

Fast CMOS Octal D Registers (3-State)

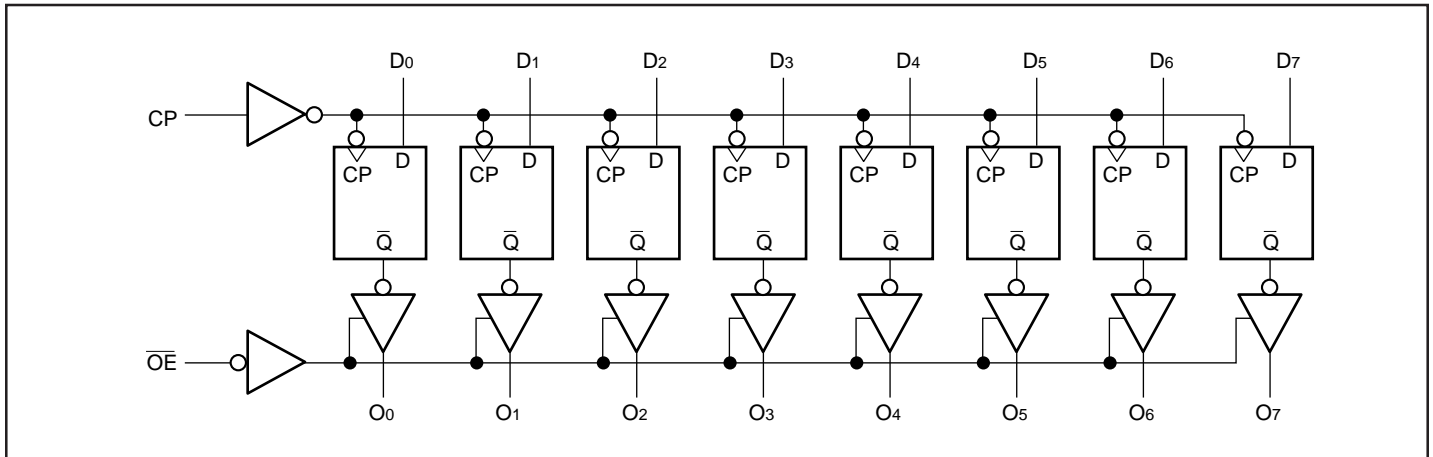
Features:

- Pin compatible with bipolar FAST™ Series at a higher speed and lower power consumption
- TTL input and output levels
- Low ground bounce outputs
- Extremely low static power
- Hysteresis on all inputs
- Industrial operating temperature range: -40°C to +85°C
- Packaging (Pb-free & Green available):
 - 20-pin 173-mil wide plastic TSSOP (L)
 - 20-pin 150-mil wide plastic QSOP (Q)
 - 20-pin 150-mil wide plastic TQSOP (R)
 - 20-pin 209-mil wide plastic SSOP (H)
 - 20-pin 300-mil wide plastic SOIC (S)

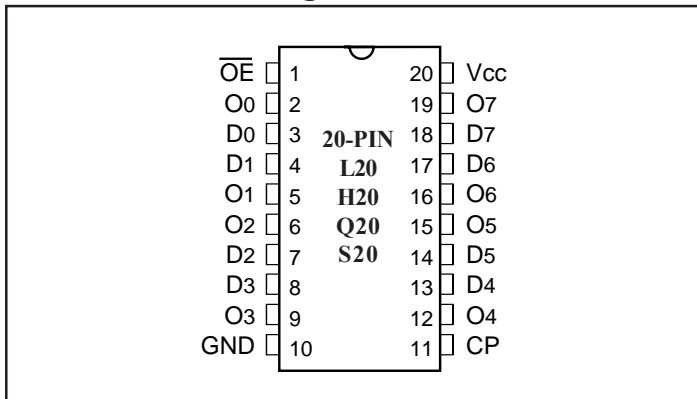
Description:

Pericom Semiconductor's PI74FCT374T/574T are 8-bit wide octal registers designed with eight D-type flip-flops with a buffered common clock and buffered 3-state outputs. When output enable (\overline{OE}) is LOW, the outputs are enabled. When \overline{OE} is HIGH, the outputs are in the high impedance state. Input data meeting the setup and hold time requirements of the D inputs is transferred to the O outputs on the LOW-to-HIGH transition of the clock input. Device models available upon request.

