High-Speed CMOS Dual 4-Input Multiplexer

Product Features:

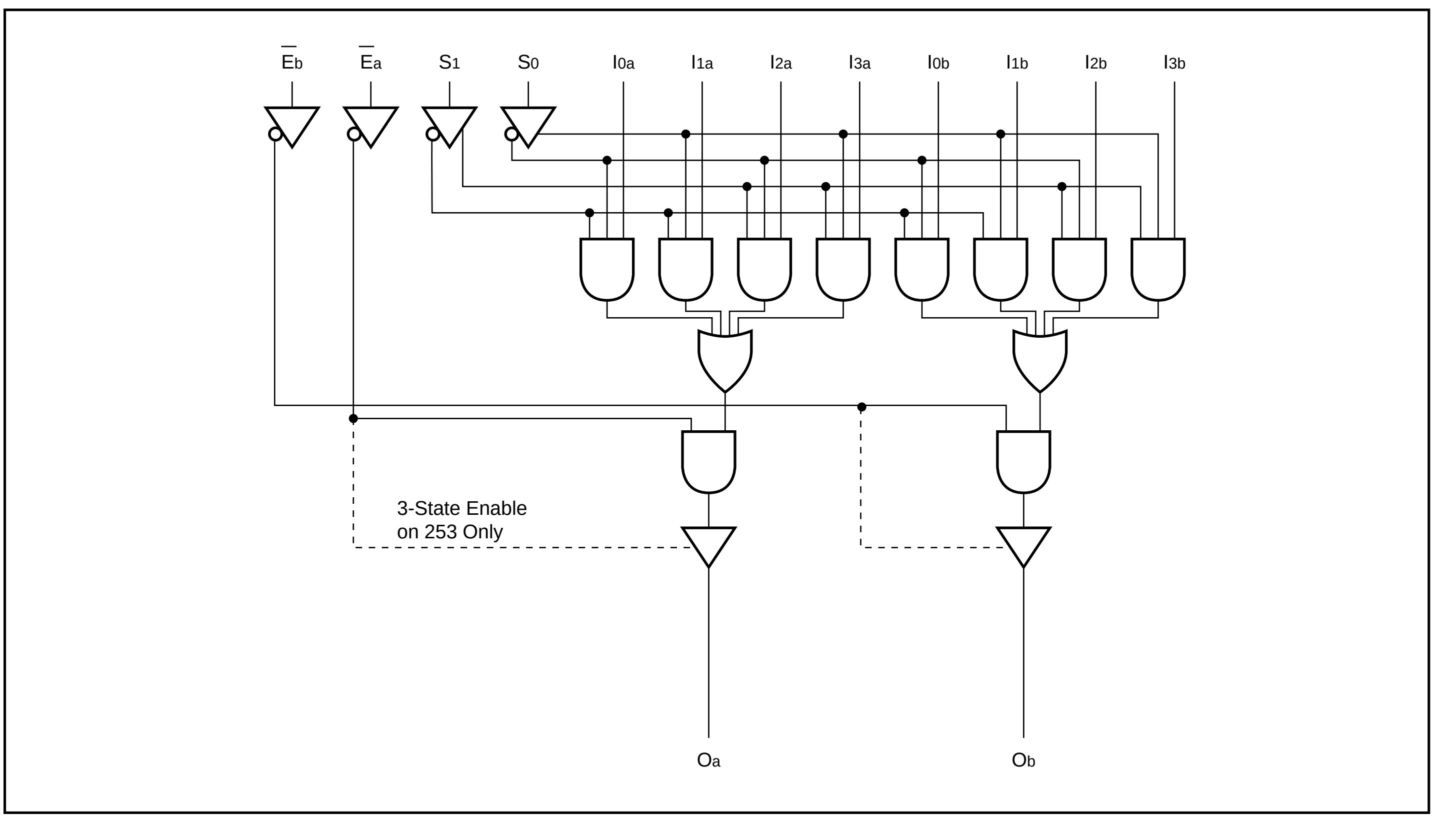
- PI74FCT153T/253T/2153T/2253T is pin compatible with bipolar FAST™ Series at a higher speed and lower power consumption
- 25Ω series resistor on all outputs (FCT2XXX only)
- TTL input and output levels
- Low ground bounce outputs (25Ω series only)
- Extremely low static power
- Hysteresis on all inputs
- 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 resulting from reflections, thus eliminating the need for an external terminating resistor.

