



PI74FCT16260T PI74FCT162260T

Fast CMOS 12-Bit Tri-Port Bus Exchanger

Product Features

Common Features

- PI74FCT16260 and PI74FCT162260 are high-speed, low power devices with high current drive.
- $V_{CC} = 5V \pm 10\%$
- Typical tsk (o) (Output Skew) < 250ps, clocked mode
- Extended range of $-40^{\circ}C$ to $+85^{\circ}C$
- Hysteresis on all inputs

PI74FCT16260T Features

- High output drive: $I_{OH} = -32mA$; $I_{OL} = 64mA$
- Power off disable outputs permit “live insertion”
- Typical V_{OLP} (Output Ground Bounce) < 1.0V at $V_{CC} = 5V$, $T_A = 25^{\circ}C$

PI74FCT162260T Features

- Balanced output drive: $I_{OL}/I_{OH} = 24mA$
- Typical V_{OLP} (Output Ground Bounce) < 0.6V at $V_{CC} = 5V$, $T_A = 25^{\circ}C$
- Series current limiting resistors
- Packages available:
 - 56-pin 240 mil wide TSSOP (A56)
 - 56-pin 300 mil wide SSOP (V56)

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 FCT16260AT/CT and the FCT162260AT/CT Tri-Port Bus Exchangers are high-speed 12-bit latched bus multiplexers/ transceivers for use in high speed microprocessor applications. These Bus Exchangers support memory interleaving with latched outputs on the B-ports and address multiplexing with latched inputs on the B-ports.

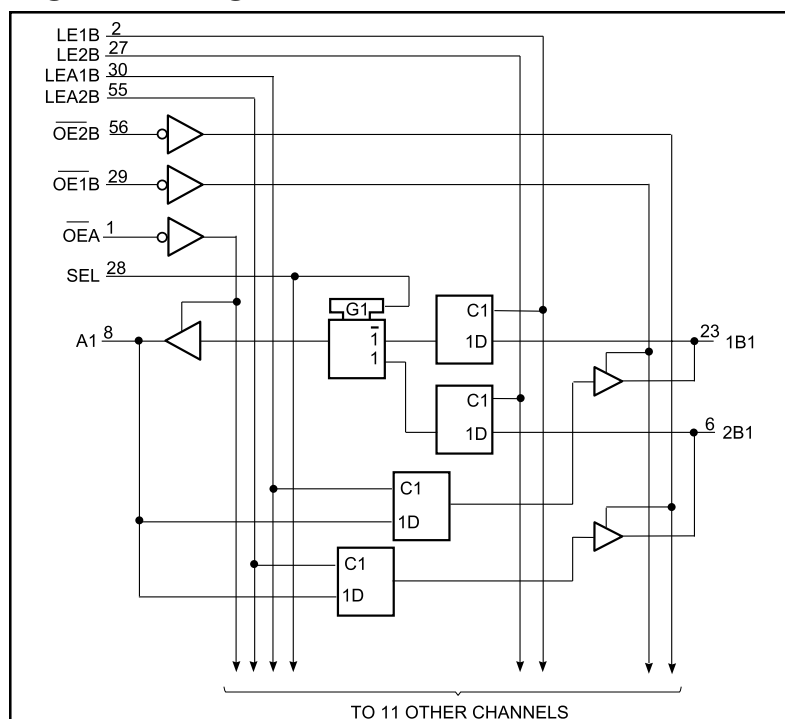
The Tri-port Bus Exchanger has three 12-bit ports. Data may be transferred between the A-port and either/both of the B-ports.

The latch enable (LE1B, LE2B, LEA1B and LEA2B) inputs control data storage. When a latch-enable input is HIGH, the latch is transparent. When the latch enable input is LOW, the data at the input is latched and remains latched until the latch enable input is returned HIGH. Independent output enables ($\overline{OE1B}$ and $\overline{OE2B}$ allow reading from one port while writing to the other port.

The FCT16260AT/CT are ideally suited for driving high capacitance loads and low impedance backplanes. The output buffers are designed with power off disable capability to allow “live insertion” of boards when used as backplane drivers.

The FCT162260AT/CT have balanced output drive with current limiting resistors. This offers low ground bounce, minimal undershoot, and controlled output fall times reducing the need for external series terminating resistors.

