



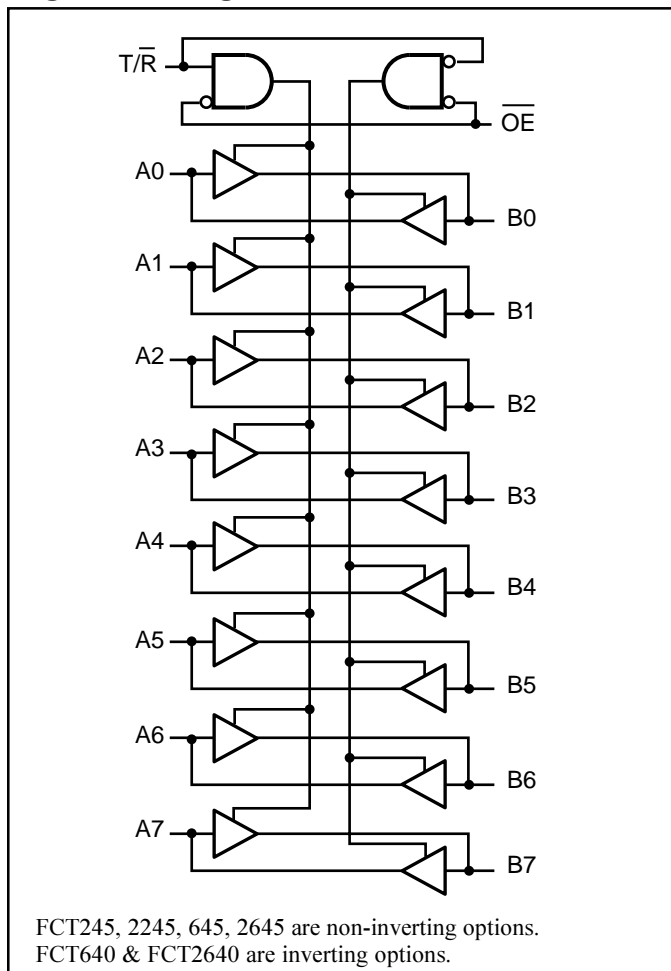
# PI74FCT245T/640T/645T PI74FCT2245T/2640T/2645T (25Ω Series)

## Fast CMOS Octal Bidirectional Transceivers

### Product Features

- PI74FCT245/640/645T and PI74FCT2245/2640T/2645T are pin compatible with bipolar FAST™ Series at a higher speed and lower power consumption
- 25 Ohm 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 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)
  - 20-pin 209 mil wide plastic SSOP (H)
- Device models available on request

### Logic Block Diagram

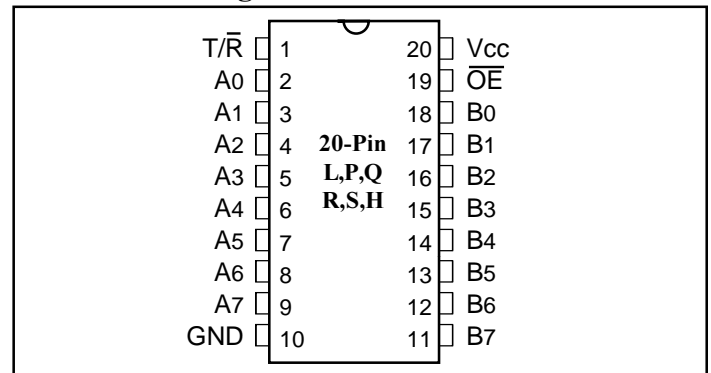


### Product Description

Pericom Semiconductor's PI74FCT series of logic circuits are produced using 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 PI74FCT245T/640T/645T and PI74FCT2245T/2640T/2645T are 8-bit wide octal buffer bidirectional transceivers designed for asynchronous two-way communication between data buses. The transmit/receive (T/R) input determines the direction of data flow through the bidirectional transceiver. Transmit (active HIGH) enables data from A ports to B ports, and receive (active LOW) from B ports to A ports. The output enable (OE) input, when HIGH, disables both A and B ports by placing them in HIGH Z condition.

### Product Pin Configuration



### Product Pin Description

Pin Name	Description
OE	3-State Output Enable Inputs (Active LOW)
T/R	Transmit/Receive Input
A0-A7	Side A Inputs or 3-State Outputs
B0-B7	Side B Inputs or 3-State Outputs
GND	Ground
VCC	Power

### Truth Table<sup>(1)</sup>

Inputs		Outputs
OE	T/R	
L	L	Bus B Data to Bus A <sup>(2)</sup>
L	H	Bus A Data to Bus B <sup>(2)</sup>
H	X	High Z State

1. H = High Voltage Level, X = Don't Care, L = Low Voltage Level, Z = High Impedance
2. 640 is inverting from input to output.