The PI74FCT153T/253T and PI74FCT2153T/2253T are high-speed dual 4-input multiplexers. The PI74FCT153T/2153T has TTL outputs, while the PI74FCT253T/2253T has 3-state outputs. The output buffers are designed with a power-off disable allowing "live insertion" of boards when used as backplane drivers.

Logic Block Diagram



Product Pin Description

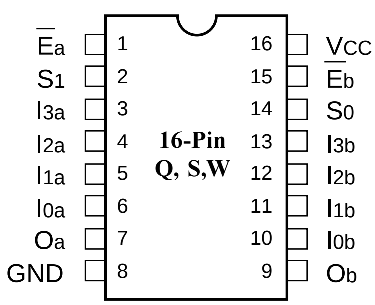
Pin Name	Description
I_{0a}-I_{3a}, I_{0b}-I_{3b}	Data Inputs
S_0, S_1	Select Inputs
$\overline{E}_a$, $\overline{E}_b$	Enable Input
O_a, O_b	Data Outputs
GND	Ground
V_{CC}	Power

Truth Table[1]

Inputs				Outputs			
				'153/2153		'253/2253	
$\overline{E}_a$	$\overline{E}_b$	S_1	S_0	O_a	O_b	O_a	O_b
H	X	X	X	L	X	Z	X
X	H	X	X	X	L	X	Z
L	L	L	L	I_{0a}	I_{0b}	I_{0a}	I_{0b}
L	L	L	H	I_{1a}	I_{1b}	I_{1a}	I_{1b}
L	L	H	L	I_{2a}	I_{2b}	I_{2a}	I_{2b}
L	L	H	H	I_{3a}	I_{3b}	I_{3a}	I_{3b}

NOTE:
1. H = High Voltage Level
   L = Low Voltage Level
   X = Don't Care
   Z = High Impedance

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, T_A = –40°C to +85°C, V_{CC} = 5.0V ± 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 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.

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	2.0	mA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max., Outputs Open Other inputs at 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 Other inputs at GND One Bit Toggling	V_{IN} = V_{CC} V_{IN} = GND		3.2	6.5[5]	mA
			V_{IN} = 3.4V V_{IN} = GND		3.5	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 Vcc = 5.0V, +25°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. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_I N_I)$
   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.

