



# CY7C130/CY7C131 CY7C140/CY7C141

## 1K x 8 Dual-Port Static RAM

### Features

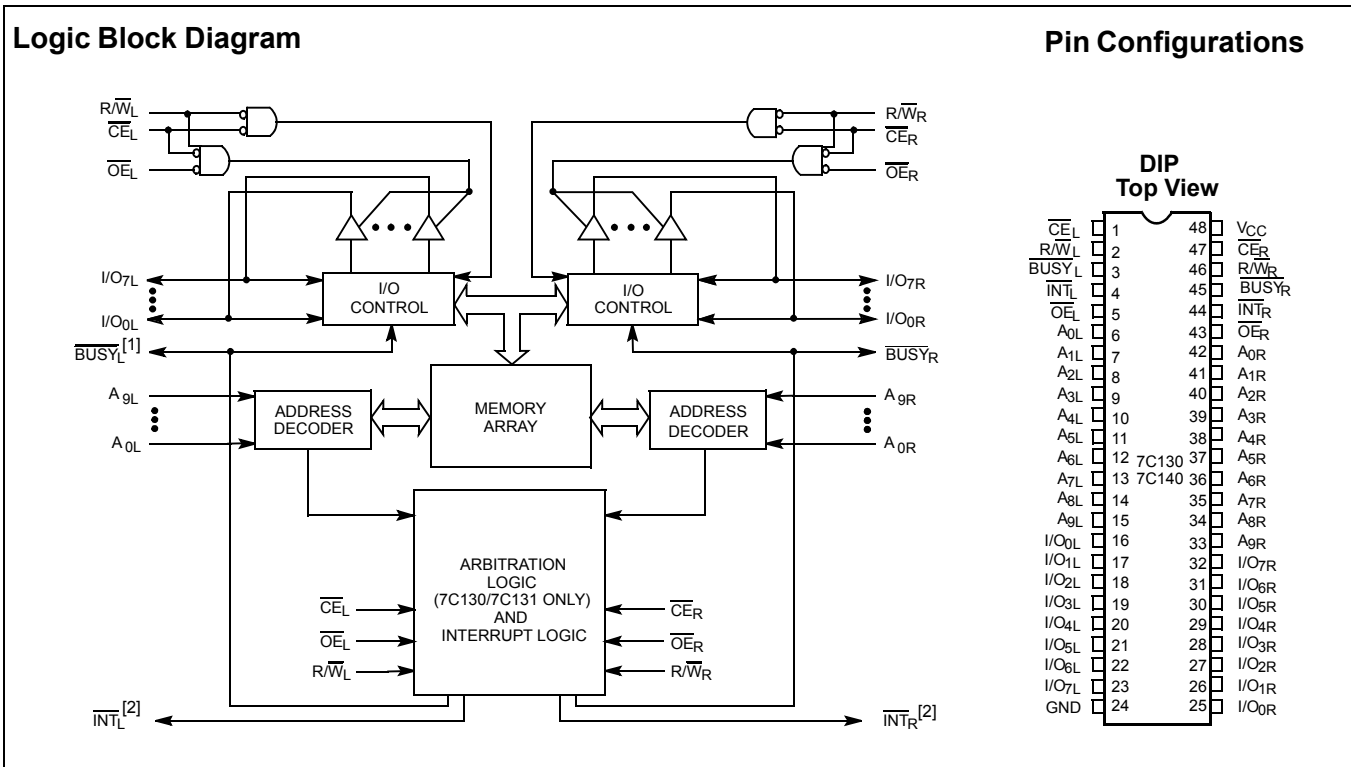
- True Dual-Ported memory cells which allow simultaneous reads of the same memory location
- 1K x 8 organization
- 0.65-micron CMOS for optimum speed/power
- High-speed access: 15 ns
- Low operating power:  $I_{CC} = 110$  mA (max.)
- Fully asynchronous operation
- Automatic power-down
- Master CY7C130/CY7C131 easily expands data bus width to 16 or more bits using slave CY7C140/CY7C141
- **BUSY** output flag on CY7C130/CY7C131; **BUSY** input on CY7C140/CY7C141
- **INT** flag for port-to-port communication
- Available in 48-pin DIP (CY7C130/140), 52-pin PLCC, 52-Pin TQFP.
- Pb-Free packages available

### Functional Description

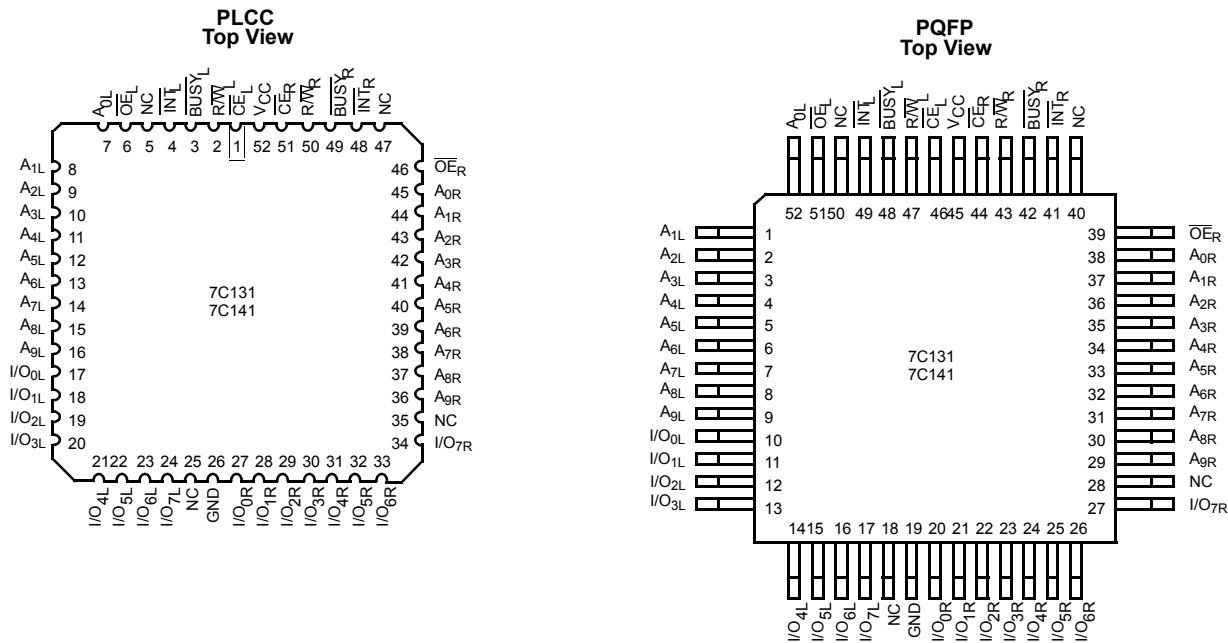
The CY7C130/CY7C131/CY7C140 and CY7C141 are high-speed CMOS 1K by 8 dual-port static RAMs. Two ports are provided permitting independent access to any location in memory. The CY7C130/ CY7C131 can be utilized as either a standalone 8-bit dual-port static RAM or as a master dual-port RAM in conjunction 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, **BUSY** and **INT**. **BUSY** signals that the port is trying to access the same location currently being accessed by the other port. **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, 52-pin Pb-free PLCC, 52-pin PQFP and 52-pin Pb-free PQFP.