### 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 & 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

**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<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 (25Ω Series)		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	(Except I/O pins) V <sub>CC</sub> = Max.	V <sub>IN</sub> = V <sub>CC</sub>			1	μA
I <sub>IL</sub>	Input LOW Current	(Except I/O pins) V <sub>CC</sub> = Max.	V <sub>IN</sub> = GND			-1	μA
I <sub>IH</sub>	Input HIGH Current	(I/O pins Only) V <sub>CC</sub> = Max.	V <sub>IN</sub> = V <sub>CC</sub>			1	μA
I <sub>IL</sub>	Input LOW Current	(I/O pins Only) 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> = -18 mA			-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	2.0	mA
I <sub>CCD</sub>	Supply Current per Input per MHz <sup>(4)</sup>	V <sub>CC</sub> = Max., Outputs Open $\overline{OE}$ = GND T/R = GND or V <sub>CC</sub> One Input Toggling 50% Duty Cycle	V <sub>IN</sub> = V <sub>CC</sub> V <sub>IN</sub> = GND		0.15	0.25	mA/ MHz
I <sub>C</sub>	Total Power Supply Current <sup>(6)</sup>	V <sub>CC</sub> = Max., Outputs Open f <sub>i</sub> = 10 MHz 50% Duty Cycle T/R = $\overline{OE}$ = GND One Bit Toggling	V <sub>IN</sub> = V <sub>CC</sub> V <sub>IN</sub> = GND		1.5	3.5 <sup>(5)</sup>	mA
			V <sub>IN</sub> = 3.4V V <sub>IN</sub> = GND		1.8	4.5 <sup>(5)</sup>	
		V <sub>CC</sub> = Max., Outputs Open f <sub>i</sub> = 2.5 MHz 50% Duty Cycle T/R = $\overline{OE}$ = GND Eight Bits Toggling	V <sub>IN</sub> = V <sub>CC</sub> V <sub>IN</sub> = GND		3.0	6.0 <sup>(5)</sup>	
			V <sub>IN</sub> = 3.4V 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.
- $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$   
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$   
 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.

### PI74FCT245T/2245T Switching Characteristics over Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	245T/2245T		245AT/2245AT		245CT/2245CT		245DT		Unit
			Com.		Com.		Com.		Com.		
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A to B, B to A	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500 Ohm	1.5	7.0	1.5	4.6	1.5	4.1	1.5	3.8	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time OE to A or B		1.5	9.0	1.5	6.2	1.5	5.8	1.5	5.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time OE to A or B <sup>(3)</sup>		1.5	7.5	1.5	5.0	1.5	4.8	1.5	4.3	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time T/R to A or B		1.5	9.0	1.5	6.2	1.5	5.8	1.5	5.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time <sup>(3)</sup> T/R to A or B <sup>(3)</sup>		1.5	7.5	1.5	5.0	1.5	4.8	1.5	4.3	ns

### PI74FCT640T/2640T Switching Characteristics over Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	640T/2640T		640AT/2640AT		640CT/2640CT		640DT		Unit
			Com.		Com.		Com.		Com.		
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A to B, B to A	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500 Ohm	2.0	7.0	1.5	5.0	1.5	4.4	1.5	3.7	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time OE to A or B		2.0	13.0	1.5	6.2	1.5	5.8	1.5	5.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time OE to A or B <sup>(3)</sup>		2.0	10.0	1.5	5.0	1.5	4.8	1.5	4.3	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time T/R to A or B		2.0	13.0	1.5	6.2	1.5	5.8	1.5	5.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time <sup>(3)</sup> T/R to A or B <sup>(3)</sup>		2.0	10.0	1.5	5.0	1.5	4.8	1.5	4.3	ns

### PI74FCT645T/2645T Switching Characteristics over Operating Range

Parameters	Description	Conditions <sup>(1)</sup>	645T/2645T		645AT/2645AT		645CT/2645CT		645DT		Unit
			Com.		Com.		Com.		Com.		
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A to B, B to A	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500 Ohm	1.5	9.5	1.5	4.6	1.5	4.1	1.5	3.8	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time OE to A or B		1.5	11.0	1.5	6.2	1.5	5.8	1.5	5.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time OE to A or B <sup>(3)</sup>		1.5	12.0	1.5	5.0	1.5	4.8	1.5	4.3	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time T/R to A or B		1.5	11.0	1.5	6.2	1.5	5.8	1.5	5.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time <sup>(3)</sup> T/R to A or B <sup>(3)</sup>		1.5	12.0	1.5	5.0	1.5	4.8	1.5	4.3	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.

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