

### Product Features

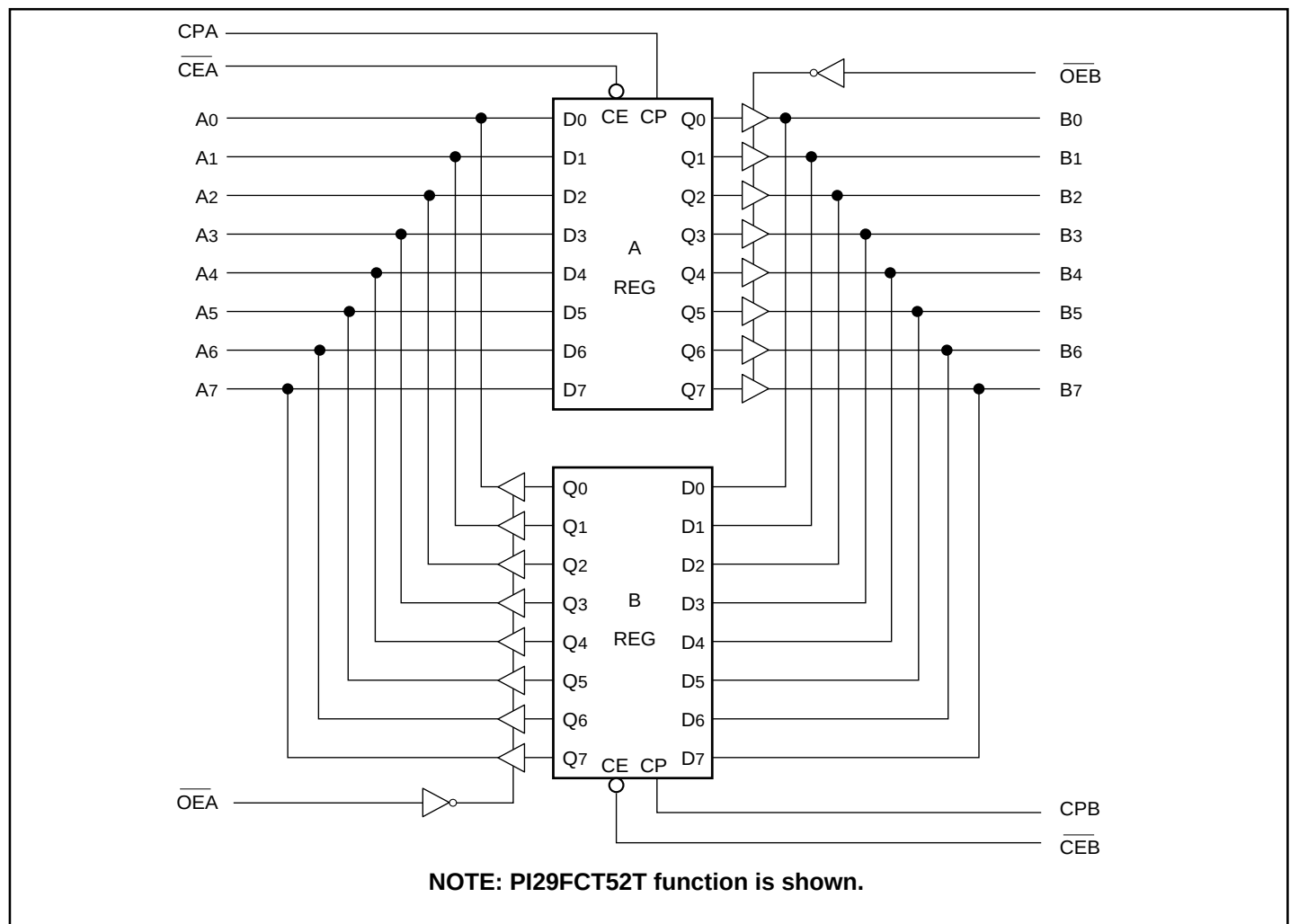
- PI29FCT52/53T is pin compatible with bipolar FAST™ Series at a higher speed and lower power consumption
- TTL input and output levels
- Extremely low static power
- Hysteresis on all inputs
- Industrial operating temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packages available:
  - 24-pin 300 mil wide plastic DIP (P)
  - 24-pin 150 mil wide plastic QSOP (Q)
  - 24-pin 150 mil wide plastic TQSOP (R)
  - 24-pin 300 mil wide plastic SOIC (S)