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

**Pin Configuration (continued)**

**Pin Definitions**

| Left Port               | Right Port              | Description           |
|-------------------------|-------------------------|-----------------------|
| $\overline{CE}_L$       | $\overline{CE}_R$       | Chip Enable           |
| $\overline{R/W}_L$      | $\overline{R/W}_R$      | Read/Write Enable     |
| $\overline{OE}_L$       | $\overline{OE}_R$       | Output Enable         |
| $A_{0L}-A_{11/12L}$     | $A_{0R}-A_{11/12R}$     | Address               |
| $I/O_{0L}-I/O_{15/17L}$ | $I/O_{0R}-I/O_{15/17R}$ | Data Bus Input/Output |
| $\overline{INT}_L$      | $\overline{INT}_R$      | Interrupt Flag        |
| $\overline{BUSY}_L$     | $\overline{BUSY}_R$     | Busy Flag             |
| $V_{CC}$                |                         | Power                 |
| GND                     |                         | Ground                |

**Selection Guide**

|                           |           | 7C131-15 <sup>[3]</sup><br>7C141-15 | 7C131-25 <sup>[3]</sup><br>7C141-25 | 7C130-30<br>7C131-30<br>7C140-30<br>7C141-30 | 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 |
|---------------------------|-----------|-------------------------------------|-------------------------------------|--|--|--|--|------|
| Maximum Access Time       |           | 15                                  | 25                                  | 30   | 35   | 45   | 55   | ns   |
| Maximum Operating Current | Com'I/Ind | 190                                 | 170                                 | 170  | 120  | 120  | 110  | mA   |
|                           | Military  |                                     |                                     |  | 170  | 170  | 120  |      |
| Maximum Standby Current   | Com'I/Ind | 75                                  | 65                                  | 65   | 45   | 45   | 35   | mA   |
|                           | Military  |                                     |                                     |  | 65   | 65   | 45   |      |

Shaded areas contain preliminary information.

**Note:**

3. 15 and 25-ns version available only in PLCC/PQFP packages.

**Maximum Ratings<sup>[4]</sup>**

(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           |

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]</sup><br>7C141-15 |      | 7C130-30 <sup>[3]</sup><br>7C131-25,30<br>7C140-30<br>7C141-25,30 |      | 7C130-35,45<br>7C131-35,45<br>7C140-35,45<br>7C141-35,45 |      | 7C130-55<br>7C131-55<br>7C140-55<br>7C141-55 |      | 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  |  | 110  | 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<br>or V <sub>IN</sub> ≤ 0.2V, f = 0 | Com'l                               | 15   |   | 15   |  | 15   |  | 15   | mA   |
|                  |  |  | Mil                                 |      |   |      | 15   |      | 15   |      |      |

Shaded areas contain preliminary information.

**Note:**

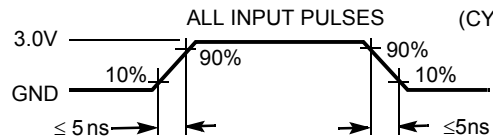
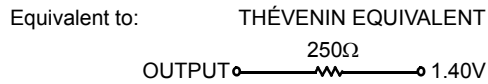
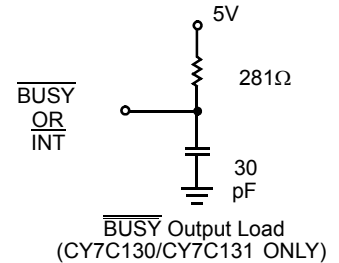
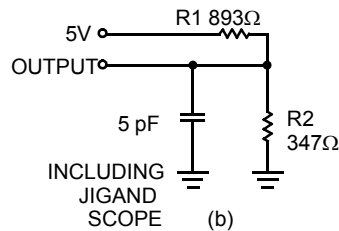
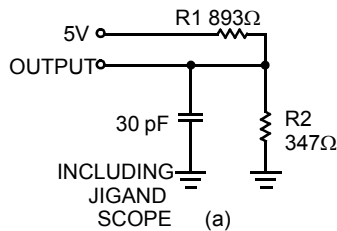
- The Voltage on any input or I/O pin cannot exceed the power pin during power-up.
- T<sub>A</sub> is the "instant on" case temperature
- See the last page of this specification for Group A subgroup testing information.
- BUSY and INT pins only.
- Duration of the short circuit should not exceed 30 seconds.
- This parameter is guaranteed but not tested.
- 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.

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

| Parameter | Description                                 | Test Conditions  | 7C131-15 <sup>[3]</sup><br>7C141-15 |      | 7C130-30 <sup>[3]</sup><br>7C131-25,30<br>7C140-30<br>7C141-25,30 |      | 7C130-35,45<br>7C131-35,45<br>7C140-35,45<br>7C141-35,45 |      | 7C130-55<br>7C131-55<br>7C140-55<br>7C141-55 |      | Unit |    |
|-----------|---|--|-------------------------------------|------|---|------|--|------|--|------|------|----|
|           |   |  | Min.                                | Max. | Min.  | Max. | Min.   | Max. | Min.   | Max. |      |    |
| $I_{SB4}$ | Standby Current<br>One Port,<br>CMOS Inputs | One Port $\overline{CE}_L$ or<br>$\overline{CE}_R \geq V_{CC} - 0.2V$ ,<br>$V_{IN} \geq V_{CC} - 0.2V$<br>or $V_{IN} \leq 0.2V$ ,<br>Active Port Outputs<br>Open,<br>$f = f_{MAX}$ <sup>[10]</sup> | Com'l                               |      | 125   |      | 105  |      | 85   |      | 70   | mA |
|           |   |  | Mil                                 |      |   |      |  | 105  |  | 85   |      |    |

**Capacitance<sup>[9]</sup>**

| Parameter | Description        | Test Conditions  | Max. | Unit |
|-----------|--------------------|--|------|------|
| $C_{IN}$  | Input Capacitance  | $T_A = 25^\circ C$ , $f = 1\text{ MHz}$ ,<br>$V_{CC} = 5.0V$ | 15   | pF   |
| $C_{OUT}$ | 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]</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. |      |
| <b>READ CYCLE</b>                 |   |                                     |      |   |      |  |      |      |
| 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   |
| <b>WRITE CYCLE<sup>[15]</sup></b> |   |                                     |      |   |      |  |      |      |
| 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/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/W LOW to High Z <sup>[14]</sup>                     |                                     | 10   |   | 15   |  | 15   | ns   |
| t <sub>LZWE</sub>                 | R/W HIGH to Low Z <sup>[14]</sup>                     | 0                                   |      | 0   |      | 0  |      | ns   |

Shaded areas contain preliminary information.

**Note:**

11. 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>/I<sub>OH</sub> and 30-pF load capacitance.
12. AC Test Conditions use V<sub>OH</sub> = 1.6V and V<sub>OL</sub> = 1.4V.
13. 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>.
14. 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.
15. The internal write time of the memory is defined by the overlap of CS LOW and R/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]</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.    |      |
| <b>BUSY/INTERRUPT TIMING</b>    |   |                                     |         |   |         |  |         |      |
| 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 $\overline{CE}$ LOW                       |                                     | 15      |   | 20      |  | 20      | ns   |
| t <sub>BHC</sub>                | BUSY HIGH from $\overline{CE}$ 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   |
| <b>INTERRUPT TIMING</b>         |   |                                     |         |   |         |  |         |      |
| t <sub>WINS</sub>               | R/W to INTERRUPT Set Time                               |                                     | 15      |   | 25      |  | 25      | ns   |
| t <sub>EINS</sub>               | $\overline{CE}$ 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>               | $\overline{OE}$ to INTERRUPT Reset Time <sup>[16]</sup> |                                     | 15      |   | 25      |  | 25      | ns   |
| t <sub>EINR</sub>               | $\overline{CE}$ 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   |

Shaded areas contain preliminary information.