Logic Block Diagram



Product Pin Description

Pin Name	Description
$\overline{OE2B}$	2B Output Enable (Active LOW)
$\overline{OE1B}$	1B Output Enable (Active LOW)
LE1B	Latch Enable, A-1B
LE2B	Latch Enable, A21B
LEA1B	Latch Enable Input for 1B-A Latch
LEA2B	Latch Enable Input for 2B-A Latch
$\overline{OE A}$	Output Enable for A (Active LOW)
SEL	1B or 2B Path Selection
A1	A-to-B Data Inputs for B-to-A 3 State Outputs
1B1	Bidirectional Data Port 1B
2B1	Bidirectional Data Port 2B
GND	Ground
VCC	Power

Product Pin Configuration

$\overline{OE A}$	1	56	$\overline{OE2B}$
LE1B	2	55	LEA2B
2B3	3	54	2B4
GND	4	53	GND
2B2	5	52	2B5
2B1	6	51	2B6
VCC	7	50	VCC
A1	8	49	2B7
A2	9	48	2B8
A3	10	47	2B9
GND	11	46	GND
A4	12	45	2B10
A5	13	44	2B11
A6	14	43	2B12
A7	15	42	1B12
A8	16	41	1B11
A9	17	40	1B10
GND	18	39	GND
A10	19	38	1B9
A11	20	37	1B8
A12	21	36	1B7
VCC	22	35	VCC
1B1	23	34	1B6
1B2	24	33	1B5
GND	25	32	GND
1B3	26	31	1B4
LE2B	27	30	LEA1B
SEL	28	29	$\overline{OE1B}$

Truth Table⁽¹⁾ A to B ($\overline{OE A} = H$)

INPUTS					OUTPUTS	
A	LEA1B	LEA2B	$\overline{OE1B}$	$\overline{OE2B}$	1B	2B
H	H	H	L	L	H	H
L	H	H	L	L	L	L
H	H	L	L	L	H	2B0 ⁽²⁾
L	H	L	L	L	L	2B0 ⁽²⁾
H	L	H	L	L	1B0 ⁽²⁾	H
L	L	H	L	L	1B0 ⁽²⁾	L
X	L	L	L	L	1B0 ⁽²⁾	2B0 ⁽²⁾
X	X	X	H	H	Z	Z
X	X	X	L	H	Active	Z
X	X	X	H	L	Z	Active
X	X	X	L	L	Active	Active

Notes:

1. H = High Signal Level
L = Low Signal Level
X = Irrelevant
Z = High Impedance
2. Output level before the indicated steady-state input conditions were established.

Truth Table⁽¹⁾ B to A ($\overline{OE B} = H$)

Inputs						Output A
1B	2B	SEL	LE1B	LE2B	$\overline{OE A}$	
H	X	H	H	X	L	H
L	X	H	H	X	L	L
X	X	H	L	X	L	A ⁽²⁾
X	H	L	X	H	L	H
X	L	L	X	H	L	L
X	X	L	X	L	L	A ⁽²⁾
X	X	X	X	X	H	Z

Fast CMOS 12-Bit Tri-Port Bus Exchanger
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
Input Voltage Range, V_{IN}	-0.5V to $V_{CC} + 0.5V$
Output Voltage Range, V_{OUT}	-0.5V to $V_{CC} + 0.5V$
DC Input Voltage	-0.5V to +5.0V
DC Output Current	100 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, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 5.0V \pm 10\%$)

Parameters	Description		Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Units
V _{IH}	Input High Voltage		Guaranteed Logic HIGH Level		2.0			V
V _{IL}	Input LOW Voltage		Guaranteed Logic LOW Level				0.8	
I _{IH}	Input HIGH Current	(Input pins)	V _{CC} = Max.	V _{IN} = V _{CC}			-1	mA
		(I/O pins)					-1	
I _{IL}	Input LOW Current	(Input pins)	V _{CC} = Max.	V _{IN} = Max.			-1	
		(I/O pins)					-1	
I _{OZH}	High Impedance Output Current		V _{CC} = Max.	V _{OUT} = 2.7V			-1	
I _{OZL}				V _{OUT} = 0.5V			-1	
V _{IK}	Clamp Diode Voltage		V _{CC} = Min., I _{IN} = -18mA			-0.7	-1.2	V
I _{OS}	Short Circuit Current (I/O pins)		V _{CC} = Max. ⁽³⁾ , V _{OUT} = GND		-80	-140	-250	mA
V _H	Input Hysteresis					100		mV

PI74FCT16260T Output Drive Characteristics (Over the Operating Range)

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Units
I_O	Output Drive Current (I/O pins)	$V_{CC} = \text{Max.}^{(3)}, V_{OUT} = 2.5V$		-50		-180	mA
V_{OH}	Output High Voltage	$V_{CC} = \text{Min.}, V_{IN} = V_{IH} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -3.0\text{mA}$	2.5	3.5		V
			$I_{OH} = -15.0\text{mA}$	2.4	3.5		
			$I_{OH} = -32.0\text{mA}$	2.0	3.0		
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}, V_{IN} = V_{IH} = V_{IH} \text{ or } V_{IL}$				0.2	0.55
I_{OFF}	Input /Output Power OFF Leakage	$V_{CC} = 0V, V_{IN} \text{ or } V_{OUT} \leq 4.5V$				± 1	mA

PI74FCT162260T Output Drive Characteristics (Over the Operating Range)

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Units
V_{OH}	Output High Voltage	$V_{CC} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -24.0\text{mA}$	2.4	3.3		V
V_{OL}	Output LOW Voltage		$I_{OL} = 24.0\text{mA}$		0.3	0.55	
I_{ODL}	Output LOW Current	$V_{CC} = 5V, V_{IN} = V_{IH} \text{ or } V_{IL}, V_{OUT} = 1.5V^{(3)}$		60	115	200	mA
I_{ODH}	Output HIGH Current	$V_{CC} = 5V, V_{IN} = V_{IH} \text{ or } V_{IL}, V_{OUT} = 1.5V^{(3)}$		-60	-115	-200	

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.

