sub> is less than t<sub>LZOE</sub>.
- t<sub>LZCE</sub>, t<sub>LZWE</sub>, t<sub>HZOE</sub>, t<sub>LZOE</sub>, t<sub>HZCE</sub> and t<sub>HZWE</sub> are tested with C<sub>L</sub> = 5pF 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 CS LOW and R $\overline{W}$  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 Characteristics** Over the Operating Range<sup>[6,11]</sup> (continued)

| Parameter                       | Description                                     | 7C131-15 <sup>[3,4]</sup><br>7C141-15 |         | 7C130-25 <sup>[3]</sup><br>7C131-25<br>7C140-25<br>7C141-25 |         | 7C130-30<br>7C131-30<br>7C140-30<br>7C141-30 |         | Unit |
|---------------------------------|-------------------------------------------------|---------------------------------------|---------|-------------------------------------------------------------|---------|----------------------------------------------|---------|------|
|                                 |                                                 | Min.                                  | Max.    | Min.                                                        | Max.    | Min.                                         | Max.    |      |
| BUSY/INTERRUPT TIMING           |                                                 |                                       |         |                                                             |         |                                              |         |      |
| t <sub>BLA</sub>                | BUSY LOW from Address Match                     |                                       | 15      |                                                             | 20      |                                              | 20      | ns   |
| t <sub>BHA</sub>                | BUSY HIGH from Address Mismatch <sup>[16]</sup> |                                       | 15      |                                                             | 20      |                                              | 20      | ns   |
| t <sub>BLC</sub>                | BUSY LOW from CE LOW                            |                                       | 15      |                                                             | 20      |                                              | 20      | ns   |
| t <sub>BHC</sub>                | BUSY HIGH from CE HIGH <sup>[16]</sup>          |                                       | 15      |                                                             | 20      |                                              | 20      | ns   |
| t <sub>PS</sub>                 | Port Set Up for Priority                        | 5                                     |         | 5                                                           |         | 5                                            |         | ns   |
| t <sub>WB</sub> <sup>[17]</sup> | R/W LOW after BUSY LOW                          | 0                                     |         | 0                                                           |         | 0                                            |         | ns   |
| t <sub>WH</sub>                 | R/W HIGH after BUSY HIGH                        | 13                                    |         | 20                                                          |         | 30                                           |         | ns   |
| t <sub>BDD</sub>                | BUSY HIGH to Valid Data                         |                                       | 15      |                                                             | 25      |                                              | 30      | ns   |
| t <sub>DDD</sub>                | Write Data Valid to Read Data Valid             |                                       | Note 18 |                                                             | Note 18 |                                              | Note 18 | ns   |
| t <sub>WDD</sub>                | Write Pulse to Data Delay                       |                                       | Note 18 |                                                             | Note 18 |                                              | Note 18 | ns   |
| INTERRUPT TIMING                |                                                 |                                       |         |                                                             |         |                                              |         |      |
| t <sub>WINS</sub>               | R/W to INTERRUPT Set Time                       |                                       | 15      |                                                             | 25      |                                              | 25      | ns   |
| t <sub>EINS</sub>               | CE to INTERRUPT Set Time                        |                                       | 15      |                                                             | 25      |                                              | 25      | ns   |
| t <sub>INS</sub>                | Address to INTERRUPT Set Time                   |                                       | 15      |                                                             | 25      |                                              | 25      | ns   |
| t <sub>OINR</sub>               | OE to INTERRUPT Reset Time <sup>[16]</sup>      |                                       | 15      |                                                             | 25      |                                              | 25      | ns   |
| t <sub>EINR</sub>               | CE to INTERRUPT Reset Time <sup>[16]</sup>      |                                       | 15      |                                                             | 25      |                                              | 25      | ns   |
| t <sub>INR</sub>                | Address to INTERRUPT Reset Time <sup>[16]</sup> |                                       | 15      |                                                             | 25      |                                              | 25      | ns   |

**Notes:**

16. These parameters are measured from the input signal changing, until the output pin goes to a high-impedance state.  
 17. CY7C140/CY7C141 only.  
 18. A write operation on Port A, where Port A has priority, leaves the data on Port B's outputs undisturbed until one access time after one of the following:  
 BUSY on Port B goes HIGH.  
 Port B's address is toggled.  
 CE for Port B is toggled.  
 R/W for Port B is toggled during valid read.

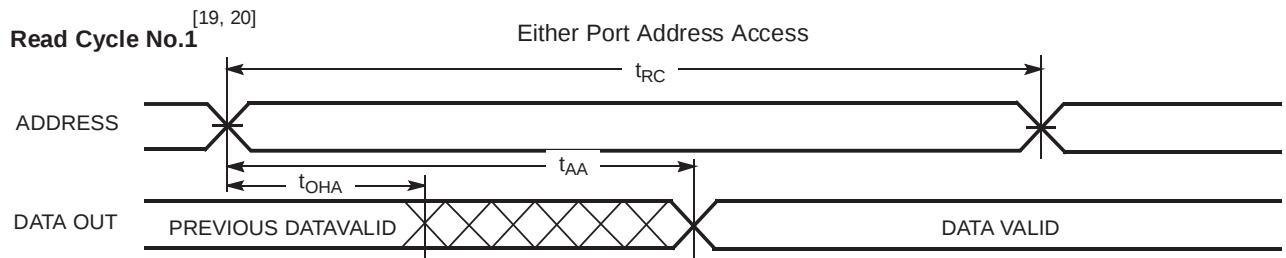
**Switching Characteristics** Over the Operating Range<sup>[6,11]</sup>