**Note:**

16. These parameters are measured from the input signal changing, until the output pin goes to a high-impedance state.

17. CY7C140/CY7C141 only.

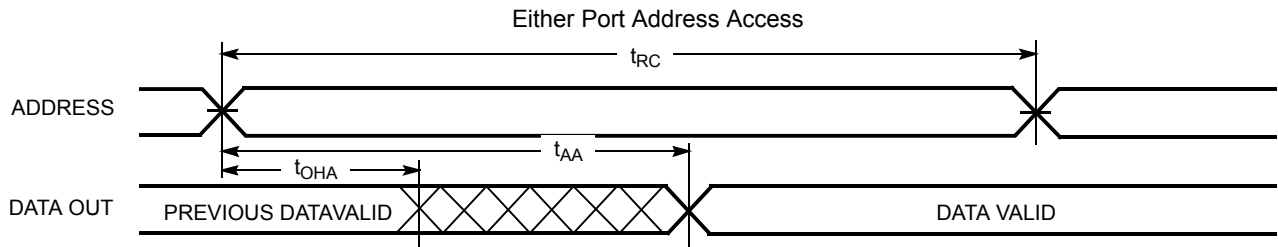
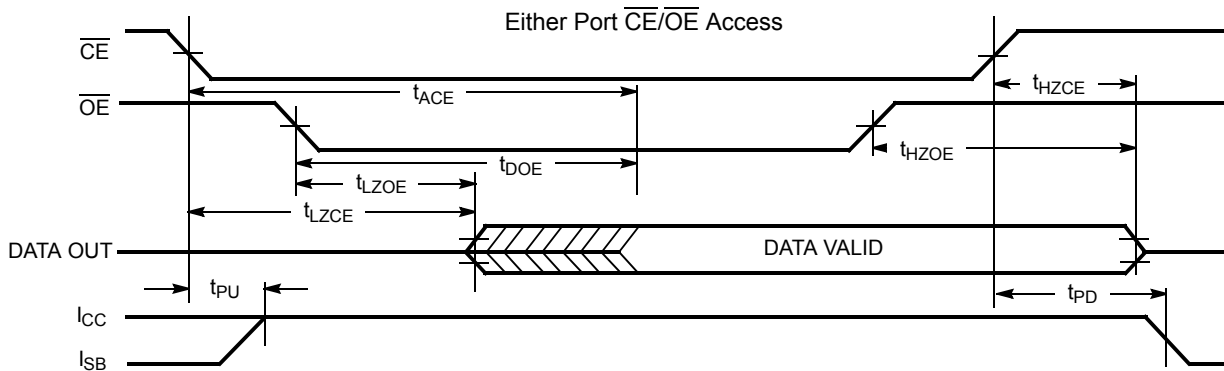
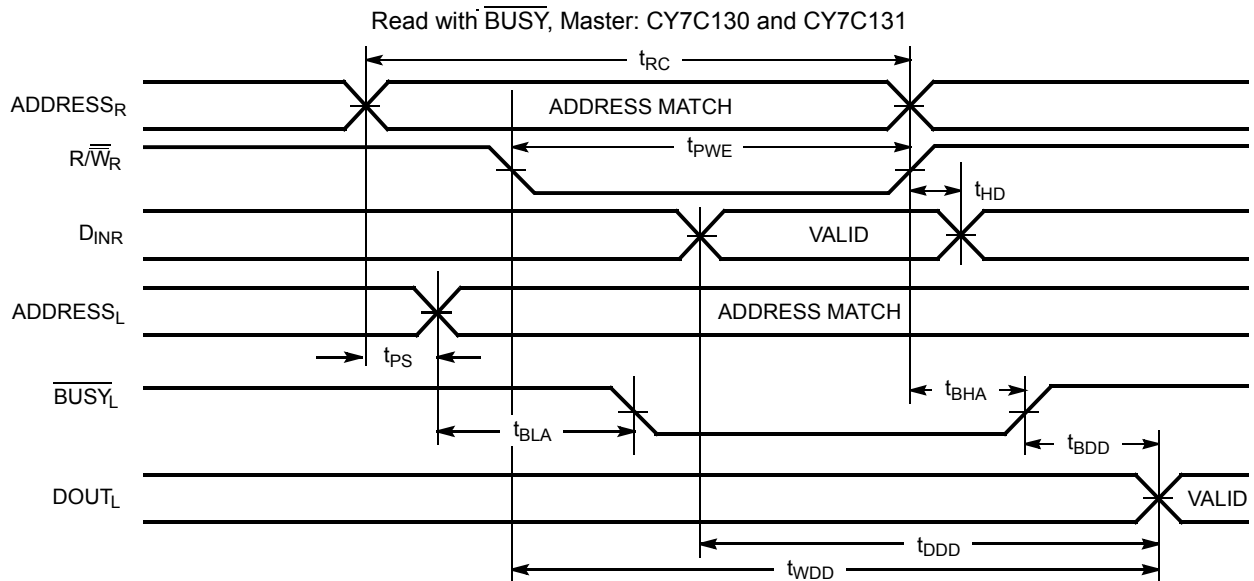
18. A write operation on Port A, where Port A has priority, leaves the data on Port B's outputs undisturbed until one access time after one of the following:  
 BUSY on Port B goes HIGH.  
 Port B's address is toggled.  
 $\overline{CE}$  for Port B is toggled.  
 R/W for Port B is toggled during valid 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. |      |
| <b>READ CYCLE</b> |   |  |      |  |      |  |      |      |
| 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>  | $\overline{CE}$ LOW to Data Valid <sup>[12]</sup>     |  | 35   |  | 45   |  | 55   | ns   |
| t <sub>DOE</sub>  | $\overline{OE}$ LOW to Data Valid <sup>[12]</sup>     |  | 20   |  | 25   |  | 25   | 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> |  | 20   |  | 20   |  | 25   | ns   |
| t <sub>LZCE</sub> | $\overline{CE}$ LOW to Low Z <sup>[9, 13, 14]</sup>   | 5  |      | 5  |      | 5  |      | 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.    |      |
| t <sub>HZCE</sub>                 | $\overline{CE}$ HIGH to High Z <sup>[9, 13, 14]</sup>                |  | 20      |  | 20      |  | 25      | 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>                    |  | 35      |  | 35      |  | 35      | ns   |
| <b>WRITE CYCLE<sup>[15]</sup></b> |  |  |         |  |         |  |         |      |
| 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/ $\overline{W}$ 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/ $\overline{W}$ LOW to High Z <sup>[14]</sup>                      |  | 20      |  | 20      |  | 25      | ns   |
| t <sub>LZWE</sub>                 | R/ $\overline{W}$ HIGH to Low Z <sup>[14]</sup>                      | 0  |         | 0  |         | 0  |         | ns   |
| <b>BUSY/INTERRUPT TIMING</b>      |  |  |         |  |         |  |         |      |
| 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<sup>[17]</sup></sub>    | R/ $\overline{W}$ LOW after $\overline{BUSY}$ LOW                    | 0  |         | 0  |         | 0  |         | ns   |
| t <sub>WH</sub>                   | R/ $\overline{W}$ 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   |
| <b>INTERRUPT TIMING</b>           |  |  |         |  |         |  |         |      |
| t <sub>WINS</sub>                 | R/ $\overline{W}$ 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   |

