

**Product Features**

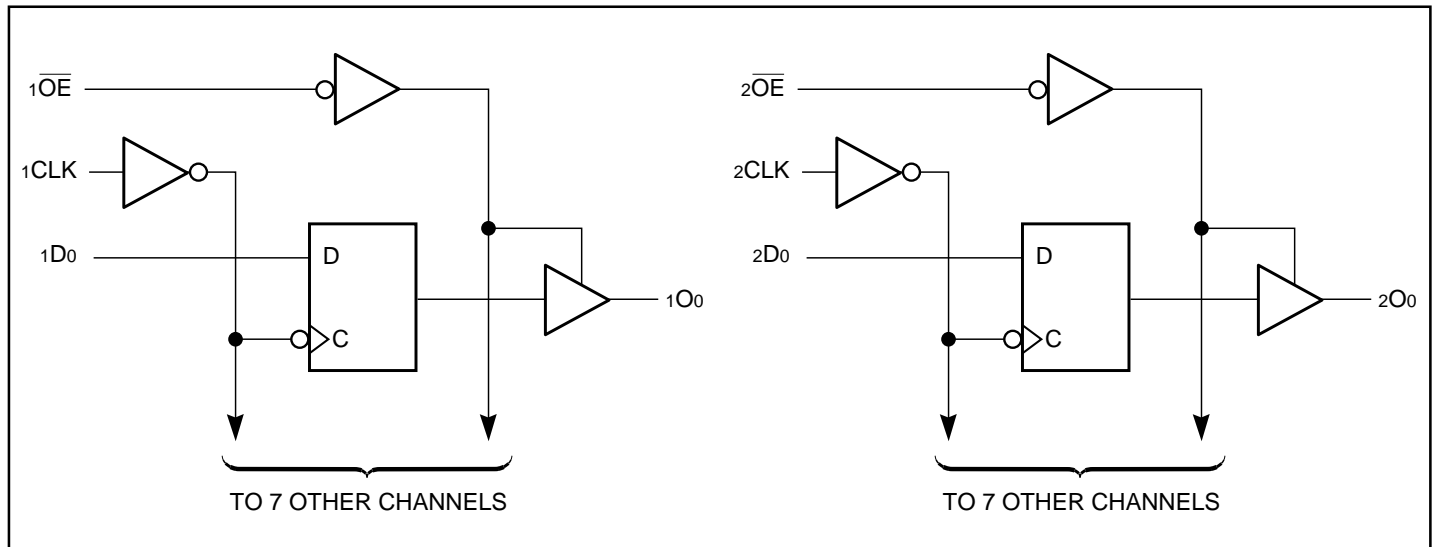
- Advanced Low Power CMOS Operation
- Can serve as a 5V to 3V translator
- Excellent output drive capability:  
Balanced drives (24 mA sink and source)  
Compatible with LVC™ class of products.
- Pin compatible with industry standard  
double-density pinouts
- Low ground bounce outputs
- Hysteresis on all inputs
- Industrial operating temperature range: -40°C to +85°C
- Inputs can be driven by 3.3V or 5V devices
- Multiple center pin and distributed Vcc/GND pins  
minimizing switching noise
- Packages available:
  - 48-pin 240 mil wide plastic TSSOP (A)
  - 48-pin 300 mil wide plastic SSOP (V)
  - 48-pin 173 mil wide plastic TVSOP (K)

**Product Description**

Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.6 micron CMOS technology, achieving industry leading speed grades.

The PI74FCT163374 is a 16-bit octal register designed with 16 D-type flip-flops with a buffered common clock and 3-state outputs. The Output Enable ( $\overline{xOE}$ ) and clock ( $xCLK$ ) controls are organized to operate as two 8-bit registers or one 16-bit register. When  $\overline{OE}$  is HIGH, the outputs are in the high-impedance state. Input data meeting the setup and hold time requirements of the D inputs is transferred to the O outputs on the LOW-to-HIGH transition of the clock input.

