PERICOM

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 (Q)
  – 16-pin 300 mil wide plastic SOIC (S)
  – 16-pin 150 mil wide plastic SOIC (W)

Product Description:
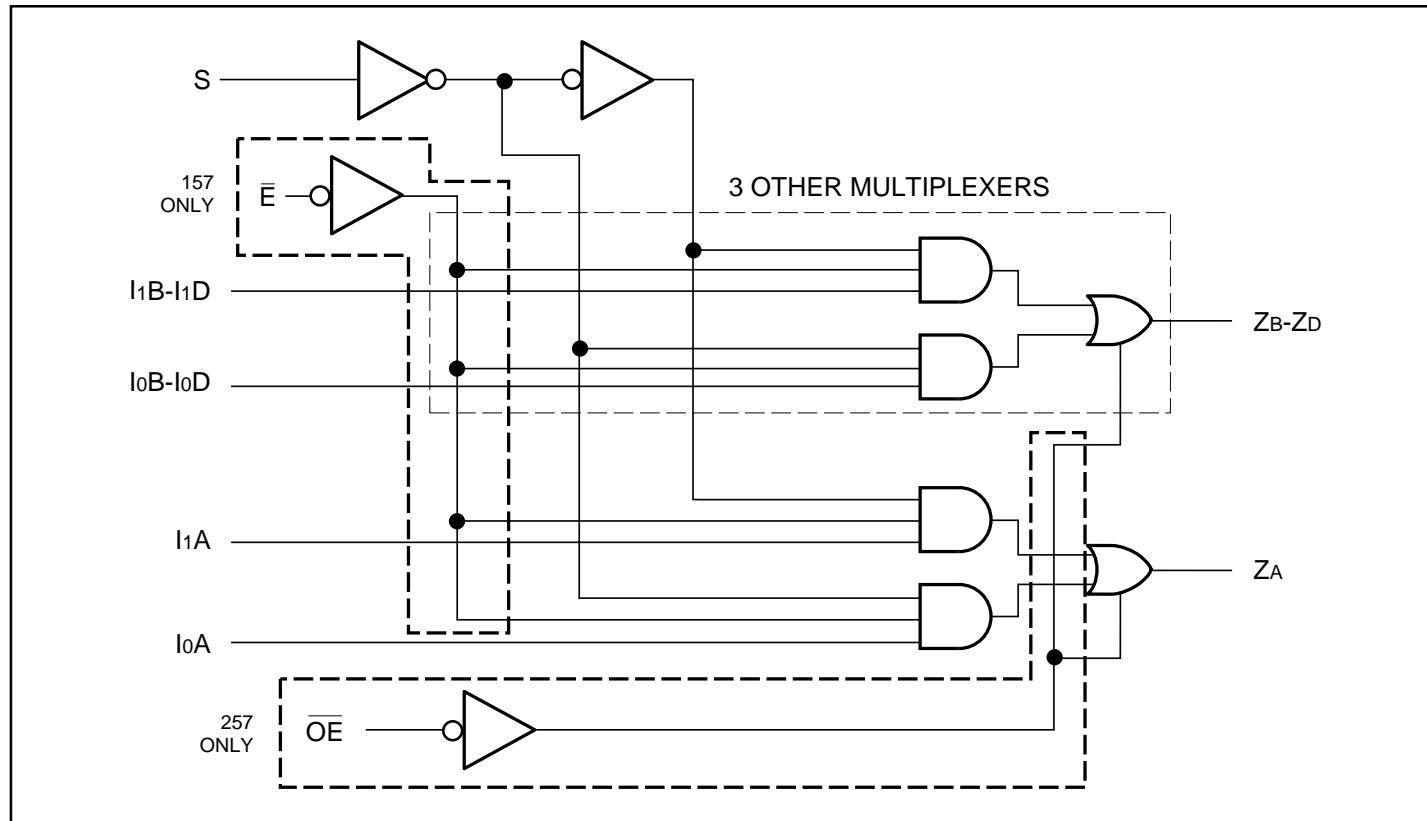
Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.8 micron CMOS technology, achieving industry leading speed grades. All PI74FCT2XXX devices have a built-in 25-ohm series resistor on all outputs to reduce noise because of reflections, thus eliminating the 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 ($\overline{E}$). When $\overline{E}$ is inactive, all four outputs are held LOW. The PI74FCT157T/2157T can generate any four of the 16 different funtions 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