| Parameter         | Description                                                 | 7C130-35<br>7C131-35<br>7C140-35<br>7C141-35 |      | 7C130-45<br>7C131-45<br>7C140-45<br>7C141-45 |      | 7C130-55<br>7C131-55<br>7C140-55<br>7C141-55 |      | Unit |
|-------------------|-------------------------------------------------------------|----------------------------------------------|------|----------------------------------------------|------|----------------------------------------------|------|------|
|                   |                                                             | Min.                                         | Max. | Min.                                         | Max. | Min.                                         | Max. |      |
| READ CYCLE        |                                                             |                                              |      |                                              |      |                                              |      |      |
| t <sub>RC</sub>   | Read Cycle Time                                             | 35                                           |      | 45                                           |      | 55                                           |      | ns   |
| t <sub>AA</sub>   | Address to Data Valid <sup>[12]</sup>                       |                                              | 35   |                                              | 45   |                                              | 55   | ns   |
| t <sub>OHA</sub>  | Data Hold from Address Change                               | 0                                            |      | 0                                            |      | 0                                            |      | ns   |
| t <sub>ACE</sub>  | $\overline{\text{CE}}$ LOW to Data Valid <sup>[12]</sup>    |                                              | 35   |                                              | 45   |                                              | 55   | ns   |
| t <sub>DOE</sub>  | $\overline{\text{OE}}$ LOW to Data Valid <sup>[12]</sup>    |                                              | 20   |                                              | 25   |                                              | 25   | ns   |
| t <sub>LZOE</sub> | $\overline{\text{OE}}$ LOW to Low Z <sup>[9,13, 14]</sup>   | 3                                            |      | 3                                            |      | 3                                            |      | ns   |
| t <sub>HZOE</sub> | $\overline{\text{OE}}$ HIGH to High Z <sup>[9,13, 14]</sup> |                                              | 20   |                                              | 20   |                                              | 25   | ns   |
| t <sub>LZCE</sub> | $\overline{\text{CE}}$ LOW to Low Z <sup>[9,13, 14]</sup>   | 5                                            |      | 5                                            |      | 5                                            |      | ns   |
| t <sub>HZCE</sub> | $\overline{\text{CE}}$ HIGH to High Z <sup>[9,13, 14]</sup> |                                              | 20   |                                              | 20   |                                              | 25   | ns   |
| t <sub>PU</sub>   | $\overline{\text{CE}}$ LOW to Power-Up <sup>[9]</sup>       | 0                                            |      | 0                                            |      | 0                                            |      | ns   |
| t <sub>PD</sub>   | $\overline{\text{CE}}$ HIGH to Power-Down <sup>[9]</sup>    |                                              | 35   |                                              | 35   |                                              | 35   | ns   |

**Switching Characteristics** Over the Operating Range<sup>[6,11]</sup> (continued)

| Parameter                       | Description                                                          | 7C130-35<br>7C131-35<br>7C140-35<br>7C141-35 |         | 7C130-45<br>7C131-45<br>7C140-45<br>7C141-45 |         | 7C130-55<br>7C131-55<br>7C140-55<br>7C141-55 |         | Unit |
|---------------------------------|----------------------------------------------------------------------|----------------------------------------------|---------|----------------------------------------------|---------|----------------------------------------------|---------|------|
|                                 |                                                                      | Min.                                         | Max.    | Min.                                         | Max.    | Min.                                         | Max.    |      |
| WRITE CYCLE <sup>[15]</sup>     |                                                                      |                                              |         |                                              |         |                                              |         |      |
| t <sub>WC</sub>                 | Write Cycle Time                                                     | 35                                           |         | 45                                           |         | 55                                           |         | ns   |
| t <sub>SCE</sub>                | $\overline{CE}$ LOW to Write End                                     | 30                                           |         | 35                                           |         | 40                                           |         | ns   |
| t <sub>AW</sub>                 | Address Set-Up to Write End                                          | 30                                           |         | 35                                           |         | 40                                           |         | ns   |
| t <sub>HA</sub>                 | Address Hold from Write End                                          | 2                                            |         | 2                                            |         | 2                                            |         | ns   |
| t <sub>SA</sub>                 | Address Set-Up to Write Start                                        | 0                                            |         | 0                                            |         | 0                                            |         | ns   |
| t <sub>PWE</sub>                | R/W Pulse Width                                                      | 25                                           |         | 30                                           |         | 30                                           |         | ns   |
| t <sub>SD</sub>                 | Data Set-Up to Write End                                             | 15                                           |         | 20                                           |         | 20                                           |         | ns   |
| t <sub>HD</sub>                 | Data Hold from Write End                                             | 0                                            |         | 0                                            |         | 0                                            |         | ns   |
| t <sub>HZWE</sub>               | R/W LOW to High Z <sup>[14]</sup>                                    |                                              | 20      |                                              | 20      |                                              | 25      | ns   |
| t <sub>LZWE</sub>               | R/W HIGH to Low Z <sup>[14]</sup>                                    | 0                                            |         | 0                                            |         | 0                                            |         | ns   |
| BUSY/INTERRUPT TIMING           |                                                                      |                                              |         |                                              |         |                                              |         |      |
| t <sub>BLA</sub>                | $\overline{BUSY}$ LOW from Address Match                             |                                              | 20      |                                              | 25      |                                              | 30      | ns   |
| t <sub>BHA</sub>                | $\overline{BUSY}$ HIGH from Address Mismatch <sup>[16]</sup>         |                                              | 20      |                                              | 25      |                                              | 30      | ns   |
| t <sub>BLC</sub>                | $\overline{BUSY}$ LOW from $\overline{CE}$ LOW                       |                                              | 20      |                                              | 25      |                                              | 30      | ns   |
| t <sub>BHC</sub>                | $\overline{BUSY}$ HIGH from $\overline{CE}$ HIGH <sup>[16]</sup>     |                                              | 20      |                                              | 25      |                                              | 30      | ns   |
| t <sub>PS</sub>                 | Port Set Up for Priority                                             | 5                                            |         | 5                                            |         | 5                                            |         | ns   |
| t <sub>WB</sub> <sup>[17]</sup> | R/W LOW after $\overline{BUSY}$ LOW                                  | 0                                            |         | 0                                            |         | 0                                            |         | ns   |
| t <sub>WH</sub>                 | R/W HIGH after $\overline{BUSY}$ HIGH                                | 30                                           |         | 35                                           |         | 35                                           |         | ns   |
| t <sub>BDD</sub>                | $\overline{BUSY}$ HIGH to Valid Data                                 |                                              | 35      |                                              | 45      |                                              | 45      | ns   |
| t <sub>DDD</sub>                | Write Data Valid to Read Data Valid                                  |                                              | Note 18 |                                              | Note 18 |                                              | Note 18 | ns   |
| t <sub>WDD</sub>                | Write Pulse to Data Delay                                            |                                              | Note 18 |                                              | Note 18 |                                              | Note 18 | ns   |
| INTERRUPT TIMING                |                                                                      |                                              |         |                                              |         |                                              |         |      |
| t <sub>WINS</sub>               | R/W to $\overline{INTERRUPT}$ Set Time                               |                                              | 25      |                                              | 35      |                                              | 45      | ns   |
| t <sub>EINS</sub>               | $\overline{CE}$ to $\overline{INTERRUPT}$ Set Time                   |                                              | 25      |                                              | 35      |                                              | 45      | ns   |
| t <sub>INS</sub>                | Address to $\overline{INTERRUPT}$ Set Time                           |                                              | 25      |                                              | 35      |                                              | 45      | ns   |
| t <sub>OINR</sub>               | $\overline{OE}$ to $\overline{INTERRUPT}$ Reset Time <sup>[16]</sup> |                                              | 25      |                                              | 35      |                                              | 45      | ns   |
| t <sub>EINR</sub>               | $\overline{CE}$ to $\overline{INTERRUPT}$ Reset Time <sup>[16]</sup> |                                              | 25      |                                              | 35      |                                              | 45      | ns   |
| t <sub>INR</sub>                | Address to $\overline{INTERRUPT}$ Reset Time <sup>[16]</sup>         |                                              | 25      |                                              | 35      |                                              | 45      | ns   |

