

PI74FCT162Q245T

Product Features:

- $V_{CC} = 5V \pm 10\%$
- Balanced output drivers: $\pm 12 \text{ mA}$
- Output impedance: 35Ω (typical)
- Typical Volp (Output Ground Bounce) < 0.5V at $V_{CC} = 5V$, $T_A = 25^{\circ}C$
- Bus Hold retains last active bus state during tri-state
- Hysteresis on all inputs
- Packages available:
 - 48-pin 240-mil wide plastic TSSOP (A48)
 - 48-pin 300-mil wide plastic SSOP (V48)
 - 48-pin 150-mil wide plastic BQSOP (B48)
- Device models available on request

Fast, Low Noise CMOS 16-Bit **Bidirectional Transceivers**

Product Description:

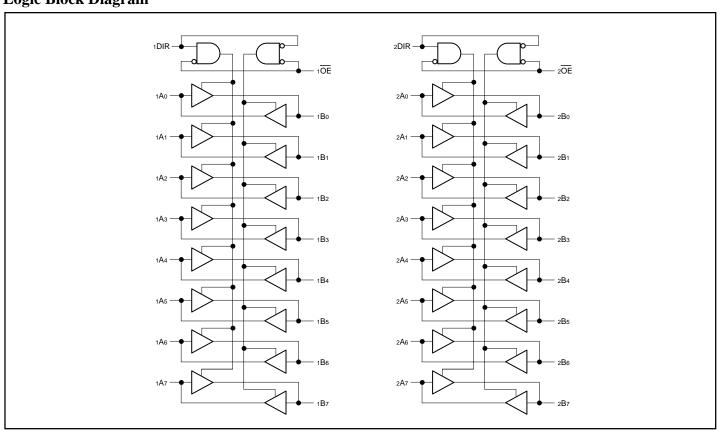
Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.6 micron CMOS technology, achieving industry leading speed grades.

The PI74FCT162Q245T is a 16-bit bidirectional transceiver designed for asynchronous two-way communication between data buses. The direction control input pin (xDIR) determines the direction of data flow through the bidirectional transceiver. The Direction and Output Enable controls are designed to operate these devices as either two independent 8-bit transceivers or one 16-bit transceiver. The output enable (\overline{OE}) input, when HIGH, disables both A and B ports by placing them in HIGH Z condition.

The PI74FCT162Q245T is designed with current limiting resistors at its outputs to control the output edge rate resulting in lower ground bounce and undershoot. This device features a typical output impedance of 35Ω , eliminating the need for external terminating resistors for most bus interface applications. This noise suppression benefit is designated by the letter "Q" (for quiet) in the part number.

The PI74FCT162Q245T also features "Bus Hold" which retains the input's last state whenever the input goes to high-impedance preventing "floating" inputs and eliminating the need for pullup/ down resistors.

Logic Block Diagram



Product Pin Description

Pin Name	Description
xŌĒ	Output Enable Inputs (Active LOW)
xDIR	Direction Control Input
xAx	Side A Inputs or 3-State Outputs ⁽¹⁾
xBx	Side B Inputs or 3-State Outputs ⁽¹⁾
GND	Ground
Vcc	Power

Note: 1. For the PI74FCT162Q245T, these pins have "Bus Hold." All other pins are standard, outputs, or I/Os.

Truth Table

Inpu	ıts ⁽¹⁾	
xŌE	xDIR	Outputs ⁽¹⁾
L	L	Bus B Data to Bus A
L	Н	Bus A Data to Bus B
Н	X	High Z State

Note: 1. H = High Voltage Level

X = Don't Care

L = Low Voltage LevelZ = High Impedance

Product Pin Configuration

PI74FCT162Q245T LOW NOISE 16-BIT BIDIRECTIONAL TRANSCEIVERS

Maximum Ratings

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

Storage Temperature65°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 Voltage0.5V to +7.0V
DC Output Current
Power Dissipation

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, $TA = -40^{\circ}C$ to $+85^{\circ}C$, $VCC = 5.0V \pm 10\%$)

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ ⁽²⁾	Max.	Units
VIH	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0			V
VIL	Input LOW Voltage	Guaranteed Logic LOW Level				0.8	V
Іін	Input HIGH Current	Standard Input, VCC = Max.	$V_{IN} = V_{CC}$			1	μA
Іін	Input HIGH Current	Bus Hold Input ⁽⁴⁾ , $V_{CC} = Max$.	$V_{IN} = V_{CC}$			±100	μA
IIL	Input LOW Current	Standard Input, VCC = Min.	$V_{IN} = GND$			-1	μA
In	Input LOW Current	Bus Hold Input ⁽⁴⁾ , $V_{CC} = Min$.	$V_{IN} = GND$			±100	μA
Івнн	Bus Hold	Bus Hold Input $^{(4)}$, VCC = Min.	$V_{IN} = 2.0V$	-50			μA
IBHL	Sustain Current		$V_{IN} = 0.8V$	+50			
Іохн	High Impedance	$V_{CC} = Max.$	Vout = Vcc			1	μA
Iozl	Output Current	$V_{CC} = Max.$	Vout = GND			-1	μA
Vik	Clamp Diode Voltage	$V_{CC} = Min.$, $I_{IN} = -18 \text{ mA}$			-0.7	-1.2	V
Io	Output Drive Current	$V_{CC} = Max.^{(3)}, V_{OUT} = 2.5V$		-50		-180	mA
VH	Input Hysteresis				100		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 = 5.0V, $+25^{\circ}C$ 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. Pins with Bus Hold are identified in the pin description.
- 5. This specification does not apply to bi-directional functionalities with Bus Hold.