PI74FCT153/2153T Switching Characteristics over Operating Range

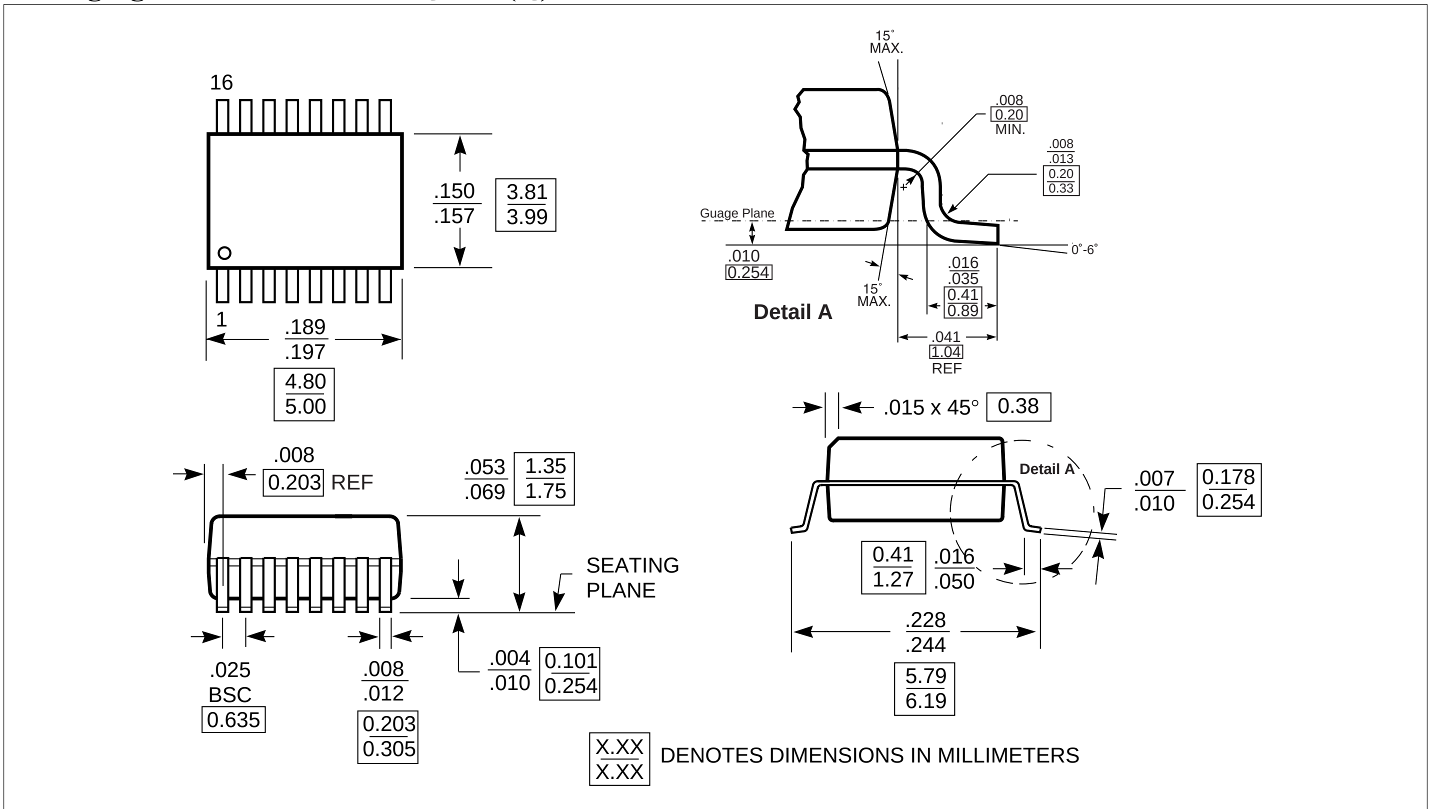
Parameters	Description	Conditions(1)	153T/2153T Com. Min	153T/2153T Com. Max	153AT/2153AT Com. Min	153AT/2153AT Com. Max	153CT/2153CT Com. Min	153CT/2153CT Com. Max	Unit
t_{PLH} t_{PHL}	Propagation Delay S_n to O	C_L = 50 pF R_L = 500ohm	1.5	9.0	1.5	6.6	1.5	5.6	ns
t_{PLH} t_{PHL}	Propagation Delay I_n to O		1.5	7.0	1.5	5.2	1.5	4.5	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}$ to O		1.5	7.0	1.5	5.2	1.5	4.8	ns

