

## Fast CMOS Quad 2-Input Multiplexer

### Product Features:

- PI74FCT157/257/2157/2257T is 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 (25Ω series only)
- Extremely low static power
- Hysteresis on all inputs
- Industrial operating temperature range: -40°C to +85°C
- Packages available:
  - 16-pin 150 mil wide plastic QSOP (Q16)
  - 16-pin 300 mil wide plastic SOIC (S16)
  - 16-pin 150 mil wide plastic SOIC (W16)

### Product Description:

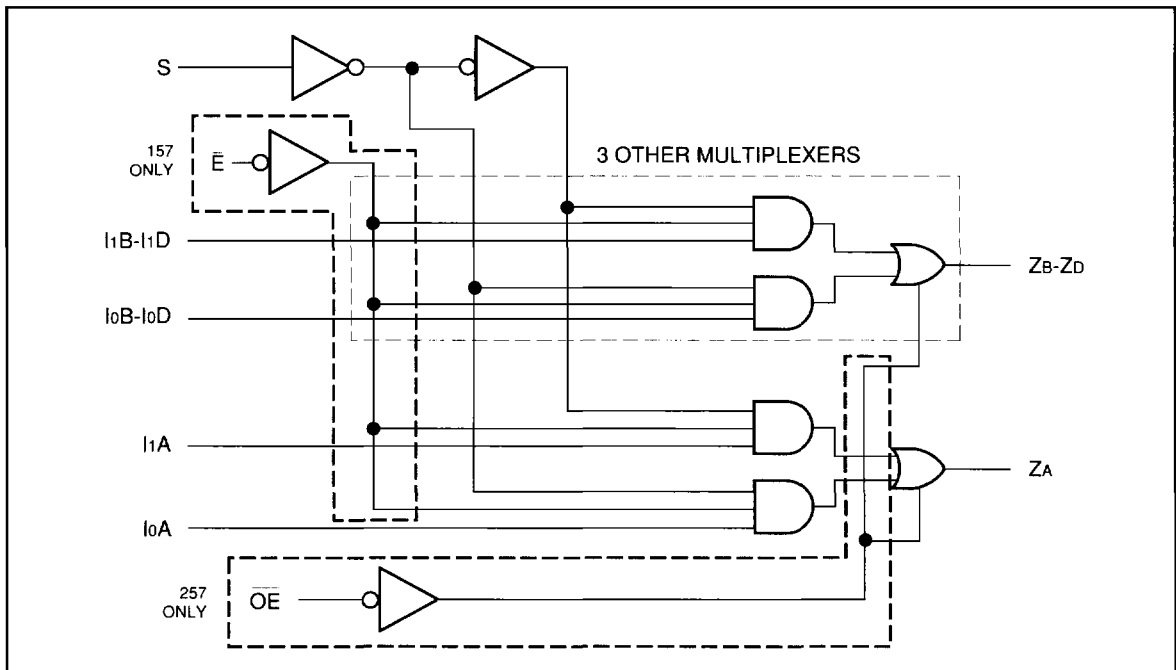
Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.8 micron CMOS technology, achieving industry leading speed grades. All PI74FCT2XXX devices have a built-in 25-ohm series resistor on all outputs to reduce noise because of reflections, thus eliminating the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

The PI74FCT157T/257T and PI74FCT2157T/2257T are high-speed quad 2-input multiplexers. The common select input can be used to select four bits of data from two sources. The four buffered outputs present the selected data in the true (non-inverting) form.

The PI74FCT157T/2157T has a common, active-LOW, Enable input ( $\bar{E}$ ). When  $\bar{E}$  is inactive, all four outputs are held LOW. The PI74FCT157T/2157T can generate any four of the 16 different functions of two variables with one common variable. The PI74FCT157T/2157T can be used as a function generator or to move data from two different groups of registers to a common bus.

The PI74FCT257/2257T has a common Output Enable ( $\overline{OE}$ ) input. When  $\overline{OE}$  is HIGH, all outputs are switched to a high-impedance state allowing the outputs to interface directly with bus-oriented systems.

### Logic Block Diagram



### Product Pin Description

Pin Name	Description
I0A-I0D	Source 0 Data Inputs
I1A-I1D	Source 1 Data Inputs
$\bar{E}$	Enable Input (Active LOW) FCT157/2157
$\bar{OE}$	Output Enable (Active LOW) FCT257/2257
S	Select Input
ZA-ZD	Outputs
GND	Ground
Vcc	Power

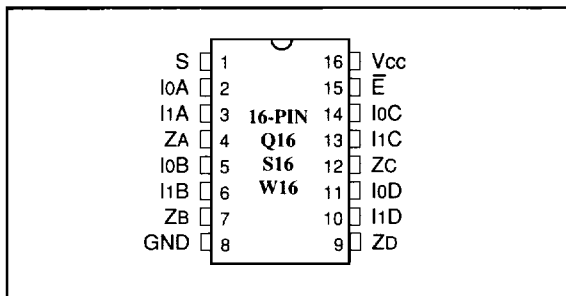
### Truth Table<sup>(1)</sup>

Inputs				Outputs Z <sub>N</sub>	
E/OE	S	I <sub>0</sub>	I <sub>1</sub>	157/2157	257/2257
H	X	X	X	L	Z
L	H	X	L	L	L
L	H	X	H	H	H
L	L	L	X	L	L
L	L	H	X	H	H

