



# PI74FCT240T/241T/ 244T/540T/541T (25 ohmSeries) PI74FCT2240T/2241T/2244T/2541T

## Fast CMOS Octal Buffer/Line Drivers

### Product Features

- PI74FCT240/241/244/540/541T and PI74FCT2240/2241/2244/2541T are pin compatible with bipolar FAST™ Series at a higher speed and lower power consumption
- 25Ω series resistor on all outputs (FCT2XXX only)
- TTL input and output levels
- Low ground bounce outputs
- Extremely low static power
- Hysteresis on all inputs
- Industrial operating temperature range: -40°C to +85°C
- Packages available:
  - 20-pin 173 mil wide plastic TSSOP (L)
  - 20-pin 209 mil wide plastic SSOP (H)
  - 20-pin 300 mil wide plastic DIP (P)
  - 20-pin 150 mil wide plastic QSOP (Q)
  - 20-pin 150 mil wide plastic TQSOP (R)
  - 20-pin 300 mil wide plastic SOIC (S)
- Device models available upon request

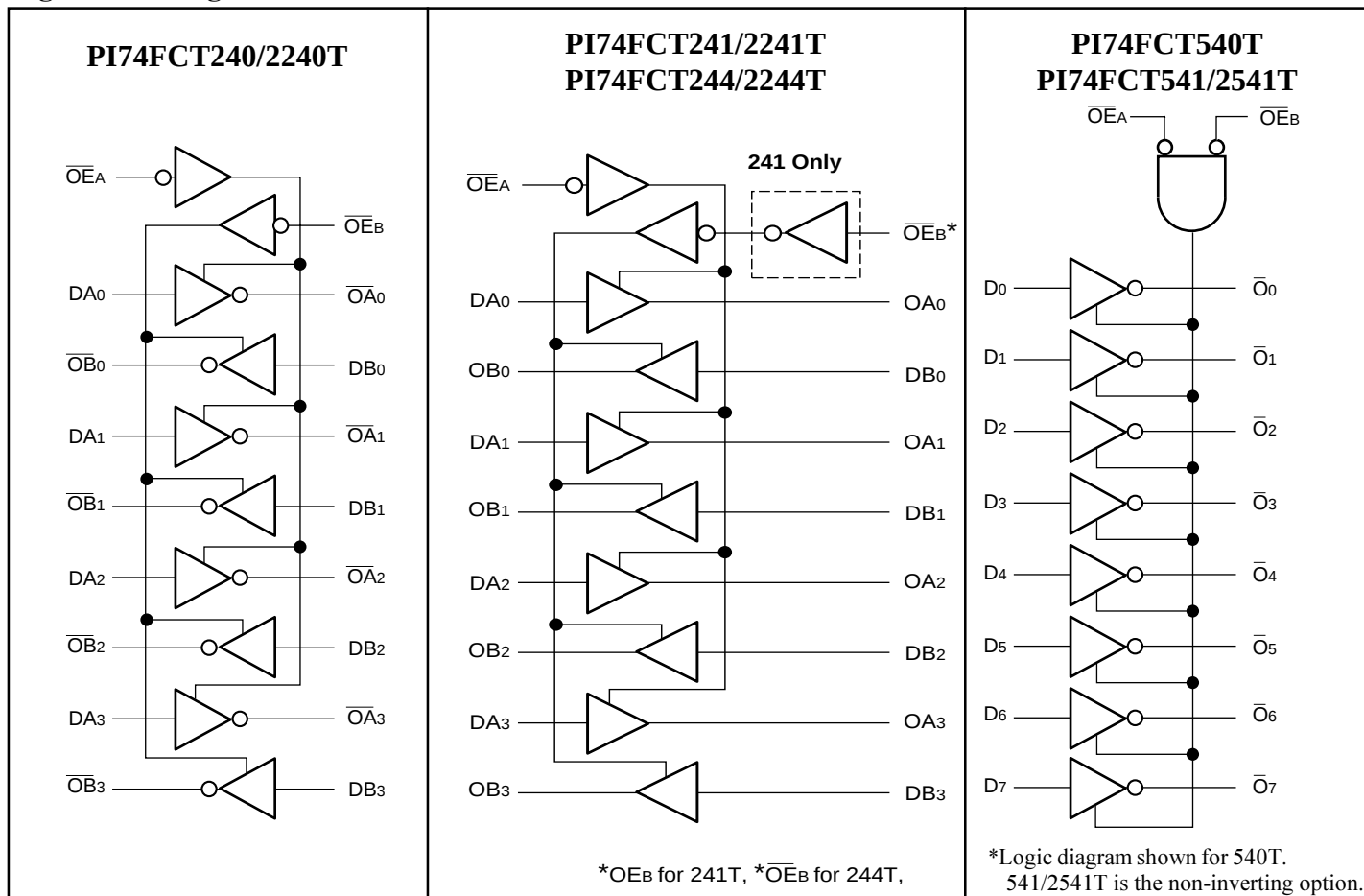
### Product Description

Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.6/0.8 micron CMOS technology, achieving industry leading speed grades. All PI74FCT2XXX devices have a built-in 25 ohm series resistor on all outputs to reduce noise because of reflections, thus eliminating the need for an external terminating resistor.

The PI74FCT240T/241T/244T/540T/541T and PI74FCT2240T/2241T/2244T/2541T are 8-bit wide driver circuits, designed to be used in applications requiring high-speed and high-output drive. Ideal applications would include bus drivers, memory drivers, address drivers, and system clock drivers.