### Product Description

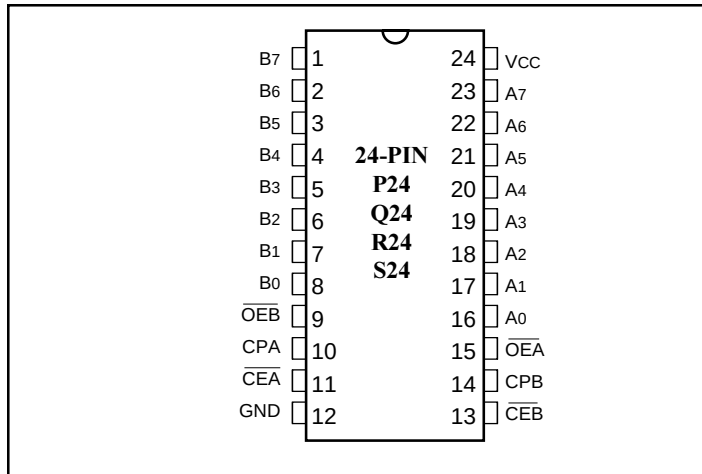
Pericom Semiconductor's PI29FCT series of logic circuits are produced in the Company's advanced 0.8 micron CMOS technology, achieving industry leading speed grades.

The PI29FCT52T and the PI29FCT53T are 8-bit registered transceivers designed with two 8-bit back-to-back registers to store data flowing in both directions between two bidirectional buses. Separate clock enable and 3-state output enable signals are provided for each register. The PI29FCT52T is a non-inverting option of the PI29FCT53T.

### PI29FCT52T and PI29FCT53T Logic Block Diagram



## PI29FCT52/53T Product Pin Configuration



## Product Pin Description

| Pin Name         | Description                             |
|------------------|-----------------------------------------|
| A0-A7            | A Register Inputs or B Register Outputs |
| B0-B7            | B Register Inputs or A Register Outputs |
| CPA              | Clock for A Register                    |
| CPB              | Clock for B Register                    |
| $\overline{OE}A$ | Output Enable for B Register            |
| $\overline{OE}B$ | Output Enable for A Register            |
| $\overline{CE}A$ | Clock Enable for A Register             |
| $\overline{CE}B$ | Clock Enable for B Register             |
| GND              | Ground                                  |
| VCC              | Power                                   |

## PI29FCT52/53T Register Truth Table<sup>(1)</sup> (Applies to A or B Register)

| Function  | Inputs          |            |                 | Internal        |
|-----------|-----------------|------------|-----------------|-----------------|
|           | $\overline{DN}$ | CP         | $\overline{CE}$ | $\overline{QN}$ |
| Hold Data | X               | X          | H               | NC              |
| Load Data | L               | $\uparrow$ | L               | L               |
|           | H               | $\uparrow$ | L               | H               |

## PI29FCT52/53T Output Control Table<sup>(1)</sup>

| Function        | $\overline{OE}$ | $\overline{QN}$ | Y-Outputs |    |
|-----------------|-----------------|-----------------|-----------|----|
|                 |                 |                 | 52        | 53 |
| Disable Outputs | H               | X               | Z         | Z  |
| Enable Outputs  | L               | L               | L         | H  |
|                 | L               | H               | H         | L  |

1. H = High Voltage Level  
 L = Low Voltage Level  
 X = Don't Care  
 Z = High Impedance  
 NC = No Change  
 $\uparrow$  = LOW-to-HIGH transition