**Switching Waveforms**



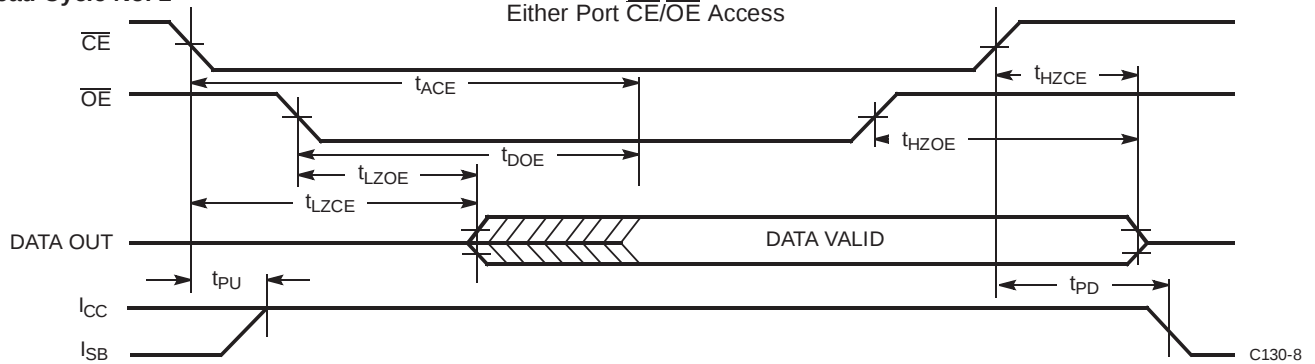
C130-7

**Notes:**

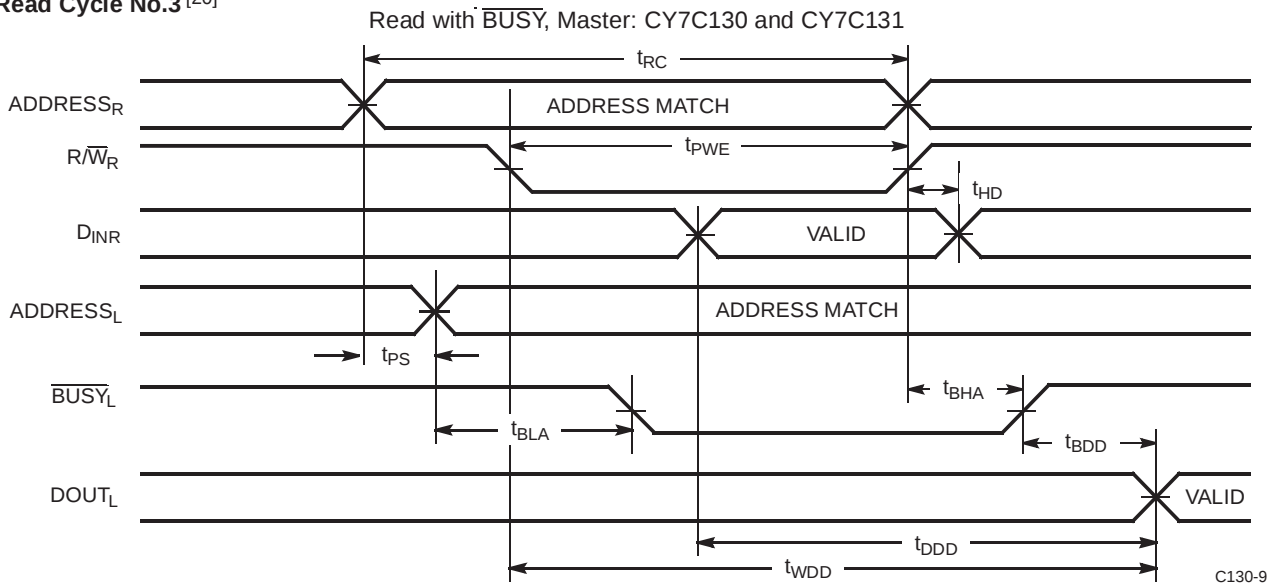
19.  $R/\overline{W}$  is HIGH for read cycle.  
20. Device is continuously selected,  $\overline{CE} = V_{IL}$  and  $\overline{OE} = V_{IL}$ .

**Switching Waveforms (continued)**

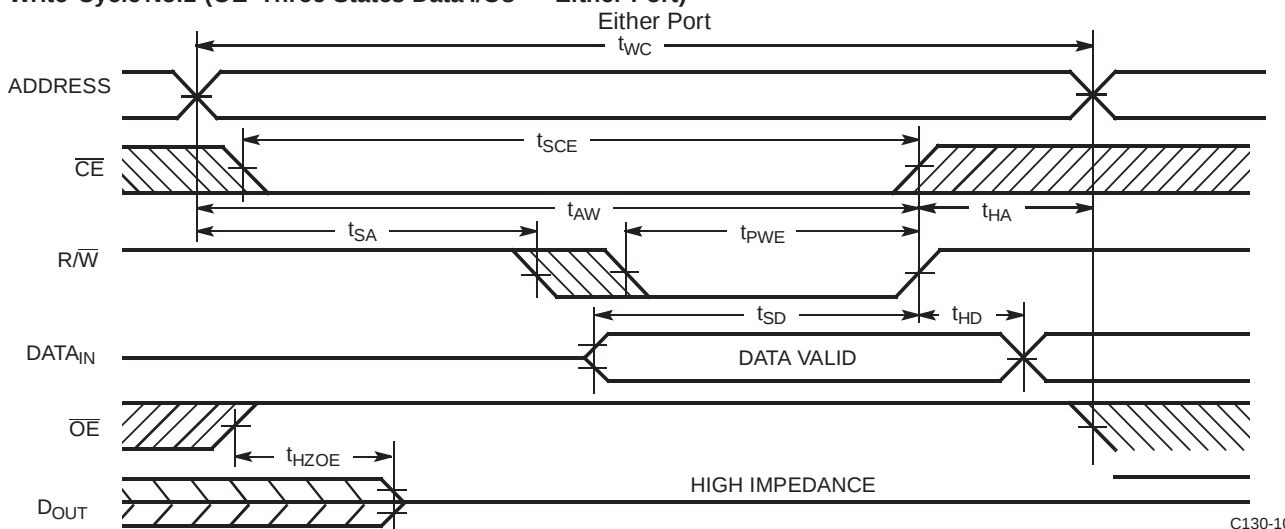
**Read Cycle No. 2** <sup>[19, 21]</sup>