The PI74FCT540T and PI74FCT541/2541T provide similar driver capabilities, but have their pins physically grouped by function. All inputs are located on one side of the package, while outputs are on the opposite side, allowing for a much simpler and denser board layout.

### Logic Block Diagrams



## Product Pin Description

| Pin Name                         | Description                               |
|----------------------------------|-------------------------------------------|
| $\overline{OE}A, \overline{OE}B$ | 3-State Output Enable Inputs (Active LOW) |
| $OEB^{(1)}$                      | 3-State Output Enable Input (Active HIGH) |
| Dxx                              | Inputs                                    |
| Oxx                              | Outputs                                   |
| GND                              | Ground                                    |
| VCC                              | Power                                     |

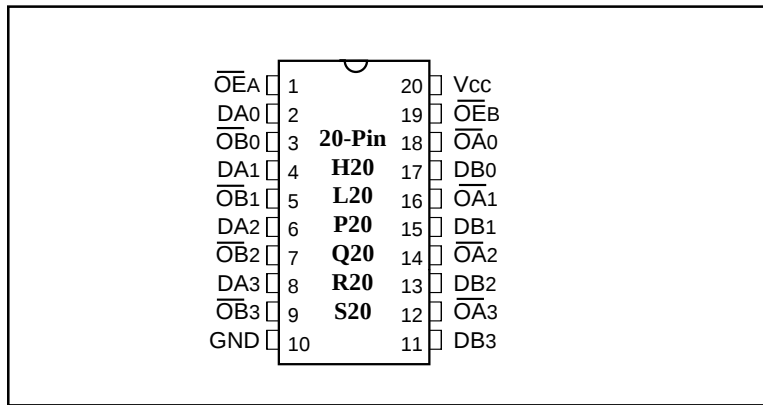
## Truth Table

| Inputs <sup>(1)</sup> |                  |             |   | Outputs <sup>(1)</sup> |     |     |     |     |
|-----------------------|------------------|-------------|---|------------------------|-----|-----|-----|-----|
| $\overline{OE}A$      | $\overline{OE}B$ | $OEB^{(2)}$ | D | 240                    | 241 | 244 | 540 | 541 |
| L                     | L                | H           | L | H                      | L   | L   | H   | L   |
| L                     | L                | H           | H | L                      | H   | H   | L   | H   |
| H                     | H                | L           | X | Z                      | Z   | Z   | Z   | Z   |

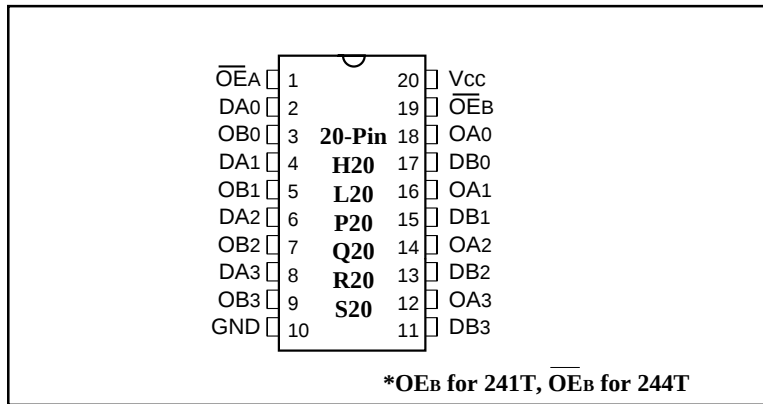
### Note:

1. H = High Voltage Level, X = Don't Care, L = Low Voltage Level, Z = High Impedance
2.  $OEB$  for 241 only.

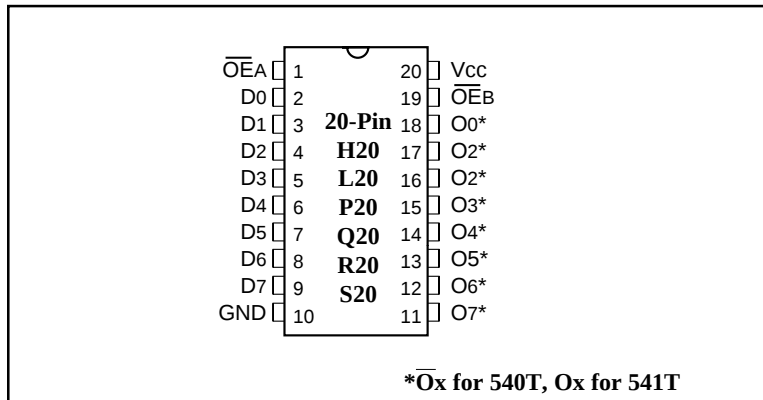
## PI74FCT240/2240T Product Pin Configuration



## PI74FCT241/2241/244/2244T Product Pin Configuration



## PI74FCT540/541/2541T Product Pin Configuration



## Maximum Ratings

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

|                                                                         |                 |                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Temperature .....                                               | –65°C to +150°C | <b>Note:</b><br>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. |
| Ambient Temperature with Power Applied .....                            | –40°C to +85°C  |                                                                                                                                                                                                                                                                                                                                                                                                             |
| Supply Voltage to Ground Potential (Inputs & V <sub>CC</sub> 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 .....                                                 | 120mA           |                                                                                                                                                                                                                                                                                                                                                                                                             |
| Power Dissipation .....                                                 | 0.5W            |                                                                                                                                                                                                                                                                                                                                                                                                             |

## DC Electrical Characteristics (Over the Operating Range, T<sub>A</sub> = –40°C to +85°C, V<sub>CC</sub> = 5.0V ± 5%)

| Parameters       | Description           | Test Conditions <sup>(1)</sup>                                               |                                    | Min. | Typ <sup>(2)</sup> | Max. | Units |
|------------------|-----------------------|------------------------------------------------------------------------------|------------------------------------|------|--------------------|------|-------|
| V <sub>OH</sub>  | Output HIGH Voltage   | V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OH</sub> = –15.0mA          | 2.4  | 3.0                |      | V     |
| V <sub>OL</sub>  | Output LOW Current    | V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OL</sub> = 64mA             |      | 0.3                | 0.55 | V     |
| V <sub>OL</sub>  | Output LOW Current    | V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OL</sub> = 12mA (25ΩSeries) |      | 0.3                | 0.50 | V     |
| V <sub>IH</sub>  | Input HIGH Voltage    | Guaranteed Logic HIGH Level                                                  |                                    | 2.0  |                    |      | V     |
| V <sub>IL</sub>  | Input LOW Voltage     | Guaranteed Logic LOW Level                                                   |                                    |      |                    | 0.8  | V     |
| I <sub>IH</sub>  | Input HIGH Current    | V <sub>CC</sub> = Max.                                                       | V <sub>IN</sub> = V <sub>CC</sub>  |      |                    | 1    | μA    |
| I <sub>IL</sub>  | Input LOW Current     | V <sub>CC</sub> = Max.                                                       | V <sub>IN</sub> = GND              |      |                    | –1   | μA    |
| I <sub>OZH</sub> | High Impedance        | V <sub>CC</sub> = Max.                                                       | V <sub>OUT</sub> = 2.7V            |      |                    | 1    | μA    |
| I <sub>OZL</sub> | Output Current        |                                                                              | V <sub>OUT</sub> = 0.5V            |      |                    | –1   | μA    |
| V <sub>IK</sub>  | Clamp Diode Voltage   | V <sub>CC</sub> = Min., I <sub>IN</sub> = –18mA                              |                                    |      | –0.7               | –1.2 | V     |
| I <sub>OFF</sub> | Power Down Disable    | V <sub>CC</sub> = GND, V <sub>OUT</sub> = 4.5V                               |                                    | —    | —                  | 100  | μA    |
| I <sub>OS</sub>  | Short Circuit Current | V <sub>CC</sub> = Max. <sup>(3)</sup> , V <sub>OUT</sub> = GND               |                                    | –60  | –120               |      | mA    |
| V <sub>H</sub>   | Input Hysteresis      |                                                                              |                                    |      | 200                |      | mV    |