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Product Pin Description

Pin Name	Description
I_0A-I_0D	Source 0 Data Inputs
I_1A-I_1D	Source 1 Data Inputs
$\overline{E}$	Enable Input (Active LOW) FCT157/2157
$\overline{OE}$	Output Enable (Active LOW) FCT257/2257
S	Select Input
Z_A-Z_D	Outputs
GND	Ground
V_{CC}	Power
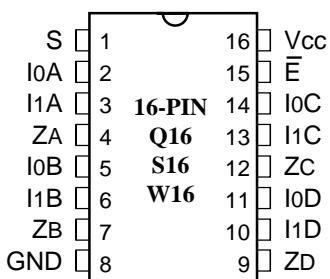
Truth Table[1]

| Inputs				Outputs Z_N	
$\overline{E}/\overline{OE}$	S	I_0	I_1	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
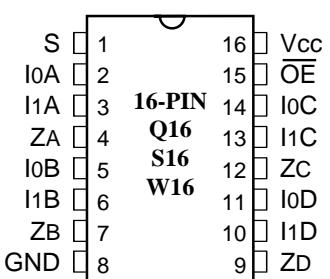
NOTE:
1. H = High Voltage Level
   X = Don't Care
   L = Low Voltage Level
   Z = High Impedance

PI74FCT157/2157T Product Pin Configuration

```
        ┌───┐ ∪ ┌───┐
  S  ──┤ 1      16 ├── Vcc
 I0A ──┤ 2      15 ├── E̅
 I1A ──┤ 3  16-PIN 14 ├── I0C
 ZA  ──┤ 4   Q16  13 ├── I1C
 I0B ──┤ 5   S16  12 ├── ZC
 I1B ──┤ 6   W16  11 ├── I0D
 ZB  ──┤ 7      10 ├── I1D
 GND ──┤ 8       9 ├── ZD
        └───────────┘
```

PI74FCT257/2257T Product Pin Configuration

```
        ┌───┐ ∪ ┌───┐
  S  ──┤ 1      16 ├── Vcc
 I0A ──┤ 2      15 ├── O̅E̅
 I1A ──┤ 3  16-PIN 14 ├── I0C
 ZA  ──┤ 4   Q16  13 ├── I1C
 I0B ──┤ 5   S16  12 ├── ZC
 I1B ──┤ 6   W16  11 ├── I0D
 ZB  ──┤ 7      10 ├── I1D
 GND ──┤ 8       9 ├── ZD
        └───────────┘
```

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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, $T_A = -40°C$ to $+85°C$, $V_{CC} = 5.0V \pm 5\%$)

Parameters	Description	Test Conditions[1]		Min.	Typ[2]	Max.	Units
V_{OH}	Output HIGH Voltage	V_{CC} = Min., $V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -15.0$ mA	2.4	3.0		V
V_{OL}	Output LOW Current	V_{CC} = Min., $V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 48$ mA		0.3	0.50	V
V_{OL}	Output LOW Current	V_{CC} = Min., $V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 12$ mA (25Ω Series)		0.3	0.50	V
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0			V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level				0.8	V
I_{IH}	Input HIGH Current	V_{CC} = Max.	$V_{IN} = V_{CC}$			1	µA
I_{IL}	Input LOW Current	V_{CC} = Max.	$V_{IN} = GND$			–1	µA
I_{OZH}	High Impedance	V_{CC} = Max.	$V_{OUT} = 2.7V$			1	µA
I_{OZL}	Output Current		$V_{OUT} = 0.5V$			–1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., $I_{IN} = -18$ mA			–0.7	–1.2	V
I_{OFF}	Power Down Disable	$V_{CC} = GND$, $V_{OUT} = 4.5V$		—	—	100	µA
I_{OS}	Short Circuit Current	V_{CC} = Max.[3], $V_{OUT} = GND$		–60	–120		mA
V_H	Input Hysteresis				200		mV