**Read Cycle No.3** <sup>[20]</sup>



**Write Cycle No.1 (OE Three-States Data I/Os - Either Port)** <sup>[15, 22]</sup>

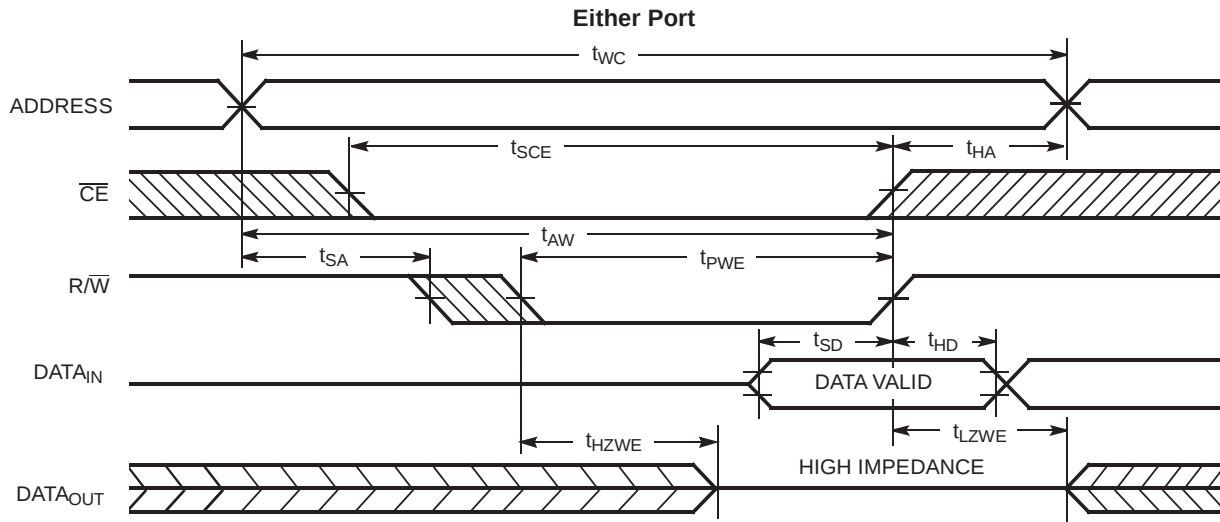


**Notes:**

21. Address valid prior to or coincident with  $\overline{\text{CE}}$  transition LOW.
22. If  $\overline{\text{OE}}$  is LOW during a  $\overline{\text{R/W}}$  controlled write cycle, the write pulse width must be the larger of  $t_{\text{PWE}}$  or  $t_{\text{HZOE}} + t_{\text{SD}}$  to allow the data I/O pins to enter high impedance and for data to be placed on the bus for the required  $t_{\text{SD}}$ .

**Switching Waveforms (continued)**

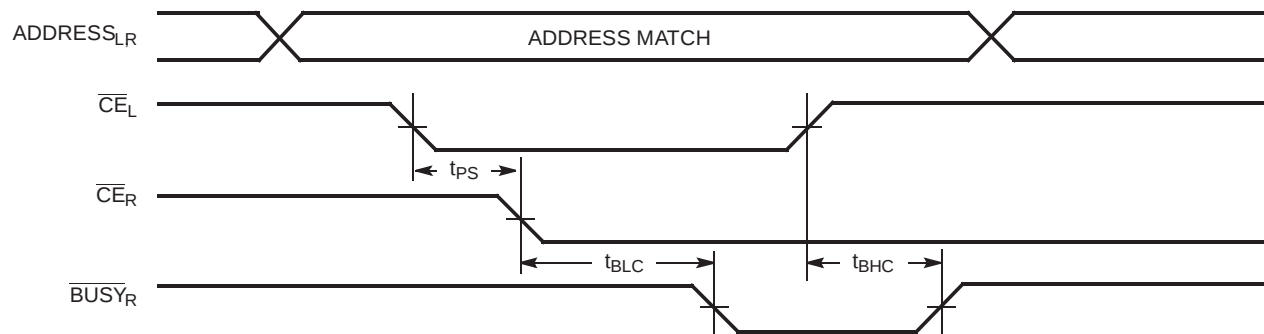
**Write Cycle No. 2 ( $\overline{R/\overline{W}}$  Three-States Data I/Os - Either Port)** <sup>[16, 23]</sup>



C130-11

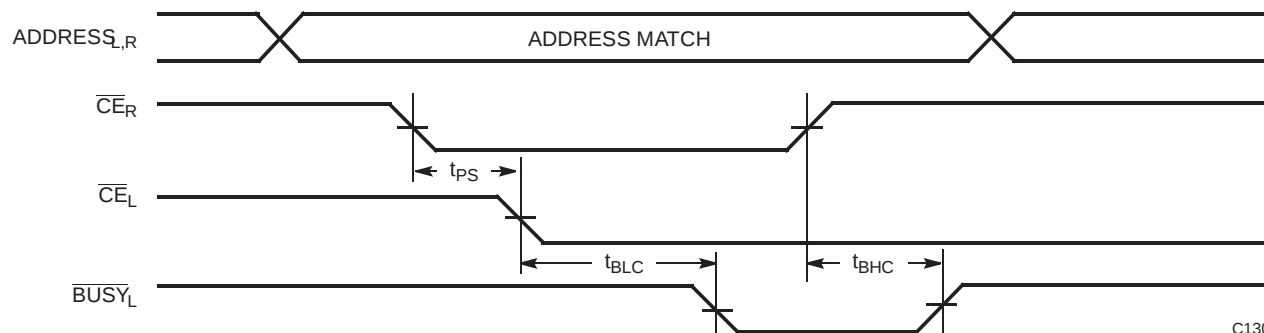
**Busy Timing Diagram No. 1 ( $\overline{CE}$  Arbitration)**