## Capacitance (T<sub>A</sub> = 25°C, f = 1 MHz)

| Parameters <sup>(4)</sup> | Description        | Test Conditions       | Typ | Max. | Units |
|---------------------------|--------------------|-----------------------|-----|------|-------|
| C <sub>IN</sub>           | Input Capacitance  | V <sub>IN</sub> = 0V  | 6   | 10   | pF    |
| C <sub>OUT</sub>          | Output Capacitance | V <sub>OUT</sub> = 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<sub>CC</sub> = 5.0V, +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 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                | 2.5                 | mA         |
| I <sub>CCD</sub> | Supply Current per Input per MHz <sup>(4)</sup> | V <sub>CC</sub> = Max.,<br>Outputs Open<br>$\overline{OE}_A = \overline{OE}_B = \text{GND}$ or<br>$\overline{OE}_A = \text{GND}, \overline{OE}_B = V_{CC}$<br>One Bit 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>i</sub> = 10 MHz<br>50% Duty Cycle<br>$\overline{OE}_A = \overline{OE}_B = \text{GND}$ or<br>$\overline{OE}_A = \text{GND}, \overline{OE}_B = V_{CC}$<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            |      | 1.8                | 4.5 <sup>(5)</sup>  |            |
|                  |                                                 | V <sub>CC</sub> = Max.,<br>Outputs Open<br>f <sub>i</sub> = 2.5 MHz<br>50% Duty Cycle<br>$\overline{OE}_A = \overline{OE}_B = \text{GND}$ or<br>$\overline{OE}_A = \text{GND}, \overline{OE}_B = V_{CC}$<br>Eight Bits Toggling | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND |      | 3.0                | 6.0 <sup>(5)</sup>  |            |
|                  |                                                 |                                                                                                                                                                                                                                 | V <sub>IN</sub> = 3.4V<br>V <sub>IN</sub> = GND            |      | 5.0                | 14.0 <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.

### PI74FCT240/2240T Switching Characteristics over Operating Range

| Parameters       | Description                        | Conditions <sup>(1)</sup>                      | 240T/2240T |      | 240AT/2240AT |     | 240CT/2240CT |     | 240DT |     | Units |  |
|------------------|------------------------------------|------------------------------------------------|------------|------|--------------|-----|--------------|-----|-------|-----|-------|--|
|                  |                                    |                                                | Com.       |      | Com.         |     | Com.         |     | Com.  |     |       |  |
|                  |                                    |                                                | Min        | Max  | Min          | Max | Min          | Max | Min   | Max |       |  |
| t <sub>PLH</sub> | Propagation Delay                  | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500Ω | 1.5        | 8.0  | 1.5          | 4.8 | 1.5          | 4.3 | 1.5   | 3.6 | ns    |  |
| t <sub>PHL</sub> | D <sub>N</sub> to $\bar{O}_N$      |                                                |            |      |              |     |              |     |       |     |       |  |
| t <sub>PZH</sub> | Output Enable Time                 |                                                | 1.5        | 10.0 | 1.5          | 6.2 | 1.5          | 5.8 | 1.5   | 4.8 | ns    |  |
| t <sub>PZL</sub> | $\bar{O}_{EX}$ to $\bar{O}_N$      |                                                |            |      |              |     |              |     |       |     |       |  |
| t <sub>PHZ</sub> | Output Disable Time <sup>(3)</sup> |                                                | 1.5        | 9.5  | 1.5          | 5.6 | 1.5          | 5.2 | 1.5   | 4.0 | ns    |  |
| t <sub>PLZ</sub> | $\bar{O}_{EX}$ to $\bar{O}_N$      |                                                |            |      |              |     |              |     |       |     |       |  |