**Logic Block Diagram**



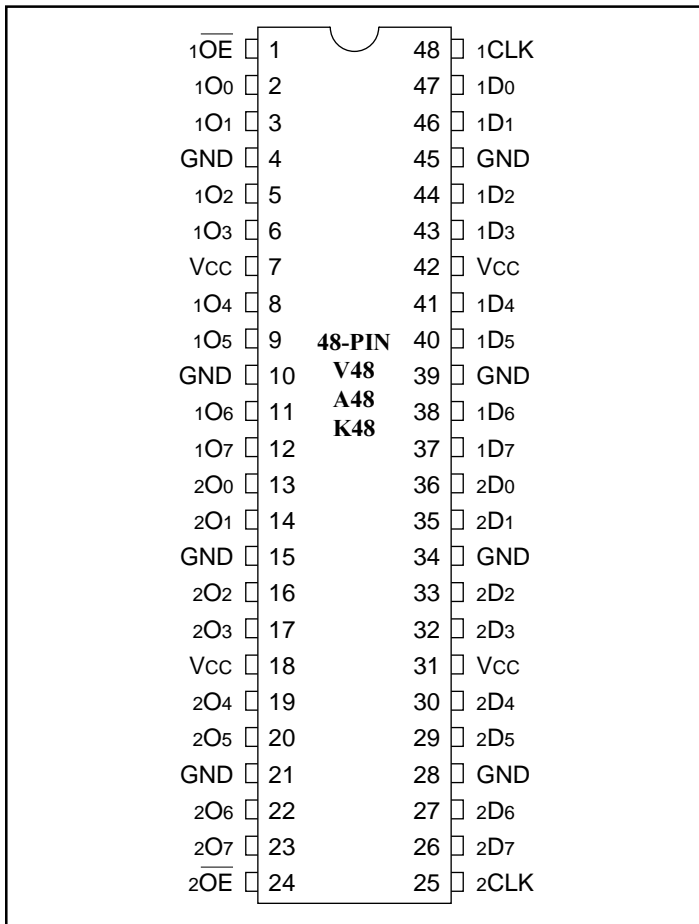
### Product Pin Description

| Pin Name         | Description                               |
|------------------|---|
| $\overline{xOE}$ | 3-State Output Enable Inputs (Active LOW) |
| xCLK             | Clock Inputs                              |
| xDx              | Data Inputs                               |
| xOx              | 3-State Outputs                           |
| GND              | Ground                                    |
| Vcc              | Power                                     |

### Truth Table

| Function      | Inputs <sup>(1)</sup> |      |                  | Outputs <sup>(1)</sup> |
|---------------|-----------------------|------|------------------|------------------------|
|               | $\overline{xDx}$      | xCLK | $\overline{xOE}$ | xOx                    |
| High-Z        | X                     | L    | H                | Z                      |
|               | X                     | H    | H                | Z                      |
| Load Register | L                     |      | L                | L                      |
|               | H                     |      | L                | H                      |
|               | L                     |      | H                | Z                      |
|               | H                     |      | H                | Z                      |

### Product Pin Configuration



#### Note:

1. H = High Voltage Level, X = Don't Care, L = Low Voltage Level, Z = High Impedance

### Capacitance (TA = 25°C, f = 1 MHz)

| Parameters <sup>(1)</sup> | Description        | Test Conditions | Typ | Max. | Units |
|---------------------------|--------------------|-----------------|-----|------|-------|
| CIN                       | Input Capacitance  | VIN = 0 V       | 4.5 | 6    | pF    |
| COU                       | Output Capacitance | VOU = 0 V       | 5.5 | 8    | pF    |

#### Note:

1. This parameter is determined by device characterization but is not production tested.

### Maximum Ratings

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

|  |                 |
|--|-----------------|
| Storage Temperature .....                                  | -55°C to +125°C |
| Ambient Temperature with Power Applied .....               | -40°C to +85°C  |
| Supply Voltage to Ground Potential (Inputs & Vcc Only) ... | -0.5V to +7.0V  |
| Supply Voltage to Ground Potential (Outputs & D/O Only)    | -0.5V to +7.0V  |
| DC Input Voltage .....                                     | -0.5V to +7.0V  |
| DC Output Current .....                                    | 120 mA          |
| Power Dissipation .....                                    | 1.0W            |