**$\overline{CE}_L$  Valid First:**



C130-12

**$\overline{CE}_R$  Valid First:**



C130-13

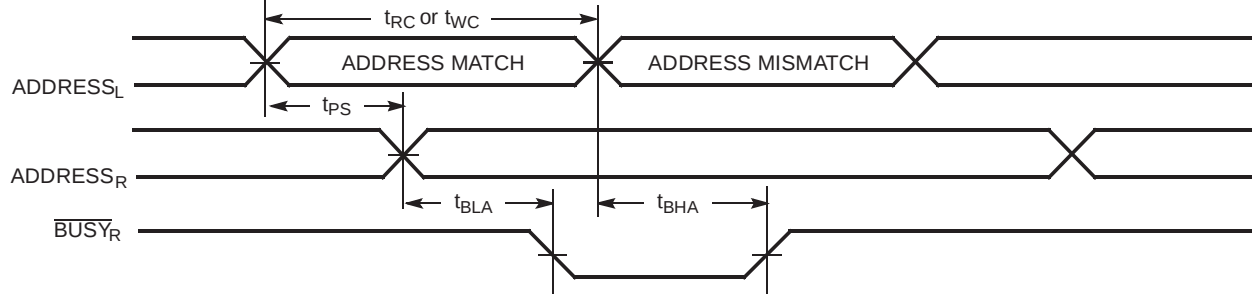
**Note:**

23. If the  $\overline{CE}$  LOW transition occurs simultaneously with or after the  $\overline{R/\overline{W}}$  LOW transition, the outputs remain in the high-impedance state

**Switching Waveforms (continued)**

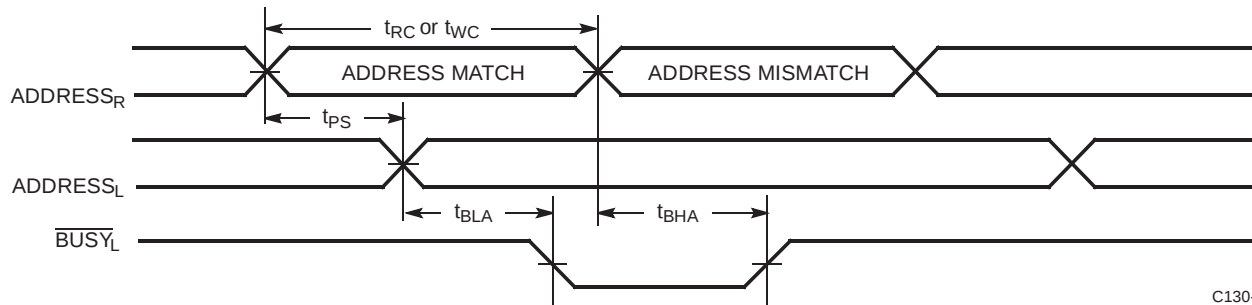
**Busy Timing Diagram No. 2 (Address Arbitration)**