### 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 .....                  | –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 .....                                       | 0.5W            |

#### 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, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ , $V_{CC} = 5V \pm 5\%$ )

| Parameters | Description                   | Test Conditions <sup>(1)</sup>                                 |                             | Min. | Typ <sup>(2)</sup> | Max. | Units         |
|------------|-------------------------------|----------------------------------------------------------------|-----------------------------|------|--------------------|------|---------------|
| $V_{OH}$   | Output HIGH Voltage           | $V_{CC} = \text{Min.}$ , $V_{IN} = V_{IH}$ or $V_{IL}$         | $I_{OH} = -15.0 \text{ mA}$ | 2.4  | 3.0                |      | V             |
| $V_{OL}$   | Output LOW Current            | $V_{CC} = \text{Min.}$ , $V_{IN} = V_{IH}$ or $V_{IL}$         | $I_{OL} = 64 \text{ mA}$    |      | 0.3                | 0.55 | V             |
| $V_{IH}$   | Input HIGH Voltage            | Guaranteed Logic HIGH Level                                    |                             | 2.0  |                    |      | V             |
| $V_{IL}$   | Input LOW Voltage             | Guaranteed Logic LOW Level                                     |                             |      |                    | 0.8  | V             |
| $I_{IH}$   | Input HIGH Current            | $V_{CC} = \text{Max.}$                                         | $V_{IN} = V_{CC}$           |      |                    | 1    | $\mu\text{A}$ |
| $I_{IL}$   | Input LOW Current             | $V_{CC} = \text{Max.}$                                         | $V_{IN} = \text{GND}$       |      |                    | –1   | $\mu\text{A}$ |
| $I_{OZH}$  | High Impedance Output Current | $V_{CC} = \text{Max.}$                                         | $V_{OUT} = 2.7V$            |      |                    | 1    | $\mu\text{A}$ |
| $I_{OZL}$  |                               |                                                                | $V_{OUT} = 0.5V$            |      |                    | –1   | $\mu\text{A}$ |
| $V_{IK}$   | Clamp Diode Voltage           | $V_{CC} = \text{Min.}$ , $I_{IN} = -18 \text{ mA}$             |                             |      | –0.7               | –1.2 | V             |
| $I_{OS}$   | Short Circuit Current         | $V_{CC} = \text{Max.}$ <sup>(3)</sup> , $V_{OUT} = \text{GND}$ |                             | –60  | –120               |      | mA            |
| $I_{OFF}$  | Power Down Disable            | $V_{CC} = \text{GND}$ , $V_{OUT} = 4.5V$                       |                             | —    | —                  | 100  | $\mu\text{A}$ |
| $V_H$      | Input Hysteresis              |                                                                |                             |      | 200                |      | mV            |

### Capacitance ( $T_A = 25^\circ\text{C}$ , $f = 1 \text{ MHz}$ )

| Parameters <sup>(4)</sup> | Description        | Test Conditions | Typ | Max. | Units |
|---------------------------|--------------------|-----------------|-----|------|-------|
| $C_{IN}$                  | Input Capacitance  | $V_{IN} = 0V$   | 6   | 10   | pF    |
| $C_{OUT}$                 | Output Capacitance | $V_{OUT} = 0V$  | 8   | 12   | pF    |

#### Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at  $V_{CC} = 5.0V$ ,  $+25^\circ\text{C}$  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 determined by device characterization but is not production tested.