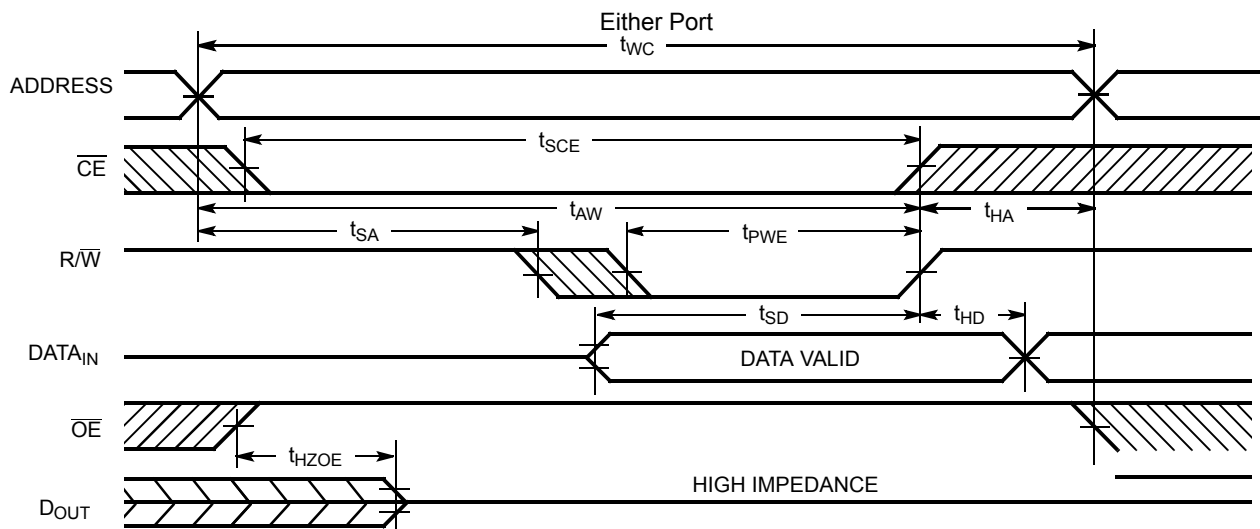
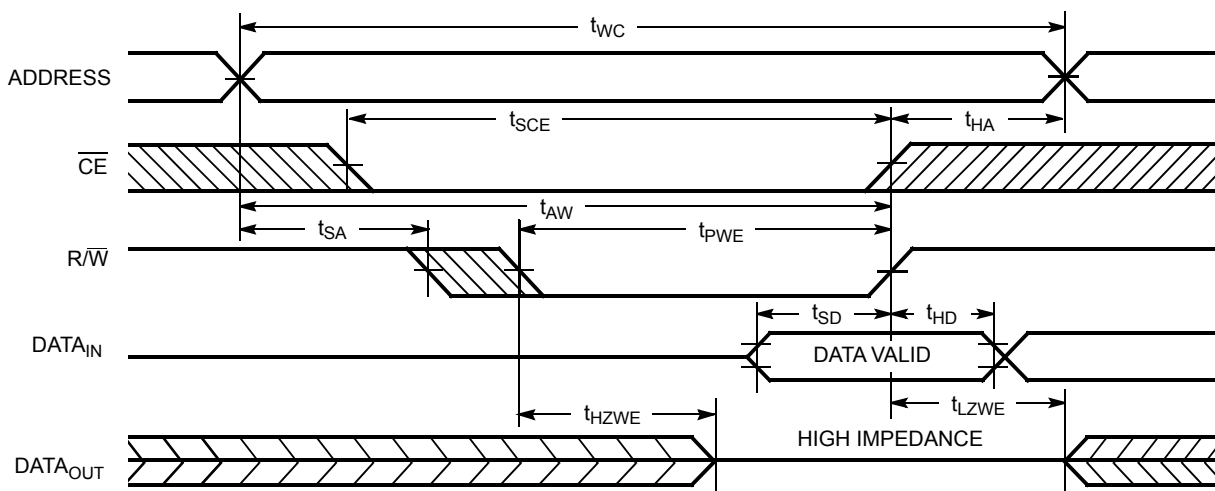
**Switching Waveforms**
**Read Cycle No. 1<sup>[19, 20]</sup>**

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

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

**Notes:**

19. R/ $\overline{W}$  is HIGH for read cycle.

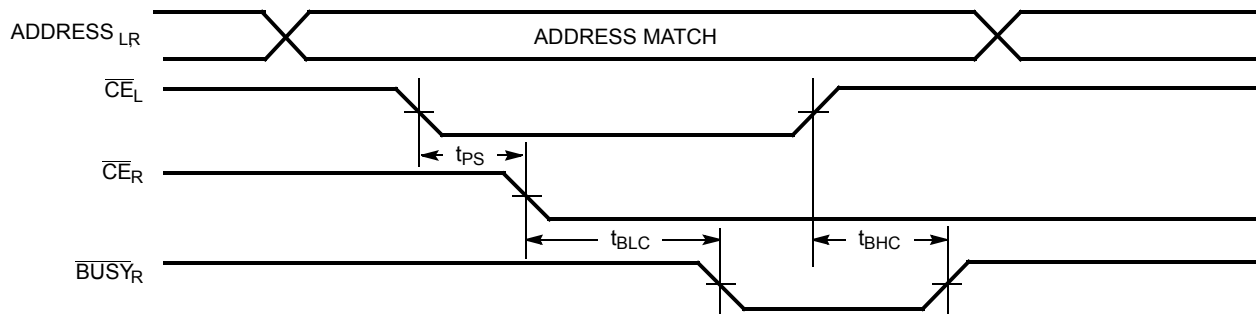
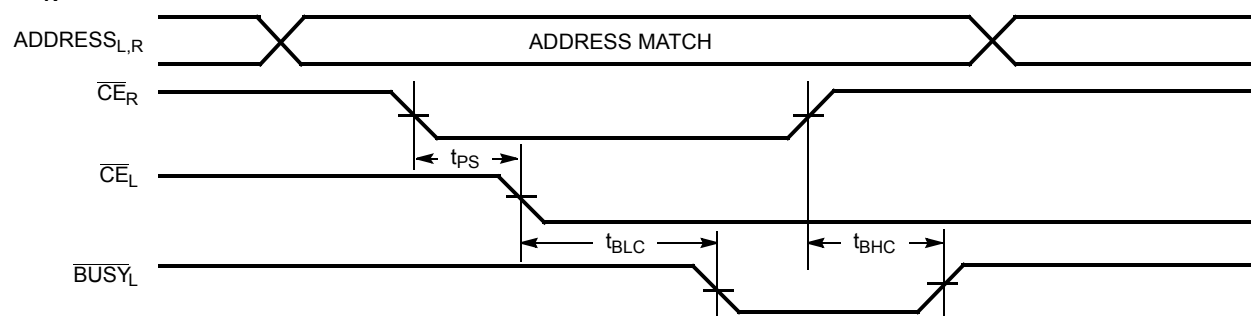
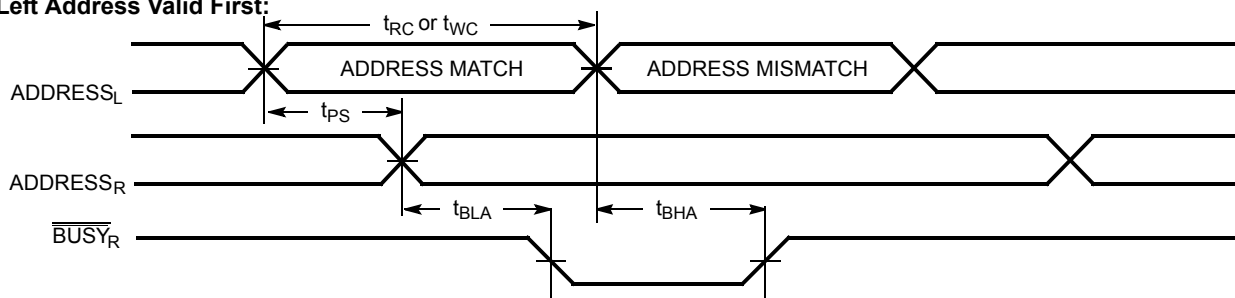
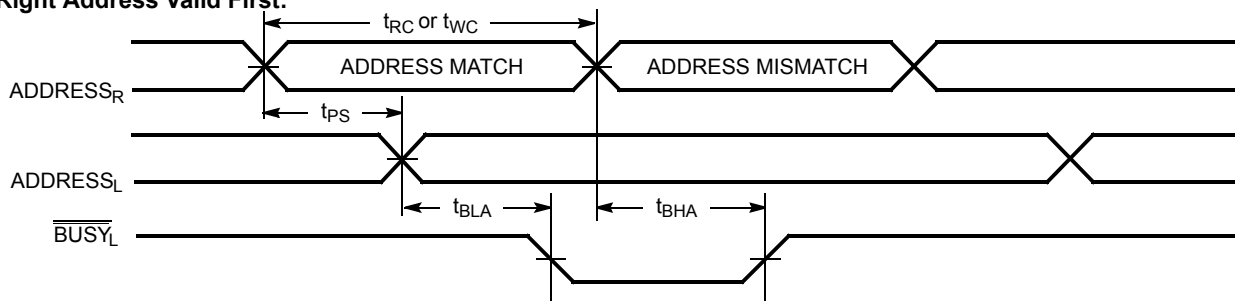
20. Device is continuously selected,  $\overline{CE} = V_{IL}$  and  $\overline{OE} = V_{IL}$ .