**Note:**

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### DC Electrical Characteristics (Over the Operating Range, TA = -40°C to +85°C, VCC = 2.7V to 3.6V)

| Parameters | Description   | Test Conditions <sup>(1)</sup>                         |                          | Min.               | Typ. <sup>(2)</sup> | Max.    | Units |
|------------|---|--|--------------------------|--------------------|---------------------|---------|-------|
| VIH        | Input HIGH Voltage (Input pins)                     | Guaranteed Logic HIGH Level                            |                          | 2.2                | —                   | 5.5     | V     |
|            | Input HIGH Voltage (I/O pins)                       |  |                          | 2.0                | —                   | Vcc+0.5 | V     |
| VIL        | Input LOW Voltage (Input and I/O pins)              | Guaranteed Logic LOW Level                             |                          | -0.5               | —                   | 0.8     | V     |
| IIH        | Input HIGH Current (Input pins)                     | VCC = Max.   | VIN = 5.5V               | —                  | —                   | ±1      | µA    |
|            | Input HIGH Current (I/O pins)                       | VCC = Max.   | VIN = VCC                | —                  | —                   | ±1      | µA    |
| IIL        | Input LOW Current (Input pins)                      | VCC = Max.   | VIN = GND                | —                  | —                   | ±1      | µA    |
|            | Input LOW Current (I/O pins)                        | VCC = Max.   | VIN = GND                | —                  | —                   | ±1      | µA    |
| IOZH       | High Impedance Output Current (3-State Output pins) | VCC = Max.   | VOUT = VCC               | —                  | —                   | ±1      | µA    |
| IOZL       |   | VCC = Max.   | VOUT = GND               | —                  | —                   | ±1      | µA    |
| VIK        | Clamp Diode Voltage                                 | VCC = Min., IIN = -18mA                                |                          | —                  | -0.7                | -1.2    | V     |
| IODH       | Output HIGH Current                                 | VCC = 3.3V, VIN = VIH or VIL, VO = 1.5V <sup>(3)</sup> |                          | -36                | -60                 | -110    | mA    |
| IODL       | Output LOW Current                                  | VCC = 3.3V, VIN = VIH or VIL, VO = 1.5V <sup>(3)</sup> |                          | 50                 | 90                  | 200     | mA    |
| VOH        | Output HIGH Voltage                                 | VCC = Min.   | I <sub>OH</sub> = -0.1mA | Vcc-0.2            | —                   | —       | V     |
|            |   | VIN = VIH or VIL                                       | I <sub>OH</sub> = -3mA   | 2.4                | 3.0                 | —       | V     |
|            |   | VCC = 3.0V,  | I <sub>OH</sub> = -8mA   | 2.4 <sup>(5)</sup> | 3.0                 | —       | V     |
|            |   | VIN = VIH or VIL                                       | I <sub>OH</sub> = -24mA  | 2.0                | —                   | —       | V     |
| VOL        | Output LOW Voltage                                  | VCC = Min.   | I <sub>OL</sub> = 0.1mA  | —                  | —                   | 0.2     | V     |
|            |   | VIN = VIH or VIL                                       | I <sub>OL</sub> = 16mA   | —                  | 0.2                 | 0.4     | V     |
|            |   |  | I <sub>OL</sub> = 24mA   | —                  | 0.3                 | 0.5     | V     |
| Ios<br>mA  | Short Circuit Current <sup>(4)</sup>                | VCC = Max. <sup>(3)</sup> , VOUT = GND                 |                          |                    | -60                 | -85     | -240  |

<sup>VH</sup> Input Hysteresis — 150 — mV

- Notes:**
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
  2. Typical values are at Vcc = 3.3V, +25°C ambient and maximum loading.
  3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
  4. This parameter is guaranteed but not tested.
  5. VOH = VCC - 0.6V at rated current.