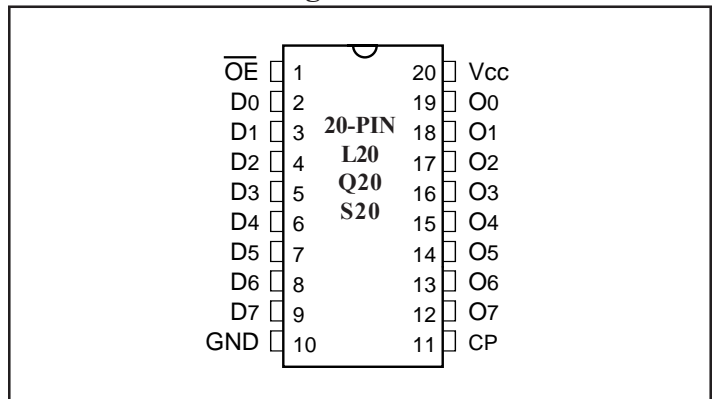
Block Diagram



PI74FCT374 Pin Configuration



PI74FCT574 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.

Truth Table⁽¹⁾

| Function | Inputs | | | Outputs | Internal |
|---------------|-----------------|----|----------------|----------------|------------------|
| | \overline{OE} | CP | D _N | O _N | $\overline{Q_N}$ |
| High-Z | H | L | X | Z | NC |
| | H | H | X | Z | NC |
| Load Register | L | ↑ | L | L | H |
| | L | ↑ | H | H | L |
| | H | ↑ | L | Z | H |
| | H | ↑ | H | Z | L |

- H = High Voltage Level
 - L = Low Voltage Level
 - X = Don't Care
 - Z = High Impedance
 - NC = No Change
 - ↑ = LOW-to-HIGH transition

Pin Description

| Pin Name | Description |
|---------------------|---|
| \overline{OE} | Output Enable Input (Active LOW) |
| CP | Clock Pulse for the register. Enters data on LOW-to-HIGH transition |
| D0-D7 | Data Inputs |
| O0-O7 | 3-State Outputs (true) |
| O0- $\overline{O7}$ | 3-State Outputs (inverted) |
| GND | Ground |
| Vcc | Power |

DC Electrical Characteristics (Over the Operating Range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 5.0\text{V} \pm 5\%$)

| Parameters | Description | Test Conditions ⁽¹⁾ | | Min. | Typ ⁽²⁾ | Max. | Units |
|------------------|-----------------------|--|---|------|--------------------|------|---------------|
| V _{OH} | Output HIGH Voltage | $V_{CC} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ | $I_{OH} = -15.0 \text{ mA}$ | 2.4 | 3.0 | | V |
| V _{OL} | Output LOW Current | $V_{CC} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ | $I_{OL} = 64 \text{ mA}$ | | 0.3 | 0.55 | V |
| V _{OL} | Output LOW Current | $V_{CC} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ | $I_{OL} = 12 \text{ mA (} 25\Omega \text{ Series)}$ | | 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 | $V_{CC} = \text{Max.}$ | $V_{IN} = V_{CC}$ | | | 1 | μA |
| I _{IL} | Input LOW Current | $V_{CC} = \text{Max.}$ | $V_{IN} = \text{GND}$ | | | -1 | μA |
| I _{OZH} | High Impedance | $V_{CC} = \text{Max.}$ | $V_{OUT} = 2.7\text{V}$ | | | 1 | μA |
| I _{OZL} | Output Current | | $V_{OUT} = 0.5\text{V}$ | | | -1 | μA |
| V _{IK} | Clamp Diode Voltage | $V_{CC} = \text{Min.}, I_{IN} = -18 \text{ mA}$ | | | -0.7 | -1.2 | V |
| I _{OFF} | Power Down Disable | $V_{CC} = \text{GND}, V_{OUT} = 4.5\text{V}$ | | — | — | 100 | μA |
| I _{OS} | Short Circuit Current | $V_{CC} = \text{Max.}^{(3)}, V_{OUT} = \text{GND}$ | | -60 | -120 | | mA |
| V _H | Input Hysteresis | | | | 200 | | mV |