21. Address valid prior to or coincident with  $\overline{CE}$  transition LOW.



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

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

**Notes:**

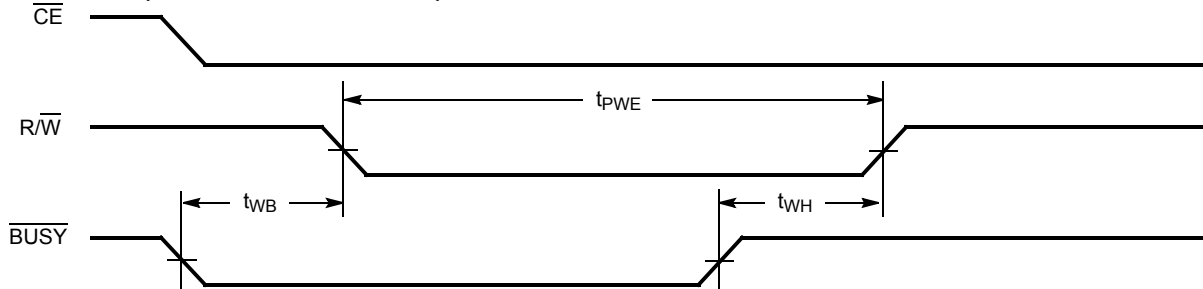
22. If  $\overline{OE}$  is LOW during a  $\overline{R/W}$  controlled write cycle, the write pulse width must be the larger of  $t_{PWE}$  or  $t_{HZWE} + t_{SD}$  to allow the data I/O pins to enter high impedance and for data to be placed on the bus for the required  $t_{SD}$ .
23. If the  $\overline{CE}$  LOW transition occurs simultaneously with or after the  $\overline{R/W}$  LOW transition, the outputs remain in the high-impedance state.

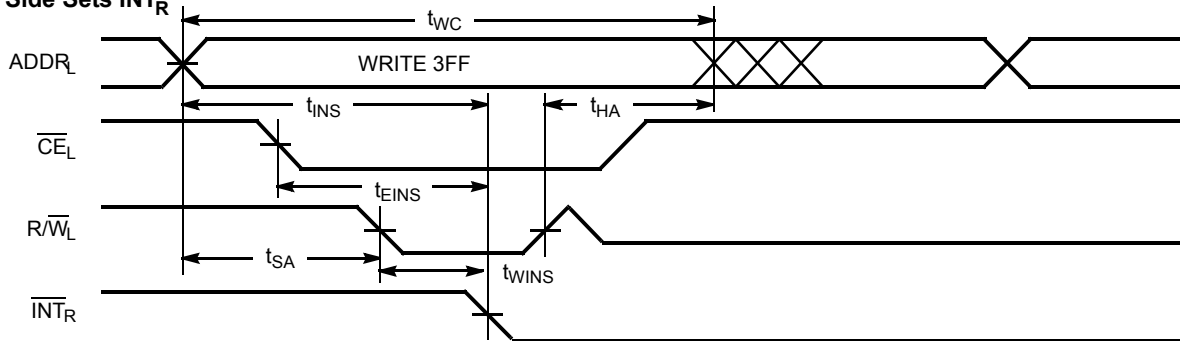
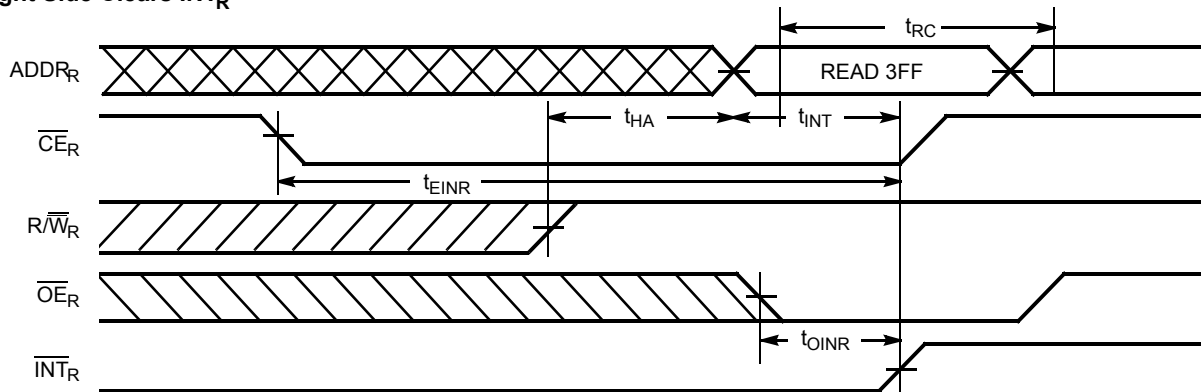
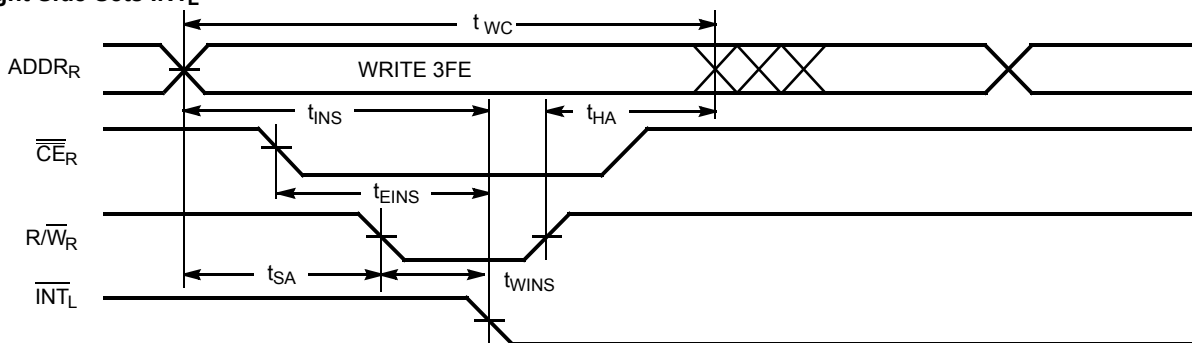
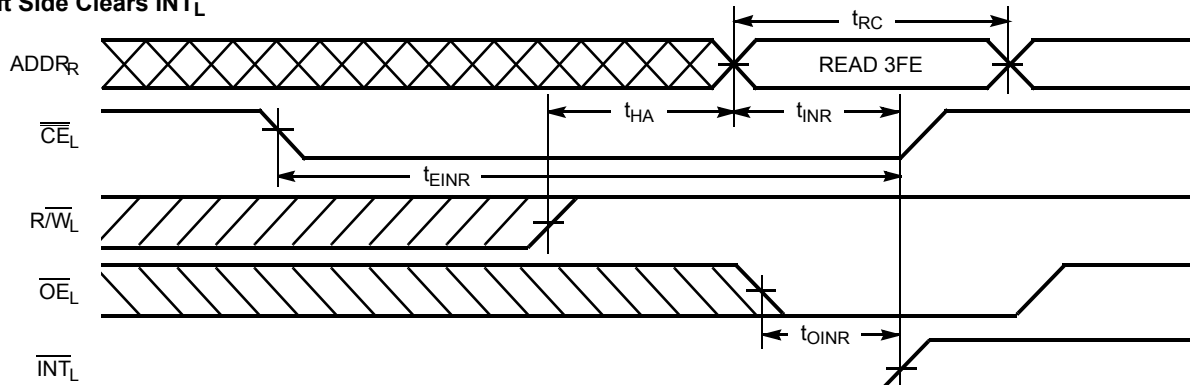
**Switching Waveforms (continued)**
**Busy Timing Diagram No. 1 ( $\overline{CE}$  Arbitration)**
 **$\overline{CE}_L$  Valid First:**