**Left Address Valid First:**



C130-14

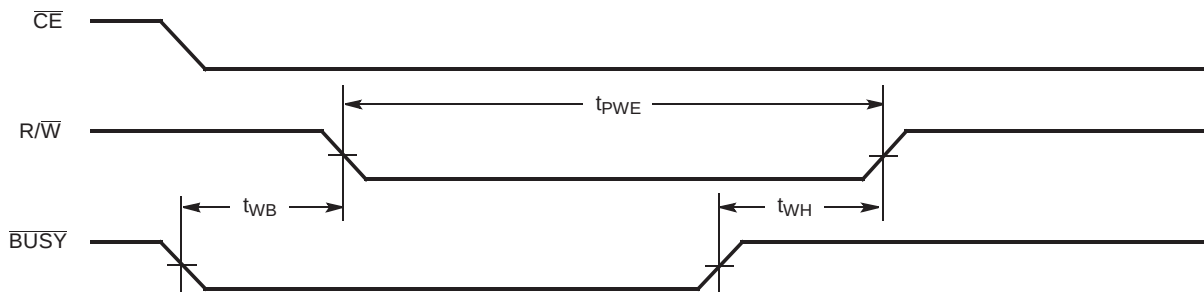
**Right Address Valid First:**



C130-15

**Busy Timing Diagram No. 3**

**Write with  $\overline{\text{BUSY}}$  (Slave: CY7C140/CY7C141)**

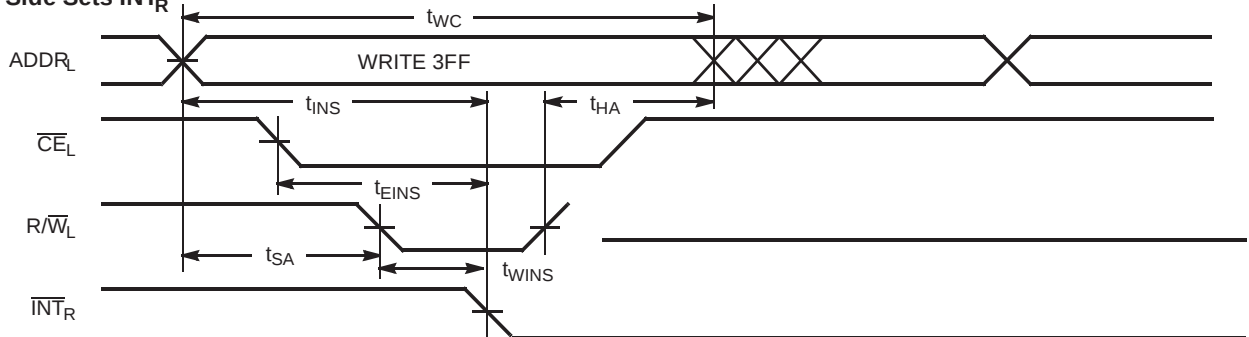


C130-16

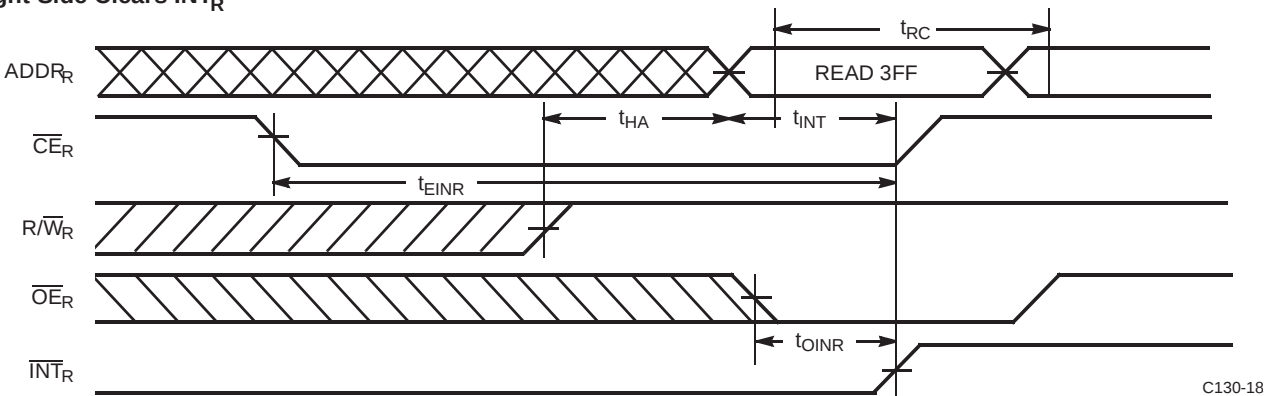
## Switching Waveforms (continued)

### Interrupt Timing Diagrams

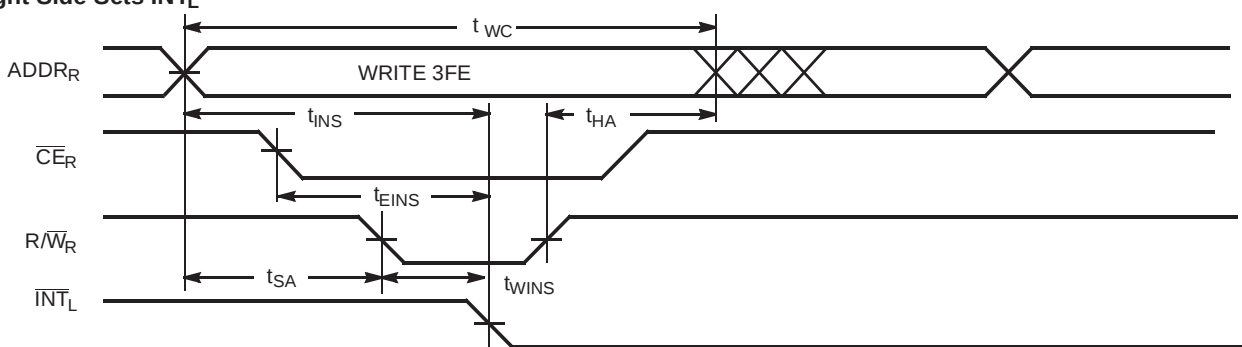
#### Left Side Sets $\overline{INT}_R$



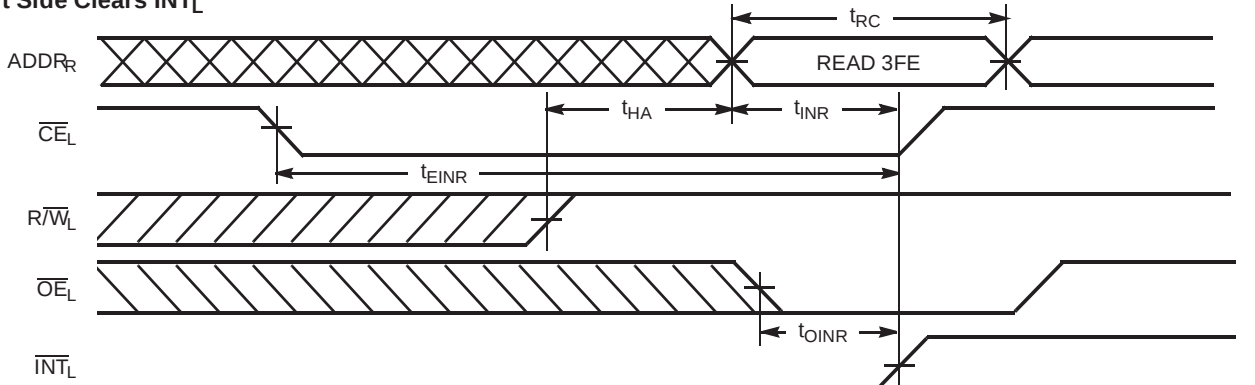
#### Right Side Clears $\overline{INT}_R$