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

| Parameters ⁽⁴⁾ | Description | Test Conditions | Typ | Max. | Units |
|---------------------------|--------------------|-----------------------|-----|------|-------|
| C _{IN} | Input Capacitance | $V_{IN} = 0\text{V}$ | 6 | 10 | pF |
| C _{OUT} | Output Capacitance | $V_{OUT} = 0\text{V}$ | 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 $V_{CC} = 5.0\text{V}$, $+25^{\circ}\text{C}$ 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.
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 OE = GND One Input 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 _{CP} = 10 MHz 50% Duty Cycle OE = GND fi = 5 MHz One Bit Toggling | V _{IN} = V _{CC} V _{IN} = GND | | 1.5 | 3.5 ⁽⁵⁾ | mA |
| | | | V _{IN} = 3.4V V _{IN} = GND | | 2.0 | 5.5 ⁽⁵⁾ | |
| | | V _{CC} = Max., Outputs Open f _{CP} = 10 MHz 50% Duty Cycle OE = GND Eight Bits Toggling fi = 2.5 MHz 50% Duty Cycle | V _{IN} = V _{CC} V _{IN} = GND | | 3.8 | 7.3 ⁽⁵⁾ | |
| | | | V _{IN} = 3.4V V _{IN} = GND | | 6.0 | 16.3 ⁽⁵⁾ | |

Notes:

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at V_{CC} = 5.0V, +25°C ambient.
- Per TTL driven input (V_{IN} = 3.4V); all other inputs at V_{CC} 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_{CC} formula. These limits are guaranteed but not tested.

6. $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$

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

I_{CC} = Quiescent Current

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

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.

PI74FCT374T Switching Characteristics over Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | 374TT | | 374AT | | 374CT | | 374DT | | Units |
|--------------------------------------|--|--|-------|------|-------|-----|-------|-----|-------|-----|-------|
| | | | Com. | | Com. | | Com. | | Com. | | |
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| t _{PLH} t _{PHL} | Propagation Delay CP to $\overline{O}N$ | C _L = 50pF R _L = 500Ω | 2.0 | 10.0 | 2.0 | 6.5 | 2.0 | 5.2 | 2.0 | 4.5 | ns |
| t _{PZH} t _{PZL} | Output Enable Time $\overline{O}E$ to $\overline{O}N$ | | 1.5 | 12.5 | 1.5 | 6.5 | 1.5 | 5.5 | 1.5 | 5.5 | ns |
| t _{PHZ} t _{PLZ} | Output Disable Time ⁽³⁾ $\overline{O}E$ to $\overline{O}N$ | | 1.5 | 8.0 | 1.5 | 5.5 | 1.5 | 5.0 | 1.5 | 5.0 | ns |
| t _{SU} | Setup Time HIGH or LOW, $\overline{D}N$ to CP | | 2.0 | — | 2.0 | — | 2.0 | — | 2.0 | — | ns |
| t _H | Hold Time HIGH or LOW, $\overline{D}N$ to CP | | 1.5 | — | 1.5 | — | 1.5 | — | 1.0 | — | ns |
| t _w | CP Pulse Width ⁽³⁾ HIGH or LOW | | 7.0 | — | 5.0 | — | 5.0 | — | 3.0 | — | ns |