### Power Supply Characteristics

| Parameters | Description                                       | Test Conditions <sup>(1)</sup>   |                                 | Min. | Typ. <sup>(2)</sup> | Max.               | Units      |
|------------|---|--|---------------------------------|------|---------------------|--------------------|------------|
| ICC        | Quiescent Power Supply Current                    | VCC = Max.   | VIN = GND or VCC                |      | 0.1                 | 10                 | μA         |
| ΔICC       | Quiescent Power Supply Current<br>TTL Inputs HIGH | VCC = Max.   | VIN = VCC – 0.6V <sup>(3)</sup> |      | 2.0                 | 30                 | μA         |
| ICCD       | Dynamic Power Supply <sup>(4)</sup>               | VCC = Max.,<br>Outputs Open<br>XOE = GND<br>One Bit Toggling<br>50% Duty Cycle                 | VIN = VCC<br>VIN = GND          |      | 50                  | 75                 | μA/<br>MHz |
| IC         | Total Power Supply<br>Current <sup>(6)</sup>      | VCC = Max.,<br>Outputs Open<br>fI = 10 MHz<br>50% Duty Cycle<br>XOE = GND<br>One Bit Toggling  | VIN = VCC – 0.6V<br>VIN = GND   |      | 0.5                 | 0.8                | mA         |
|            |   | VCC = Max.,<br>Outputs Open<br>fI = 2.5 MHz<br>50% Duty Cycle<br>XOE = GND<br>16 Bits Toggling | VIN = VCC – 0.6V<br>VIN = GND   |      | 2.5                 | 4.0 <sup>(5)</sup> |            |

**Notes:**

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at Vcc = 3.3V, +25°C ambient.
3. Per TTL driven input; all other inputs at Vcc or GND.
4. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
5. Values for these conditions are examples of the Icc formula. These limits are guaranteed but not tested.
6.  $IC = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$   
 $IC = ICC + \Delta ICC_{DHNT} + ICCD (f_{CP}/2 + f_I N_I)$   
 ICC = Quiescent Current (ICCL, ICCH and ICCZ)  
 ΔICC = Power Supply Current for a TTL High Input  
 DH = Duty Cycle for TTL Inputs High  
 NT = Number of TTL Inputs at DH  
 ICCD = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
 fCP = Clock Frequency for Register Devices (Zero for Non-Register Devices)  
 NCP = Number of Clock Inputs at fCP  
 fI = Input Frequency  
 NI = Number of Inputs at fI  
 All currents are in milliamps and all frequencies are in megahertz.

**Switching Characteristics over Operating Range<sup>(1)</sup>**

| Parameters   | Description                                      | Conditions <sup>(2)</sup> | FCT163374           |      | FCT163374A          |      | FCT163374C          |      | Units |
|--------------|--|---------------------------|---------------------|------|---------------------|------|---------------------|------|-------|
|              |  |                           | Com.                |      | Com.                |      | Com.                |      |       |
|              |  |                           | Min. <sup>(3)</sup> | Max. | Min. <sup>(3)</sup> | Max. | Min. <sup>(3)</sup> | Max. |       |
| tPLH<br>tPHL | Propagation Delay<br>xCLK to xOx                 | CL = 50pF<br>RL = 500Ω    | 2.0                 | 10.0 | 2.0                 | 6.5  | 2.0                 | 5.2  | ns    |
| tPZH<br>tPZL | Output Enable Time<br>xOE to xOx                 |                           | 1.5                 | 12.5 | 1.5                 | 6.5  | 1.5                 | 5.5  | ns    |
| tPHZ<br>tPLZ | Output Disable Time <sup>(4)</sup><br>xOE to xOx |                           | 1.5                 | 8.0  | 1.5                 | 5.5  | 1.5                 | 5.0  | ns    |
| tSU          | Setup Time HIGH<br>or LOW, xDx to xCLK           |                           | 2.0                 |      | 2.0                 |      | 2.0                 |      | ns    |
| tH           | Hold Time HIGH<br>or LOW, xDx to xCLK            |                           | 1.5                 |      | 1.5                 |      | 1.5                 |      | ns    |
| tW           | xCLK Pulse Width<br>HIGH <sup>(4)</sup>          |                           | 7.0                 |      | 5.0                 |      | 5.0                 |      | ns    |
| tSK(o)       | Output Skew <sup>(5)</sup>                       |                           |                     | 0.5  |                     | 0.5  |                     | 0.5  | ns    |

**Notes:**

1. Propagation Delays and Enable/Disable times are with Vcc = 3.3V ±0.3V, normal range. For Vcc = 2.7V, extended range, all Propagation Delays and Enable/Disable times should be degraded by 20%.
2. See test circuit and wave forms.
3. Minimum limits are guaranteed but not tested on Propagation Delays.
4. This parameter is guaranteed but not production tested.
5. Skew between any two outputs, of the same package, switching in the same direction. This parameter is guaranteed by design.