Output Drive Characteristics (Over the Operating Range)

Parameters	Description	Test Conditions ⁽¹⁾	Min.	$\mathbf{Typ}^{(2)}$	Max.	Units
Iodl	Output LOW Current	$V_{CC} = 5V$, $V_{IN} = V_{IH}$ or V_{IL} , $V_{OUT} = 1.5V^{(3)}$	36	_		mA
Іорн	Output HIGH Current	$V_{CC} = 5V$, $V_{IN} = V_{IH}$ or V_{IL} , $V_{OUT} = 1.5V^{(3)}$	-100	-166	-200	mA

Output Drive Characteristics (Over the Operating Range)

Parameters	Description	Test Conditions	Min.	$Typ^{(2)}$	Max.	Units	
Vон	Output HIGH Voltage	VCC = Min., VIN = VIH or VIL	2.4	3.3	_	V	
Vol	Output LOW Voltage	VCC = Min., VIN = VIH or VIL	IoL = 12 mA	_	0.4	0.55	V

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

Parameters ⁽⁴⁾	Description	Test Conditions	Тур	Max.	Units
Cin	Input Capacitance	$V_{IN} = 0V$	4.5	6	pF
Соит	Output Capacitance	$V_{OUT} = 0V$	5.5	8	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 Vcc = 5.0V, +25°C ambient and maximum loading.
- 3. Not more than one output should be tested 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 Quiescent Power Supply Current	Test Conditi	$\mathbf{ons}^{(1)}$	Min.	Typ ⁽²⁾	Max.	Units	
Icc		Vcc = Max.	V _{IN} = GND or V _{CC}		0.1	500	μΑ	
ΔΙcc	Supply Current per Input @ TTL HIGH	Vcc = Max.	$V_{IN} = 3.4V^{(3)}$		0.5	1.5	mA	
Іссь	Supply Current per Input per MHz ⁽⁴⁾	Vcc = Max., Outputs Open xOE = xDIR = GND One Bit Toggling 50% Duty Cycle	Vin = Vcc Vin = GND		60	100	μA/ MHz	
Ic	Total Power Supply Current ⁽⁶⁾	$Vcc = Max.,$ Outputs Open $fi = 10 \text{ MHz}$ $50\% \text{ Duty Cycle}$ $x\overline{OE} = xDIR = GND$	Vin = Vcc Vin = GND		0.6	1.5 ⁽⁵⁾	mA	
		One Bit Toggling	Vin = 3.4V Vin = GND		0.9	2.3 ⁽⁵⁾		
		$Vcc = Max.,$ Outputs Open $fi = 2.5 \text{ MHz}$ $50\% \text{ Duty Cycle}$ $x\overrightarrow{OE} = xDIR = GND$	Vin = Vcc Vin = GND		2.4	4.5 ⁽⁵⁾		
		16 Bits Toggling	Vin = 3.4V Vin = GND		6.4	16.5 ⁽⁵⁾		

Notes:

- 1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device.
- 2. Typical values are at Vcc = 5.0V, $+25^{\circ}C$ ambient.
- 3. Per TTL driven input ($V_{IN} = 3.4V$); 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 =Iquiescent + Inputs + Idynamic
 - $IC = ICC + \Delta ICC DHNT + ICCD (fCP/2 + fiNi)$
 - Icc = Quiescent Current
 - Δ Icc = Power Supply Current for a TTL High Input (VIN = 3.4V)
 - DH = Duty Cycle for TTL Inputs High
 - $N_T = Number of TTL Inputs at DH$
 - ICCD = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)
 - fcp = Clock Frequency for Register Devices (Zero for Non-Register Devices)
 - fi = Input Frequency
 - $N_I = Number of Inputs at fi$
 - All currents are in milliamps and all frequencies are in megahertz.

PI74FCT162Q245T LOW NOISE 16-BIT BIDIRECTIONAL TRANSCEIVERS

Switching Characteristics over Operating Range

			162Q245T		162Q245AT		162Q245CT		162Q245DT		162Q245ET		
			Co	Com.		Com.		Com.		Com.		Com	
Parameters	Description	Conditions ⁽¹⁾	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Unit
tplh	Propagation Delay	$C_L = 50 \text{ pF}$	1.5	7.0	1.5	4.6	1.5	4.1	1.5	3.8	1.5	3.2	ns
t PHL	A to B, B to A	$R_L = 500\Omega$											
t PZH	Output Enable Time		1.5	9.5	1.5	6.2	1.5	5.8	1.5	5.0	1.5	4.4	ns
t PZL	xOE to A or B												
t PHZ	Output Disable Time(3)		1.5	7.5	1.5	5.0	1.5	4.8	1.5	4.3	1.5	4.0	ns
tplz	xOE to A or B												
tpzh	Output Enable Time		1.5	9.5	1.5	6.2	1.5	5.8	1.5	5.0	1.5	4.8	ns
t PZL	xDIR to A or B(3)												
t PHZ	Output Disable Time		1.5	7.5	1.5	5.0	1.5	4.8	1.5	4.3	1.5	4.0	ns
tplz	xDIR to A or B ⁽³⁾												
tsk(o)	Output Skew ⁽⁴⁾		_	0.5	_	0.5	_	0.5	_	0.5	_	0.5	ns

Notes:

- 1. See test circuit and waveforms.
- 2. Minimum limits are guaranteed but not tested on Propagation Delays.
- This parameter is guaranteed but not production tested.
- 4. Skew between any two outputs, of the same package, switching in the same direction. This parameter is guaranteed by design.