Capacitance $(T_A = 25°C, f = 1 \text{ MHz})$

Parameters[4]	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0V$	6	10	pF
C_{OUT}	Output Capacitance	$V_{OUT} = 0V$	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.

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Power Supply Characteristics

Parameters	Description	Test Conditions[1]		Min.	Typ[2]	Max.	Units
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max.	V_{IN} = GND or V_{CC}		0.1	500	µA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	V_{CC} = Max.	V_{IN} = 3.4V[3]		0.5	2.5	mA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max., Outputs Open $\overline{E}$ or $\overline{OE}$ = GND One Bit Toggling 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND		0.15	0.25	mA/ MHz
I_C	Total Power Supply Current[6]	V_{CC} = Max., Outputs Open f_I = 10 MHz 50% Duty Cycle $\overline{E}$ or $\overline{OE}$ = GND One Bit Toggling	V_{IN} = V_{CC} V_{IN} = GND		1.5	3.5[5]	mA
			V_{IN} = 3.4V V_{IN} = GND		1.8	4.5[5]	
		V_{CC} = Max., Outputs Open f_I = 2.5 MHz 50% Duty Cycle $\overline{E}$ or $\overline{OE}$ = GND Four Bits Toggling	V_{IN} = V_{CC} V_{IN} = GND		1.5	3.5[5]	
			V_{IN} = 3.4V V_{IN} = GND		2.5	7.5[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 V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V); all other inputs at V_{CC} 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 I_{CC} formula. These limits are guaranteed but not tested.
6. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$

   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_I N_I)$

   I_{CC} = Quiescent Current

   ΔI_{CC} = Power Supply Current for a TTL High Input (V_{IN} = 3.4V)

   D_H = Duty Cycle for TTL Inputs High

   N_T = Number of TTL Inputs at D_H

   I_{CCD} = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)

   f_{CP} = Clock Frequency for Register Devices (Zero for Non-Register Devices)

   f_I = Input Frequency

   N_I = Number of Inputs at f_I

   All currents are in milliamps and all frequencies are in megahertz.

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PI74FCT157/2157T Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	157T/2157T Com.		157AT/2157AT Com.		157CT/2157CT Com.		157DT Com.		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay I_N to Z_N	$C_L = 50$ pF $R_L = 500\Omega$	1.5	6.0	1.5	5.0	1.5	4.3	1.5	3.9	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}$ to Z_N		1.5	10.5	1.5	6.0	1.5	4.8	1.5	4.4	ns
t_{PLH} t_{PHL}	Propagation Delay S to Z_N		1.5	10.5	1.5	7.0	1.5	5.2	1.5	4.6	ns

PI74FCT257/2257T Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	257T/2257T Com.		257AT/2257AT Com.		257CT/2257CT Com.		Unit
			Min	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay I_N to Z_N	$C_L = 50$ pF $R_L = 500\Omega$	1.5	6.0	1.5	5.0	1.5	4.3	ns
t_{PLH} t_{PHL}	Propagation Delay S to Z_N		1.5	10.5	1.5	7.0	1.5	5.2	ns
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to Z_N		1.5	8.5	1.5	7.0	1.5	6.0	ns
t_{PZH} t_{PZL}	Output Disable Time[3] $\overline{OE}$ to Z_N		1.5	6.0	1.5	5.5	1.5	5.0	ns

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.

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