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

**Busy Timing Diagram No. 2 (Address Arbitration)**
**Left Address Valid First:**

**Right Address Valid First:**


**Switching Waveforms** (continued)

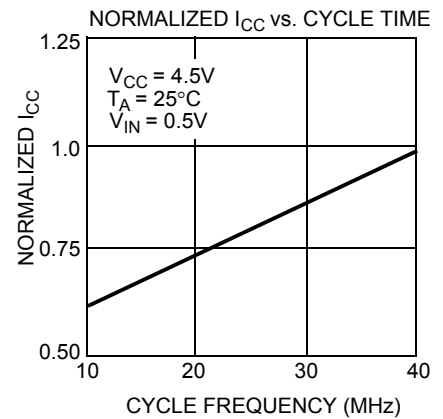
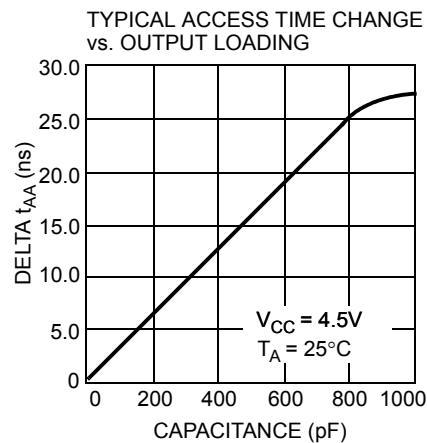
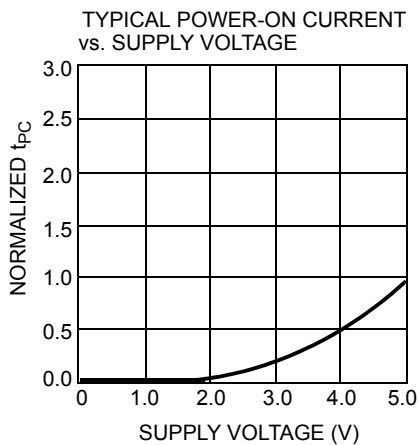
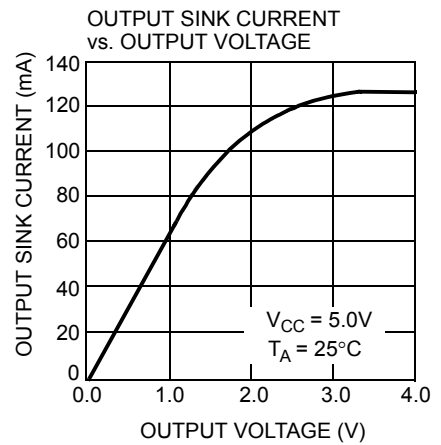
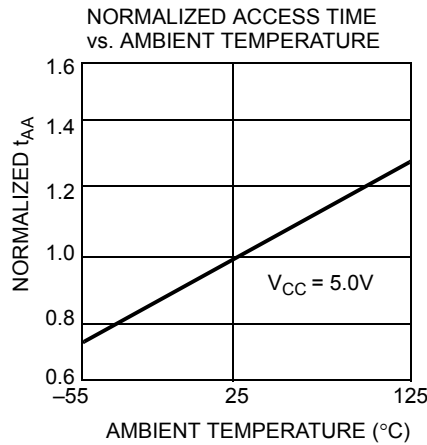
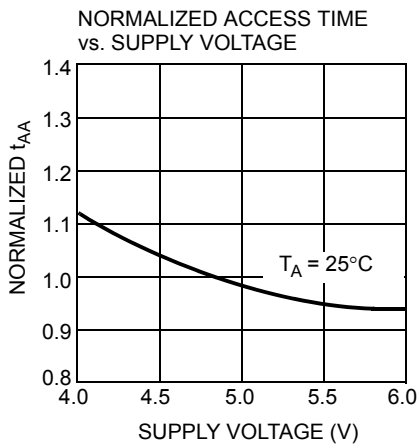
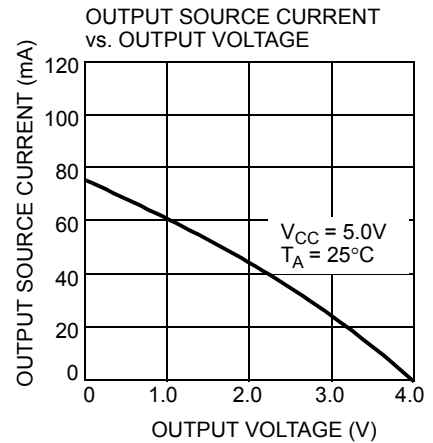
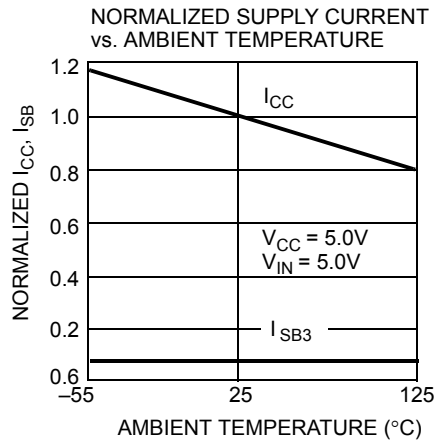
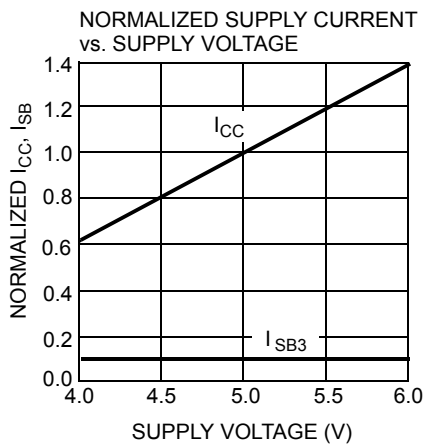
**Busy Timing Diagram No. 3**