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Units
ICCL, ICCH, ICCZ	Quiescent Power Supply Current	VCC = Max.	VIN = GND or VCC		5	500	μA
DICC	Supply Current per Input @ TTL HIGH	VCC = Max.	VIN = 3.4V ⁽³⁾		0.5	1.5	mA
ICCD	Supply Current per Input per MHz ⁽⁴⁾	VCC = Max. Outputs Open One Output Port Enabled LExx = VCC One Input Bit Toggling One Output Bit Toggling 50% Duty Cycle	VIN = VCC VIN = GND		60	100	μA/ MHz
IC	Total Power Supply Current ⁽⁶⁾	VCC = Max., Outputs Open f _I = 10MHz 50% Duty Cycle One Output Port Enabled LExx = VCC One Input Bit Toggling One Output Bit Toggling	VIN = VCC VIN = GND		0.6	1.5	mA
			VIN = 3.4V VIN = GND		0.9	2.3	
		VCC = Max., Outputs Open f _I = 2.5MHz 50% Duty Cycle One Output Port Enabled LExx = VCC Twelve Input Bit Toggling Twelve Output Bit Toggling	VIN = VCC VIN = GND		1.8	3.5 ⁽⁵⁾	
			VIN = 3.4V VIN = GND		4.8	12.5 ⁽⁵⁾	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at Vcc = 5.0V, +25°C ambient.
- Per TTL driven input (VIN = 3.4V); all other inputs at Vcc 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 Icc formula. These limits are guaranteed but not tested.
- IC = IQUIESCENT + IINPUTS + IDYNAMIC
 IC = ICC + ΔICC DHNT + ICCD (fCP/2 + FINI)
 ICC = Quiescent Current
 ΔICC = Power Supply Current for a TTL High Input (VIN = 3.4V)
 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)
 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 (Propagation Delays)

Parameters	Description	Conditions ⁽¹⁾	16260AT/162260AT		16260CT/162260CT		16260ET/162260ET		Units
			Com.		Com.		Com.		
			Min. ⁽²⁾	Max. ⁽²⁾	Min. ⁽²⁾	Max. ⁽²⁾	Min. ⁽²⁾	Max. ⁽²⁾	
t _{PLH} t _{PHL}	Propagation Delay Ax to 1Bx or Ax to 2Bx	C _L = 50 pF R _L = 500Ω	1.5	5.2	1.5	4.7	1.5	3.6	ns
t _{PLH} t _{PHL}	Propagation Delay 1Bx to Ax or 2Bx to Ax		1.5	5.6	1.5	5.0	1.5	3.6	
t _{PLH} t _{PHL}	Propagation Delay LExB to Ax		1.5	5.2	1.5	4.7	1.5	4.0	
t _{PLH} t _{PHL}	Propagation Delay LEA1B to Bx or LEA2B to 2Bx		1.5	4.7	1.5	4.4	1.5	4.0	
t _{PLH} t _{PHL}	Propagation Delay SEL to Ax		1.5	5.2	1.5	4.7	1.5	4.0	
t _{PZH} t _{PZL}	Output Enable Time OEA to Ax, OE1B to 1Bx, or OE2B to 2Bx		1.5	5.7	1.5	5.1	1.5	4.4	
t _{PHZ} t _{PLZ}	Output Disable Time OEA to Ax, OE1B to 1Bx, or OE2B to 2Bx		1.5	4.4	1.5	4.0	1.5	4.0	
t _{SU}	Setup Time, HIGH or LOW Data to Latch		1.5		1.0		1.0		
t _H	Hold Time, Latch to Data		1.0		1.0		1.0		
t _W	Pulse Width, Latch HIGH ⁽⁴⁾		3.0		3.0		3.0		
t _{SK} ⁽⁰⁾	Output Skew ⁽³⁾			0.5		0.5		0.5	

Notes:

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

Capacitance (T_A = 25°C, f = MHz)

Parameters	Description	Test Conditions	Typ.	Max.	Units
C _{IN}	Input Capacitance	V _{IN} = 0V	3.5	6.0	pF
C _{I/O}	I/O Capacitance	V _{OUT} = 0V	3.5	8.0	

Note:

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