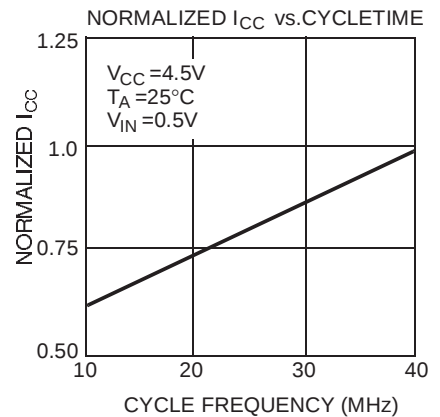
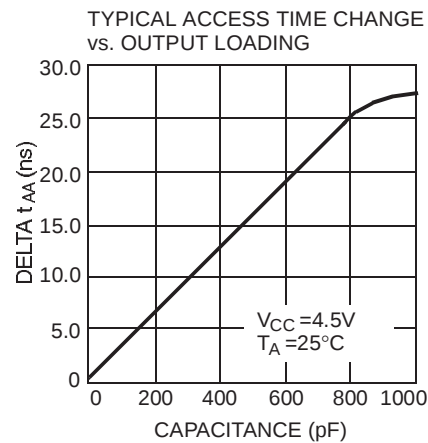
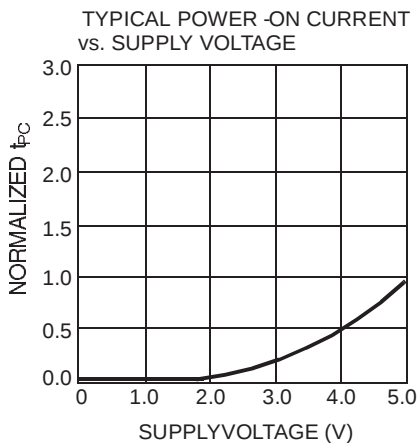
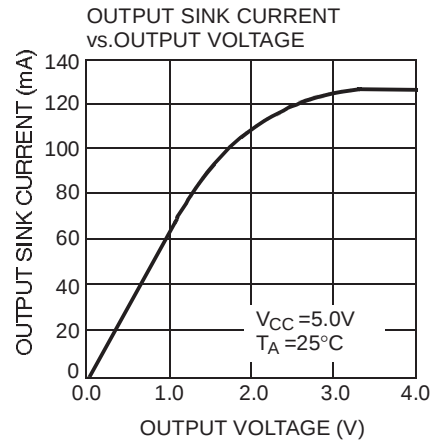
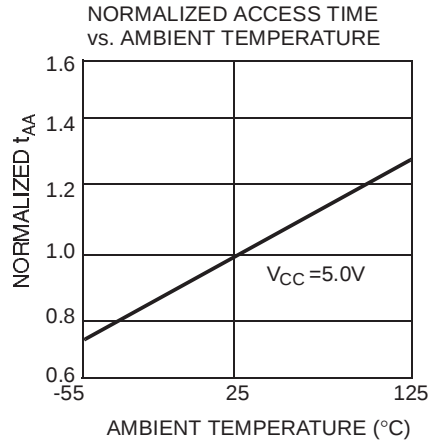
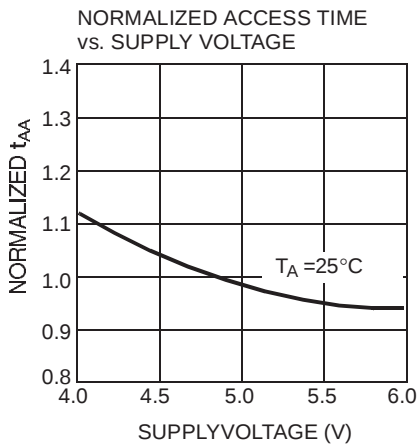
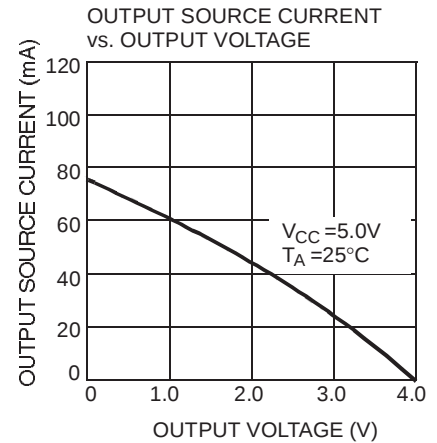
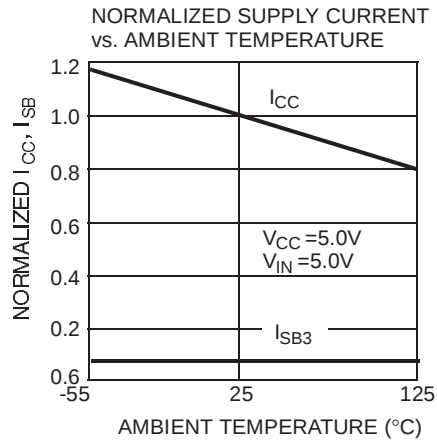
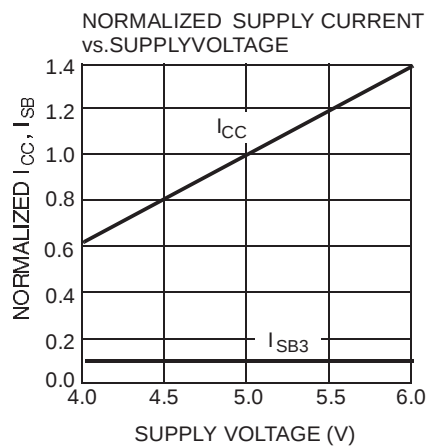
#### Right Side Sets $\overline{INT}_L$



#### Left Side Clears $\overline{INT}_L$



## Typical DC and AC Characteristics





## Ordering Information

| Speed (ns) | Ordering Code | Package Name | Package Type                     | Operating Range |
|------------|---------------|--------------|----------------------------------|-----------------|
| 30         | CY7C130-30PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C130-30PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
| 35         | CY7C130-35PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C130-35PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
|            | CY7C130-35DMB | D26          | 48-Lead (600-Mil) Sidebrazed DIP | Military        |
| 45         | CY7C130-45PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C130-45PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
|            | CY7C130-45DMB | D26          | 48-Lead (600-Mil) Sidebrazed DIP | Military        |
| 55         | CY7C130-55PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C130-55PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
|            | CY7C130-55DMB | D26          | 48-Lead (600-Mil) Sidebrazed DIP | Military        |

| Speed (ns) | Ordering Code | Package Name | Package Type                        | Operating Range |
|------------|---------------|--------------|-------------------------------------|-----------------|
| 15         | CY7C131-15JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C131-15NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 25         | CY7C131-25JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C131-25NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
|            | CY7C131-25JI  | J69          | 52-Lead Plastic Leaded Chip Carrier | Industrial      |
|            | CY7C131-25NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 30         | CY7C131-30JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C131-30NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
|            | CY7C131-30JI  | J69          | 52-Lead Plastic Leaded Chip Carrier | Industrial      |
| 35         | CY7C131-35JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C131-35NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
|            | CY7C131-35JI  | J69          | 52-Lead Plastic Leaded Chip Carrier | Industrial      |
|            | CY7C131-35NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 45         | CY7C131-45JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C131-45NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
|            | CY7C131-45JI  | J69          | 52-Lead Plastic Leaded Chip Carrier | Industrial      |
|            | CY7C131-45NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 55         | CY7C131-55JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C131-55NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
|            | CY7C131-55JI  | J69          | 52-Lead Plastic Leaded Chip Carrier | Industrial      |
|            | CY7C131-55NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |

Shaded area contains preliminary information.