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



**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        |
| 15         | CY7C131-15JC  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Commercial      |
|            | CY7C131-15JXC | J69          | 52-Lead Pb-Free Plastic Leaded Chip Carrier |                 |
|            | CY7C131-15NC  | N52          | 52-Pin Plastic Quad Flatpack                | Industrial      |
|            | CY7C131-15JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         |                 |
|            | CY7C131-15JXI | J69          | 52-Lead Pb-Free Plastic Leaded Chip Carrier |                 |
| 25         | CY7C131-25JC  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Commercial      |
|            | CY7C131-25JXC | J69          | 52-Lead Pb-Free Plastic Leaded Chip Carrier |                 |
|            | CY7C131-25NC  | N52          | 52-Pin Plastic Quad Flatpack                |                 |
|            | CY7C131-25NXC | N52          | 52-Pin Pb-Free Plastic Quad Flatpack        | Industrial      |
|            | CY7C131-25JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         |                 |
|            | 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                | Industrial      |
|            | CY7C131-30JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         |                 |
| 35         | CY7C131-35JC  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Commercial      |
|            | CY7C131-35NC  | N52          | 52-Pin Plastic Quad Flatpack                | Industrial      |
|            | CY7C131-35JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         |                 |
|            | 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                | Industrial      |
|            | CY7C131-45JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         |                 |
|            | CY7C131-45NI  | N52          | 52-Pin Plastic Quad Flatpack                |                 |
| 55         | CY7C131-55JC  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Commercial      |
|            | CY7C131-55JXC | J69          | 52-Lead Pb-Free Plastic Leaded Chip Carrier |                 |
|            | CY7C131-55NC  | N52          | 52-Pin Plastic Quad Flatpack                |                 |
|            | CY7C131-55NXC | N52          | 52-Pin Pb-Free Plastic Quad Flatpack        |                 |
|            | CY7C131-55JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Industrial      |
|            | CY7C131-55JXI | J69          | 52-Lead Pb-Free Plastic Leaded Chip Carrier |                 |
|            | CY7C131-55NI  | N52          | 52-Pin Plastic Quad Flatpack                |                 |

**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        |
| 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      |
|            | CY7C141-25JXC | J69          | 52-Lead Pb-Free Plastic Leaded Chip Carrier |                 |
|            | 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                |                 |
|            | CY7C141-30JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Industrial      |
| 35         | CY7C141-35JC  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Commercial      |
|            | CY7C141-35NC  | N52          | 52-Pin Plastic Quad Flatpack                |                 |
|            | CY7C141-35JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Industrial      |
|            | 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                |                 |
|            | CY7C141-45JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Industrial      |
|            | 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                |                 |
|            | CY7C141-55JI  | J69          | 52-Lead Plastic Leaded Chip Carrier         | Industrial      |
|            | CY7C141-55NI  | N52          | 52-Pin Plastic Quad Flatpack                |                 |

**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**

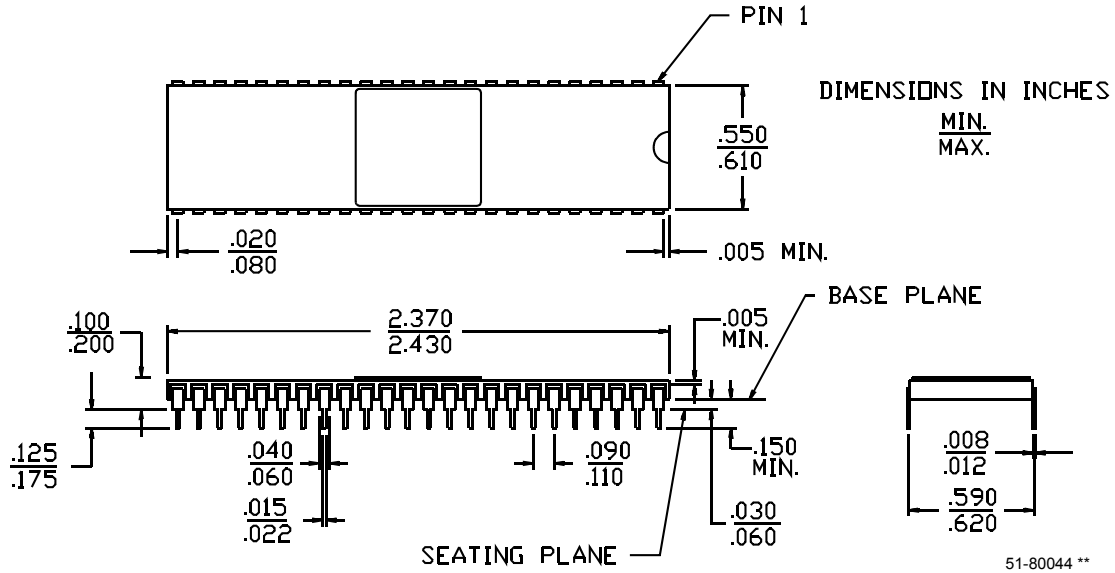
| Parameter                    | Subgroups       |
|------------------------------|-----------------|
| <b>READ CYCLE</b>            |                 |
| $t_{RC}$                     | 7, 8, 9, 10, 11 |
| $t_{AA}$                     | 7, 8, 9, 10, 11 |
| $t_{ACE}$                    | 7, 8, 9, 10, 11 |
| $t_{DOE}$                    | 7, 8, 9, 10, 11 |
| <b>WRITE CYCLE</b>           |                 |
| $t_{WC}$                     | 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 |
| <b>BUSY/INTERRUPT TIMING</b> |                 |
| $t_{BLA}$                    | 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 |
| <b>BUSY TIMING</b>           |                 |
| $t_{WB}^{[24]}$              | 7, 8, 9, 10, 11 |
| $t_{WH}$                     | 7, 8, 9, 10, 11 |
| $t_{BDD}$                    | 7, 8, 9, 10, 11 |