### PI74FCT241/2241T Switching Characteristics over Operating Range

| Parameters       | Description                                | Conditions <sup>(1)</sup>                      | 241T/2241T |     | 241AT/2241AT |     | 241CT/2241CT |     | 241DT |     | Units |  |
|------------------|--------------------------------------------|------------------------------------------------|------------|-----|--------------|-----|--------------|-----|-------|-----|-------|--|
|                  |                                            |                                                | Com.       |     | Com.         |     | Com.         |     | Com.  |     |       |  |
|                  |                                            |                                                | Min        | Max | Min          | Max | Min          | Max | Min   | Max |       |  |
| t <sub>PLH</sub> | Propagation Delay                          | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500Ω | 1.5        | 6.5 | 1.5          | 4.8 | 1.5          | 4.1 | 1.5   | 3.6 | ns    |  |
| t <sub>PHL</sub> | D <sub>N</sub> to $\bar{O}_N$              |                                                |            |     |              |     |              |     |       |     |       |  |
| t <sub>PZH</sub> | Output Enable Time                         |                                                | 1.5        | 8.0 | 1.5          | 6.2 | 1.5          | 5.8 | 1.5   | 4.8 | ns    |  |
| t <sub>PZL</sub> | $\bar{O}_{EA}/\bar{O}_{EB}$ to $\bar{O}_N$ |                                                |            |     |              |     |              |     |       |     |       |  |
| t <sub>PHZ</sub> | Output Disable Time <sup>(3)</sup>         |                                                | 1.5        | 7.0 | 1.5          | 5.6 | 1.5          | 5.2 | 1.5   | 4.0 | ns    |  |
| t <sub>PLZ</sub> | $\bar{O}_{EA}/\bar{O}_{EB}$ to $\bar{O}_N$ |                                                |            |     |              |     |              |     |       |     |       |  |

### PI74FCT244/2244T Switching Characteristics over Operating Range

| Parameters<br>Units | Description                        | Conditions <sup>(1)</sup>                      | 244T/2244T |     | 244AT/2244AT |     | 244CT/2244CT |     | 244DT |     | Units |  |
|---------------------|------------------------------------|------------------------------------------------|------------|-----|--------------|-----|--------------|-----|-------|-----|-------|--|
|                     |                                    |                                                | Com.       |     | Com.         |     | Com.         |     | Com.  |     |       |  |
|                     |                                    |                                                | Min        | Max | Min          | Max | Min          | Max | Min   | Max |       |  |
| t <sub>PLH</sub>    | Propagation Delay                  | C <sub>L</sub> = 50pF<br>R <sub>L</sub> = 500Ω | 1.5        | 6.5 | 1.5          | 4.8 | 1.5          | 4.1 | 1.5   | 3.6 | ns    |  |
| t <sub>PHL</sub>    | D <sub>N</sub> to $\bar{O}_N$      |                                                |            |     |              |     |              |     |       |     |       |  |
| t <sub>PZH</sub>    | Output Enable Time                 |                                                | 1.5        | 8.0 | 1.5          | 6.2 | 1.5          | 5.8 | 1.5   | 4.8 | ns    |  |
| t <sub>PZL</sub>    | $\bar{O}_{EX}$ to $\bar{O}_N$      |                                                |            |     |              |     |              |     |       |     |       |  |
| t <sub>PHZ</sub>    | Output Disable Time <sup>(3)</sup> |                                                | 1.5        | 7.0 | 1.5          | 5.6 | 1.5          | 5.2 | 1.5   | 4.0 | ns    |  |
| t <sub>PLZ</sub>    | $\bar{O}_{EX}$ to $\bar{O}_N$      |                                                |            |     |              |     |              |     |       |     |       |  |

#### 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.

**PI74FCT540T Switching Characteristics over Operating Range**
**PI74FCT541/2541T Switching Characteristics over Operating Range**
**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.