## Power Supply Characteristics

| Parameters       | Description                                     | Test Conditions <sup>(1)</sup>                                                                                                                                     |                                                            | Min. | Typ <sup>(2)</sup> | Max.                | Units      |
|------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------|--------------------|---------------------|------------|
| I <sub>CC</sub>  | Quiescent Power Supply Current                  | V <sub>CC</sub> = Max.                                                                                                                                             | V <sub>IN</sub> = GND or V <sub>CC</sub>                   |      | 0.1                | 500                 | μA         |
| ΔI <sub>CC</sub> | Supply Current per Input @ TTL HIGH             | V <sub>CC</sub> = Max.                                                                                                                                             | V <sub>IN</sub> = 3.4V <sup>(3)</sup>                      |      | 0.5                | 2.0                 | mA         |
| I <sub>CCD</sub> | Supply Current per Input per MHz <sup>(4)</sup> | V <sub>CC</sub> = Max.,<br>Outputs Open<br>OEA or OEB = GND<br>One Input Toggling<br>50% Duty Cycle                                                                | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 0.15               | 0.25                | mA/<br>MHz |
| I <sub>C</sub>   | Total Power Supply Current <sup>(6)</sup>       | V <sub>CC</sub> = Max.,<br>Outputs Open<br>f <sub>CP</sub> = 10 MHz<br>50% Duty Cycle<br>OEA or OEB = GND<br>fi = 5 MHz<br>One Bit Toggling                        | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 1.5                | 3.5 <sup>(5)</sup>  | mA         |
|                  |                                                 |                                                                                                                                                                    | V <sub>IN</sub> = 3.4V<br>V <sub>IN</sub> = GND            |      | 2.0                | 5.5 <sup>(5)</sup>  |            |
|                  |                                                 | V <sub>CC</sub> = Max.,<br>Outputs Open<br>f <sub>CP</sub> = 10 MHz<br>50% Duty Cycle<br>OEA or OEB = GND<br>Eight Bits Toggling<br>fi = 2.5 MHz<br>50% Duty Cycle | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 3.8                | 7.3 <sup>(5)</sup>  |            |
|                  |                                                 |                                                                                                                                                                    | V <sub>IN</sub> = 3.4V<br>V <sub>IN</sub> = GND            |      | 6.0                | 16.3 <sup>(5)</sup> |            |

### Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at V<sub>CC</sub> = 5.0V, +25°C ambient.
- Per TTL driven input (V<sub>IN</sub> = 3.4V); all other inputs at V<sub>CC</sub> or GND.
- This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
- Values for these conditions are examples of the I<sub>CC</sub> formula. These limits are guaranteed but not tested.
- I<sub>C</sub> = I<sub>QUIESCENT</sub> + I<sub>INPUTS</sub> + I<sub>DYNAMIC</sub>  

$$I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$$

I<sub>CC</sub> = Quiescent Current  
ΔI<sub>CC</sub> = Power Supply Current for a TTL High Input (V<sub>IN</sub> = 3.4V)  
D<sub>H</sub> = Duty Cycle for TTL Inputs High  
N<sub>T</sub> = Number of TTL Inputs at D<sub>H</sub>  
I<sub>CCD</sub> = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
f<sub>CP</sub> = Clock Frequency for Register Devices (Zero for Non-Register Devices)  
f<sub>i</sub> = Input Frequency  
N<sub>i</sub> = Number of Inputs at f<sub>i</sub>  
All currents are in milliamps and all frequencies are in megahertz.