**Ordering Information** (continued)

| Speed (ns) | Ordering Code | Package Name | Package Type                     | Operating Range |
|------------|---------------|--------------|----------------------------------|-----------------|
| 30         | CY7C140-30PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C140-30PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
| 35         | CY7C140-35PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C140-35PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
|            | CY7C140-35DMB | D26          | 48-Lead (600-Mil) Sidebrazed DIP | Military        |
| 45         | CY7C140-45PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C140-45PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
|            | CY7C140-45DMB | D26          | 48-Lead (600-Mil) Sidebrazed DIP | Military        |
| 55         | CY7C140-55PC  | P25          | 48-Lead (600-Mil) Molded DIP     | Commercial      |
|            | CY7C140-55PI  | P25          | 48-Lead (600-Mil) Molded DIP     | Industrial      |
|            | CY7C140-55DMB | D26          | 48-Lead (600-Mil) Sidebrazed DIP | Military        |

| Speed (ns) | Ordering Code | Package Name | Package Type                        | Operating Range |
|------------|---------------|--------------|-------------------------------------|-----------------|
| 15         | CY7C141-15JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C141-15NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 25         | CY7C141-25JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C141-25NC  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
|            | CY7C141-25JI  | J69          | 52-Lead Plastic Leaded Chip Carrier | Industrial      |
|            | CY7C141-25NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 30         | CY7C141-30JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C141-30NC  | N52          | 52-Pin Plastic Quad Flatpack        | Industrial      |
|            | CY7C141-30JI  | J69          | 52-Lead Plastic Leaded Chip Carrier |                 |
| 35         | CY7C141-35JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C141-35NC  | N52          | 52-Pin Plastic Quad Flatpack        | Industrial      |
|            | CY7C141-35JI  | J69          | 52-Lead Plastic Leaded Chip Carrier |                 |
|            | CY7C141-35NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 45         | CY7C141-45JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C141-45NC  | N52          | 52-Pin Plastic Quad Flatpack        | Industrial      |
|            | CY7C141-45JI  | J69          | 52-Lead Plastic Leaded Chip Carrier |                 |
|            | CY7C141-45NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |
| 55         | CY7C141-55JC  | J69          | 52-Lead Plastic Leaded Chip Carrier | Commercial      |
|            | CY7C141-55NC  | N52          | 52-Pin Plastic Quad Flatpack        | Industrial      |
|            | CY7C141-55JI  | J69          | 52-Lead Plastic Leaded Chip Carrier |                 |
|            | CY7C141-55NI  | N52          | 52-Pin Plastic Quad Flatpack        |                 |

Shaded area contains preliminary information.

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

| Parameter     | Subgroups |
|---------------|-----------|
| $V_{OH}$      | 1, 2, 3   |
| $V_{OL}$      | 1, 2, 3   |
| $V_{IH}$      | 1, 2, 3   |
| $V_{IL}$ Max. | 1, 2, 3   |
| $I_{IX}$      | 1, 2, 3   |
| $I_{OZ}$      | 1, 2, 3   |
| $I_{CC}$      | 1, 2, 3   |
| $I_{SB1}$     | 1, 2, 3   |
| $I_{SB2}$     | 1, 2, 3   |
| $I_{SB3}$     | 1, 2, 3   |
| $I_{SB4}$     | 1, 2, 3   |

**Switching Characteristics**

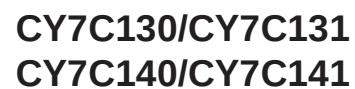
| Parameter   | Subgroups       |
|-------------|-----------------|
| READ CYCLE  |                 |
| $t_{RC}$    | 7, 8, 9, 10, 11 |
| $t_{AA}$    | 7, 8, 9, 10, 11 |
| $t_{ACE}$   | 7, 8, 9, 10, 11 |
| $t_{DOE}$   | 7, 8, 9, 10, 11 |
| WRITE CYCLE |                 |
| $t_{WC}$    | 7, 8, 9, 10, 11 |
| $t_{SCE}$   | 7, 8, 9, 10, 11 |
| $t_{AW}$    | 7, 8, 9, 10, 11 |
| $t_{HA}$    | 7, 8, 9, 10, 11 |
| $t_{SA}$    | 7, 8, 9, 10, 11 |
| $t_{PWE}$   | 7, 8, 9, 10, 11 |
| $t_{SD}$    | 7, 8, 9, 10, 11 |
| $t_{HD}$    | 7, 8, 9, 10, 11 |

| Parameter             | Subgroups       |
|-----------------------|-----------------|
| BUSY/INTERRUPT TIMING |                 |
| $t_{BLA}$             | 7, 8, 9, 10, 11 |
| $t_{BHA}$             | 7, 8, 9, 10, 11 |
| $t_{BLC}$             | 7, 8, 9, 10, 11 |
| $t_{BHC}$             | 7, 8, 9, 10, 11 |
| $t_{PS}$              | 7, 8, 9, 10, 11 |
| $t_{WINS}$            | 7, 8, 9, 10, 11 |
| $t_{EINS}$            | 7, 8, 9, 10, 11 |
| $t_{INS}$             | 7, 8, 9, 10, 11 |
| $t_{OINR}$            | 7, 8, 9, 10, 11 |
| $t_{EINR}$            | 7, 8, 9, 10, 11 |
| $t_{INR}$             | 7, 8, 9, 10, 11 |
| BUSY TIMING           |                 |
| $t_{WB}^{[24]}$       | 7, 8, 9, 10, 11 |
| $t_{WH}$              | 7, 8, 9, 10, 11 |
| $t_{BDD}$             | 7, 8, 9, 10, 11 |

**Note:**

24. CY7C140/CY7C141 only.

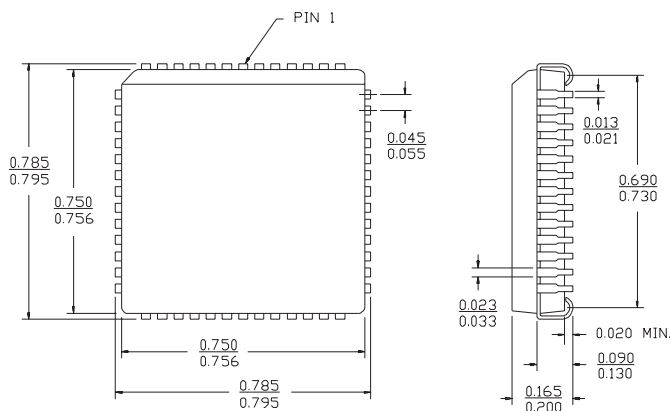
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**48-Lead (600-Mil) Sidebrazed DIP D26**

$$\frac{\text{MIN.}}{\text{MAX.}}$$


| DIMENSIONS IN INCHES |  | MIN. | MAX. |
|----------------------|--|------|------|
|----------------------|--|------|------|



**Package Diagrams** (continued)

**48-Lead (600-Mil) Molded DIP P25**