**Note:**  
24. CY7C140/CY7C141 only.

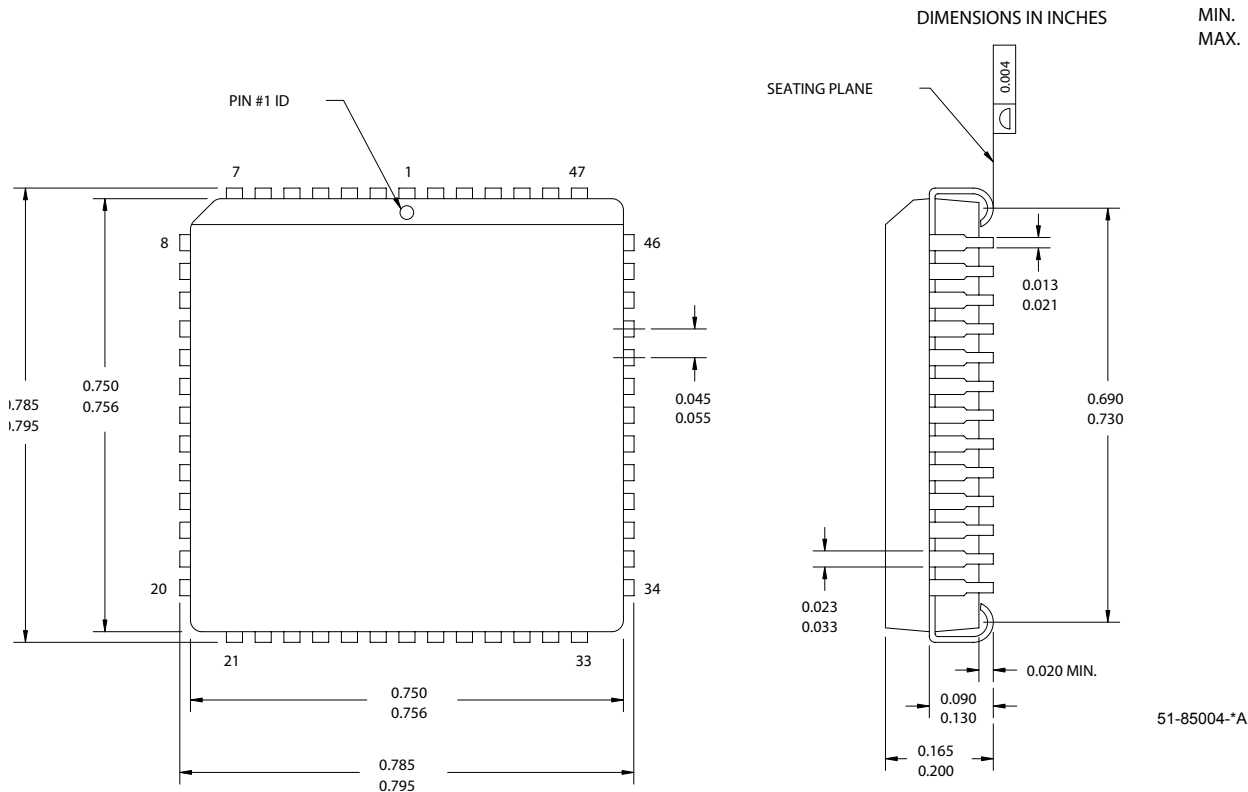


Package Diagrams

**48-Lead (600-Mil) Sidebrazed DIP D26**  
MIL-STD-1835 D-14 Config. C

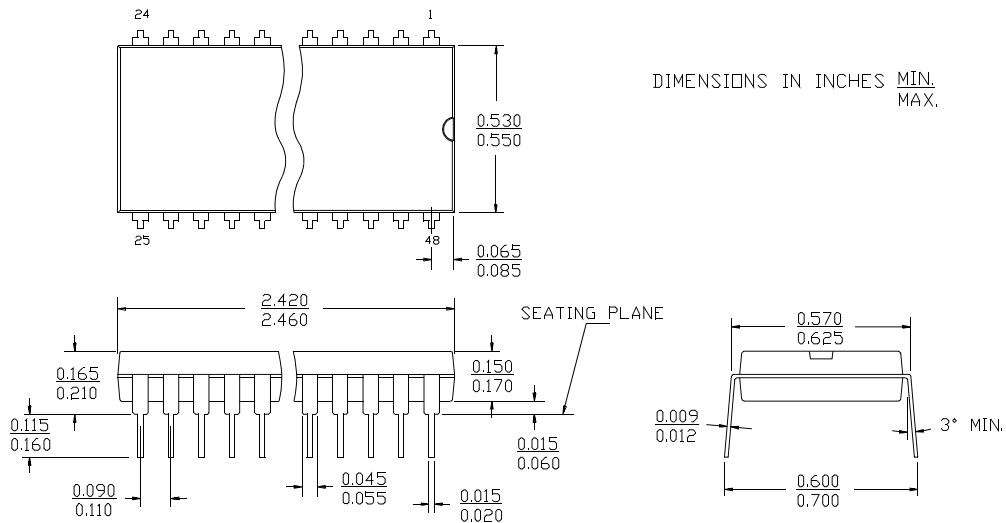


**52-Lead Plastic Leaded Chip Carrier J69**  
**52-Lead Pb-Free Plastic Leaded Chip Carrier J69**



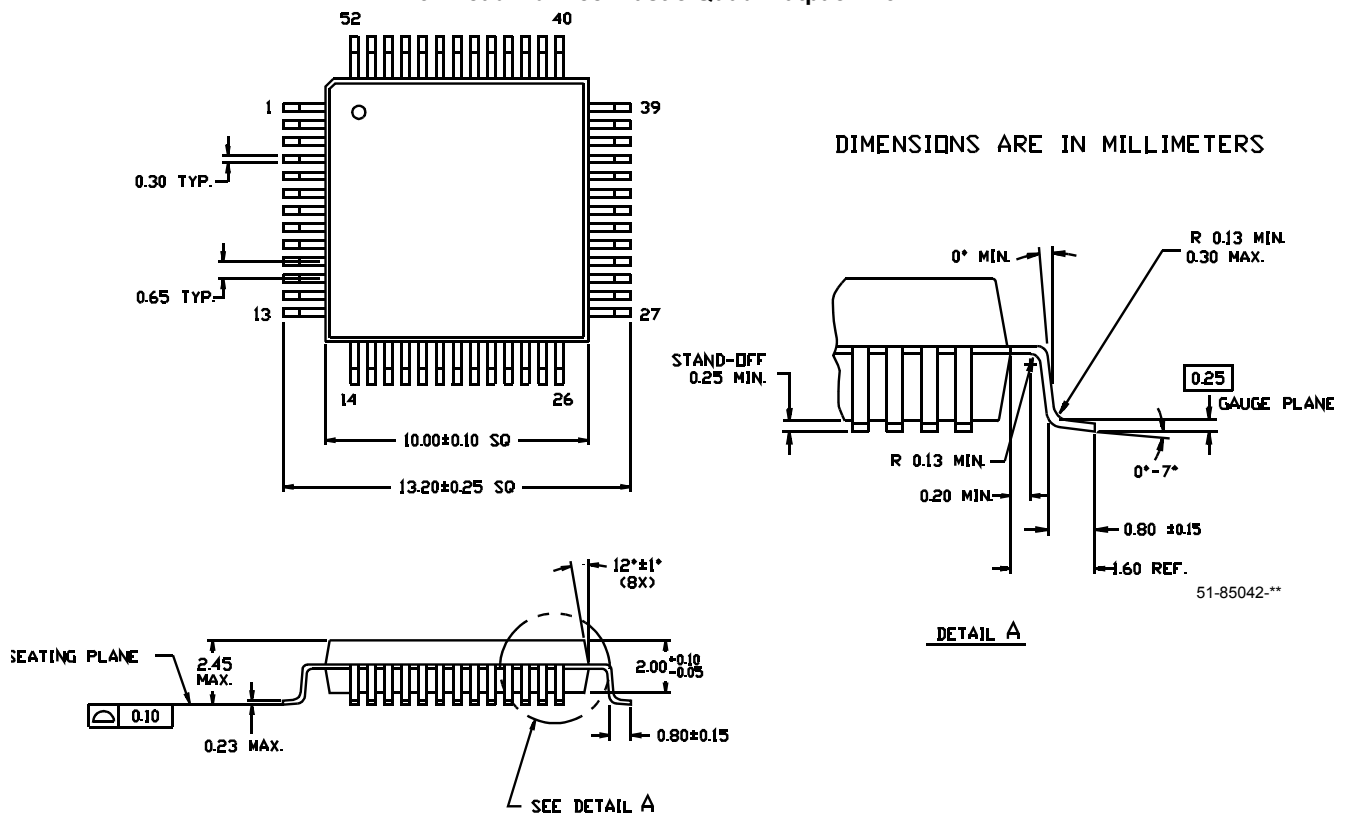
Package Diagrams (continued)

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



51-85020-\*A

**52-Lead Plastic Quad Flatpack N52**  
**52-Lead Pb-Free Plastic Quad Flatpack N52**



51-85042-\*\*

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**Document History Page**

| Document Title: CY7C130/CY7C131/CY7C140/CY7C141 1K x 8 Dual-Port Static RAM |         |            |                 |   |
|---|---------|------------|-----------------|---|
| Document Number: 38-06002   |         |            |                 |   |
| REV.  | ECN NO. | Issue Date | Orig. of Change | Description of Change   |
| **  | 110169  | 09/29/01   | SZV             | Change from Spec number: 38-00027 to 38-06002   |
| *A  | 122255  | 12/26/02   | RBI             | Power up requirements added to Maximum Ratings Information  |
| *B  | 236751  | See ECN    | YDT             | Removed cross information from features section   |
| *C  | 325936  | See ECN    | RUY             | Added pin definitions table, 52-pin PQFP package diagram and Pb-free information                            |
| *D  | 393153  | See ECN    | YIM             | Added CY7C131-15JI to ordering information<br>Added Pb-Free parts to ordering information:<br>CY7C131-15JXI |