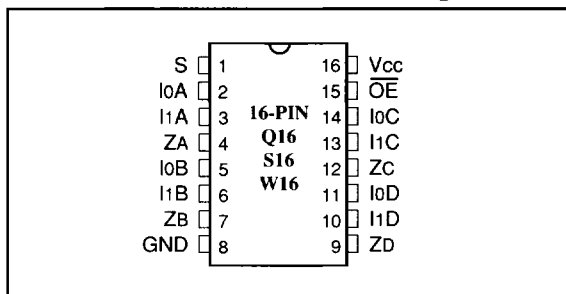
NOTE:

- H = High Voltage Level  
X = Don't Care  
L = Low Voltage Level  
Z = High Impedance

### PI74FCT157/2157T Product Pin Configuration



### PI74FCT257/2257T 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
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, TA = -40°C to +85°C, VCC = 5.0V ± 5%)

Parameters	Description	Test Conditions <sup>(1)</sup>		Min.	Typ <sup>(2)</sup>	Max.	Units
VOH	Output HIGH Voltage	VCC = Min., VIN = VIH or VIL	IOH = -15.0 mA	2.4	3.0		V
VOL	Output LOW Current	VCC = Min., VIN = VIH or VIL	IOL = 48 mA		0.3	0.50	V
VOL	Output LOW Current	VCC = Min., VIN = VIH or VIL	IOL = 12 mA (25Ω Series)		0.3	0.50	V
VIH	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0			V
VIL	Input LOW Voltage	Guaranteed Logic LOW Level				0.8	V
IiH	Input HIGH Current	VCC = Max.	VIN = VCC			1	μA
IiL	Input LOW Current	VCC = Max.	VIN = GND			-1	μA
IOZH	High Impedance	VCC = Max.	VOUT = 2.7V			1	μA
IOZL	Output Current		VOUT = 0.5V			-1	μA
VIK	Clamp Diode Voltage	VCC = Min., IIN = -18 mA			-0.7	-1.2	V
IOFF	Power Down Disable	VCC = GND, VOUT = 4.5V		—	—	100	μA
Ios	Short Circuit Current	VCC = Max. <sup>(3)</sup> , VOUT = GND		-60	-120		mA
VH	Input Hysteresis				200		mV

### Capacitance (TA = 25°C, f = 1 MHz)

Parameters <sup>(4)</sup>	Description	Test Conditions	Typ	Max.	Units
CIN	Input Capacitance	VIN = 0V	6	10	pF
COUT	Output Capacitance	VOUT = 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 VCC = 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., Outputs Open $\bar{E}$ or $\bar{OE}$ = GND One Bit 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 $\bar{E}$ or $\bar{OE}$ = 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 $\bar{E}$ or $\bar{OE}$ = GND Four Bits Toggling	V <sub>IN</sub> = V <sub>CC</sub> V <sub>IN</sub> = GND		1.5	3.5 <sup>(5)</sup>	
			V <sub>IN</sub> = 3.4V V <sub>IN</sub> = GND		2.5	7.5 <sup>(5)</sup>	

**Notes:**

- For conditions shown as Max. or Min., 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.

**PI74FCT157/2157T Switching Characteristics over Operating Range**

Parameters	Description	Conditions <sup>(1)</sup>	157T/2157T		157AT/2157AT		157CT/2157CT		157DT		Unit
			Com.		Com.		Com.		Com.		
			Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	1.5	6.0	1.5	5.0	1.5	4.3	1.5	3.9	ns
t <sub>PHL</sub>	I <sub>N</sub> to Z <sub>N</sub>										
t <sub>PLH</sub>	Propagation Delay		1.5	10.5	1.5	6.0	1.5	4.8	1.5	4.4	
t <sub>PHL</sub>	Ē to Z <sub>N</sub>										
t <sub>PLH</sub>	Propagation Delay		1.5	10.5	1.5	7.0	1.5	5.2	1.5	4.6	ns
t <sub>PHL</sub>	S to Z <sub>N</sub>										

**PI74FCT257/2257T Switching Characteristics over Operating Range**

Parameters	Description	Conditions <sup>(1)</sup>	257T/2257T		257AT/2257AT		257CT/2257CT		Unit
			Com.		Com.		Com.		
			Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω	1.5	6.0	1.5	5.0	1.5	4.3	ns
t <sub>PHL</sub>	I <sub>N</sub> to Z <sub>N</sub>								
t <sub>PLH</sub>	Propagation Delay		1.5	10.5	1.5	7.0	1.5	5.2	
t <sub>PHL</sub>	S to Z <sub>N</sub>								
t <sub>PZH</sub>	Output Enable Time		1.5	8.5	1.5	7.0	1.5	6.0	ns
t <sub>PZL</sub>	O <sub>E</sub> to Z <sub>N</sub>								
t <sub>PZH</sub>	Output Disable Time <sup>(3)</sup>		1.5	6.0	1.5	5.5	1.5	5.0	ns
t <sub>PZL</sub>	O <sub>E</sub> to Z <sub>N</sub>								

**Notes:**

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