### PI29FCT52T Switching Characteristics over Operating Range

| Parameters | Description                                           | Conditions <sup>(1)</sup> | 29FCT52AT |      | 29FCT52BT |     | 29FCT52CT |     | Unit |
|------------|-------------------------------------------------------|---------------------------|-----------|------|-----------|-----|-----------|-----|------|
|            |                                                       |                           | Com.      |      | Com.      |     | Com.      |     |      |
|            |                                                       |                           | Min       | Max  | Min       | Max | Min       | Max |      |
| tPLH       | Propagation Delay                                     | CL= 50 pF<br>RL= 500Ω     | 2.0       | 10.0 | 2.0       | 7.5 | 2.0       | 6.3 | ns   |
| tPHL       | CPA, CPB, to AN, BN                                   |                           |           |      |           |     |           |     |      |
| tPZH       | Output Enable Time                                    |                           | 1.5       | 10.5 | 1.5       | 8.0 | 1.5       | 7.0 | ns   |
| tPZL       | OE̅A, OE̅B, to AN, BN                                 |                           |           |      |           |     |           |     |      |
| tPHZ       | Output Disable Time <sup>(3)</sup>                    |                           | 1.5       | 10.0 | 1.5       | 7.5 | 1.5       | 6.5 | ns   |
| tPLZ       | OE̅A, OE̅B, to AN, BN                                 |                           |           |      |           |     |           |     |      |
| tSU        | Set-up Time HIGH or<br>LOW, AN, BN to<br>CPA, CPB     |                           | 2.5       | —    | 2.5       | —   | 2.5       | —   | ns   |
| tH         | Hold Time HIGH or<br>LOW, AN, BN to<br>CPA, CPB       |                           | 2.0       | —    | 1.5       | —   | 1.5       | —   | ns   |
| tSU        | Set-up Time HIGH or<br>LOW, CE̅A, CE̅B to<br>CPA, CPB |                           | 3.0       | —    | 3.0       | —   | 3.0       | —   | ns   |
| tH         | Hold Time HIGH or<br>LOW, CE̅A, CE̅B to<br>CPA, CPB   | 2.0                       | —         | 2.0  | —         | 2.0 | —         | ns  |      |
| tw         | Pulse Width HIGH <sup>(3)</sup> or<br>LOW, CPA or CPB | 3.0                       | —         | 3.0  | —         | 3.0 | —         | ns  |      |

#### Notes:

1. See test circuit and wave forms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. This parameter is guaranteed but not production tested.

**PI29FCT53T Switching Characteristics over Operating Range**

| Parameters   | Description                                               | Conditions <sup>(1)</sup> | 29FCT53AT |      | 29FCT53BT |     | 29FCT53CT |     | Unit |
|--------------|-----------------------------------------------------------|---------------------------|-----------|------|-----------|-----|-----------|-----|------|
|              |                                                           |                           | Com.      |      | Com.      |     | Com.      |     |      |
|              |                                                           |                           | Min       | Max  | Min       | Max | Min       | Max |      |
| tPLH<br>tPHL | Propagation Delay<br>CPA, CPB, to AN, BN                  | CL= 50 pF<br>RL= 500Ω     | 2.0       | 10.0 | 2.0       | 7.5 | 2.0       | 6.3 | ns   |
| tPZH<br>tPZL | Output Enable Time<br>OEA, OEB, to AN, BN                 |                           | 1.5       | 10.5 | 1.5       | 8.0 | 1.5       | 7.0 | ns   |
| tPHZ<br>tPLZ | Output Disable Time <sup>(3)</sup><br>OEA, OEB, to AN, BN |                           | 1.5       | 10.0 | 1.5       | 7.5 | 1.5       | 6.5 | ns   |
| tSU          | Set-up Time HIGH or<br>LOW, AN, BN to<br>CPA, CPB         |                           | 2.5       | —    | 2.5       | —   | 2.5       | —   | ns   |
| tH           | Hold Time HIGH or<br>LOW, AN, BN to<br>CPA, CPB           |                           | 2.0       | —    | 1.5       | —   | 1.5       | —   | ns   |
| tSU          | Set-up Time HIGH or<br>LOW, CEA, CEB to<br>CPA, CPB       |                           | 3.0       | —    | 3.0       | —   | 3.0       | —   | ns   |
| tH           | Hold Time HIGH or<br>LOW, CEA, CEB to<br>CPA, CPB         |                           | 2.0       | —    | 2.0       | —   | 2.0       | —   | ns   |
| tw           | Pulse Width HIGH <sup>(3)</sup> or<br>LOW, CPA or CPB     |                           | 3.0       | —    | 3.0       | —   | 3.0       | —   | ns   |

**Notes:**

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. This parameter is guaranteed but not production tested.