PI74FCT253/2253T Switching Characteristics over Operating Range

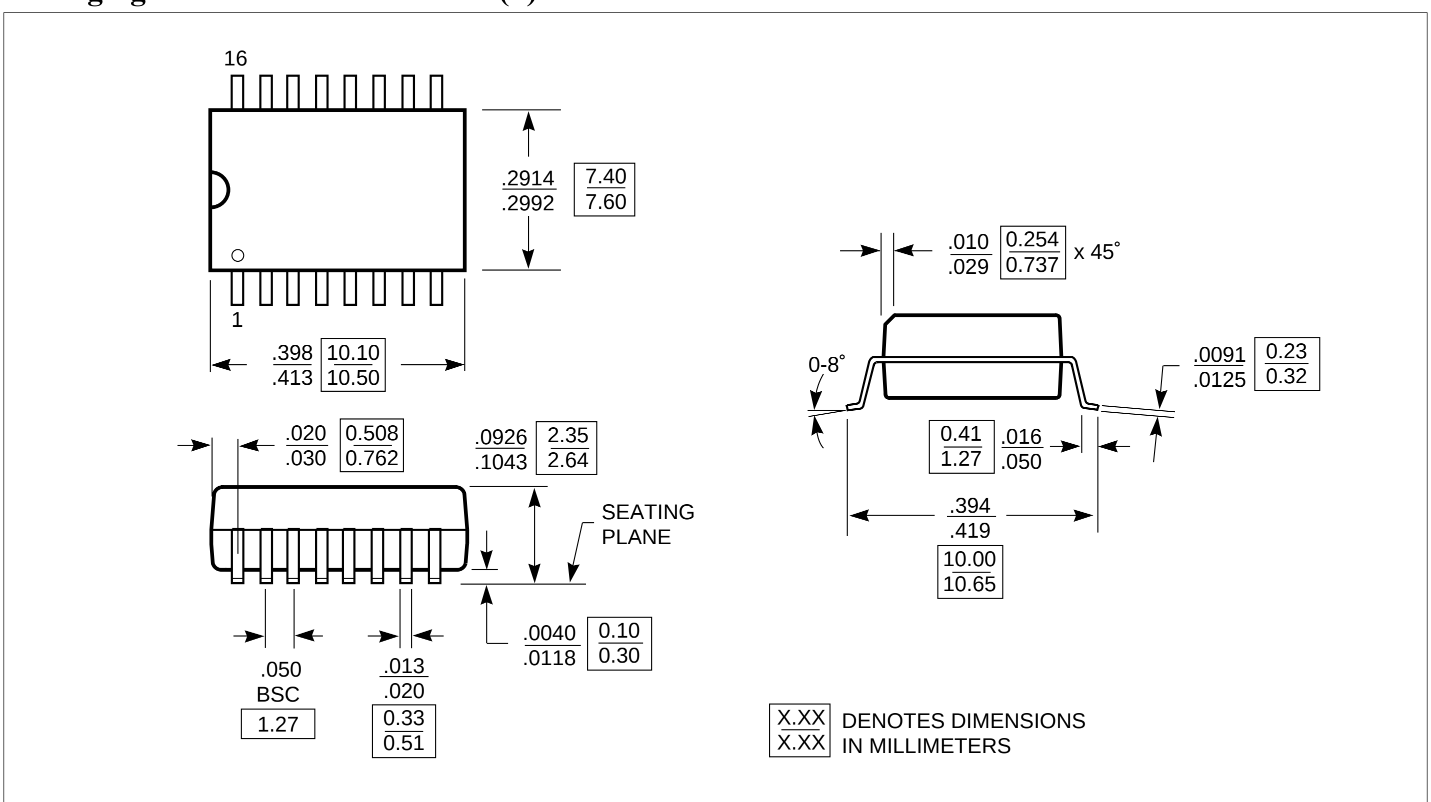
Parameters	Description	Conditions(1)	253T/2253T Com. Min	253T/2253T Com. Max	253AT/2253AT Com. Min	253AT/2253AT Com. Max	253CT/2253CT Com. Min	253CT/2253CT Com. Max	Unit
t_{PLH} t_{PHL}	Propagation Delay S_n to O	C_L = 50 pF R_L = 500ohm	1.5	9.0	1.5	6.6	1.5	5.6	ns
t_{PLH} t_{PHL}	Propagation Delay I_n to O		1.5	7.0	1.5	5.2	1.5	4.5	ns
t_{PZH} t_{PZL}	Output Enable Time $\overline{E}$ to O		1.5	9.0	1.5	6.0	1.5	5.0	ns
t_{PHZ} t_{PLZ}	Output Disable Time(3) $\overline{E}$ to O		1.5	7.0	1.5	6.0	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.

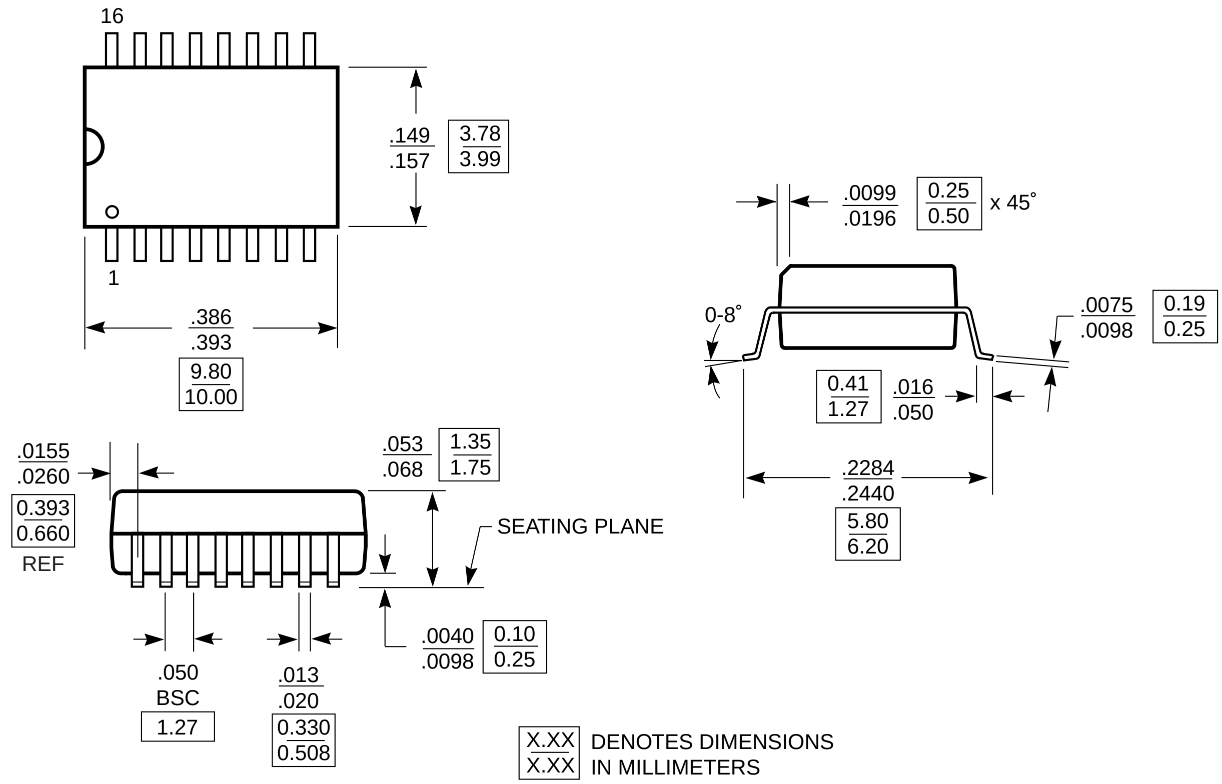
Packaging Mechanical: 16-Pin QSOP (Q)



Packaging Mechanical: 16-Pin SOIC (S)



Packaging Mechanical: 16-Pin SOIC (W)



Ordering Information

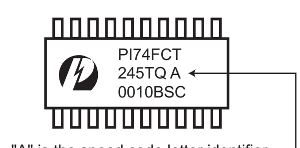
Part	Operating Range
PI74FCT153TQ	16-pin 150 mil wide plastic QSOP (Q)
PI74FCT153TS	16-pin 300 mil wide plastic SOIC (S)
PI74FCT153TW	16-pin 150 mil wide plastic SOIC (W)
PI74FCT253TQ	16-pin 150 mil wide plastic QSOP (Q)
PI74FCT253TS	16-pin 300 mil wide plastic SOIC (S)
PI74FCT253TW	16-pin 150 mil wide plastic SOIC (W)
PI74FCT2153TQ	16-pin 150 mil wide plastic QSOP (Q)
PI74FCT2153TS	16-pin 300 mil wide plastic SOIC (S)
PI74FCT2153TW	16-pin 150 mil wide plastic SOIC (W)
PI74FCT2253TQ	16-pin 150 mil wide plastic QSOP (Q)
PI74FCT2253TS	16-pin 300 mil wide plastic SOIC (S)
PI74FCT2253TW	16-pin 150 mil wide plastic SOIC (W)

Part Marking Information

Pericom s standard product mark follows our standard part number ordering information, except for those products with a speed letter code. For marking purposes, the speed letter code mark is placed after the package code letter, rather than after the device number as it is ordered.

Although all products are marked immediately after assembly to assure material traceability, Pericom does not usually mark the speed code at that time. After electrical test screening and speed binning has been completed, we then perform an add mark operation which places the speed code letter at the end of the complete part number.

Please refer to the example shown below:
Part Number as ordered: PI74FCT245ATQ
Example of Part Number as marked:



Notes:
1) 8-pin DIP, 8-pin SOIC, 8-pin TSSOP, 14-pin SOIC, 16-pin QSOP, SC70, MSOP, and SOT23 packages are not marked with the Pericom logo due to space limitations on the package.