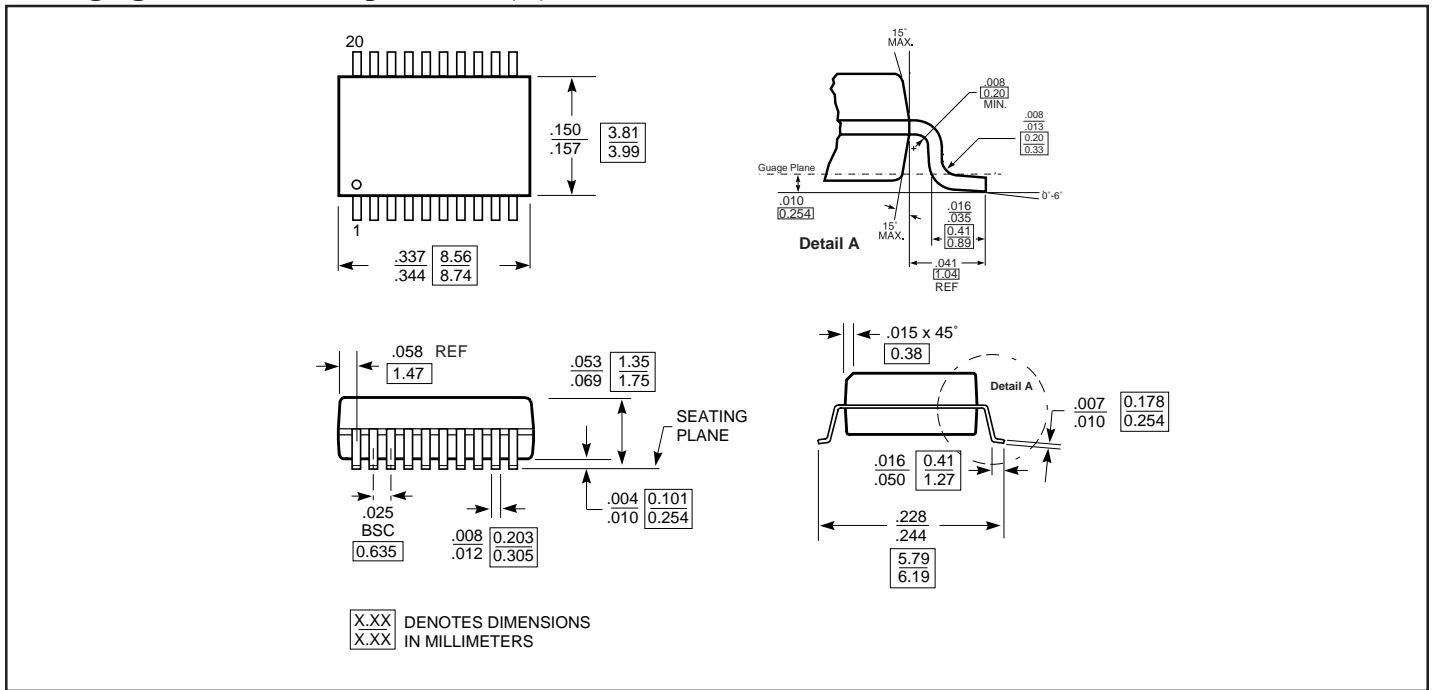
PI74FCT574T Switching Characteristics over Operating Range

| Parameters | Description | Conditions ⁽¹⁾ | 574T | | 574AT | | 574T | | 574DT | | Units |
|--------------------------------------|--|---|------|------|-------|-----|------|-----|-------|-----|-------|
| | | | Com. | | Com. | | Com. | | Com. | | |
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| t _{PLH} t _{PHL} | Propagation Delay CP to $\overline{O}N$ | C _L = 50 pF R _L = 500Ω | 2.0 | 8.5 | 2.0 | 6.5 | 2.0 | 5.2 | 2.0 | 4.5 | ns |
| t _{PZH} t _{PZL} | Output Enable Time $\overline{O}E$ to $\overline{O}N$ | | 1.5 | 10.0 | 1.5 | 6.5 | 1.5 | 5.5 | 1.5 | 5.5 | ns |
| t _{PHZ} t _{PLZ} | Output Disable Time ⁽³⁾ $\overline{O}E$ to $\overline{O}N$ | | 1.5 | 6.5 | 1.5 | 5.5 | 1.5 | 5.0 | 1.5 | 5.0 | ns |
| t _{SU} | Setup Time HIGH or LOW, $\overline{D}N$ to CP | | 2.0 | — | 2.0 | — | 2.0 | — | 2.0 | — | ns |
| t _H | Hold Time HIGH or LOW, $\overline{D}N$ to CP | | 1.5 | — | 1.5 | — | 1.5 | — | 1.0 | — | ns |
| t _w | CP Pulse Width ⁽³⁾ HIGH or LOW | | 7.0 | — | 5.0 | — | 5.0 | — | 3.0 | — | ns |

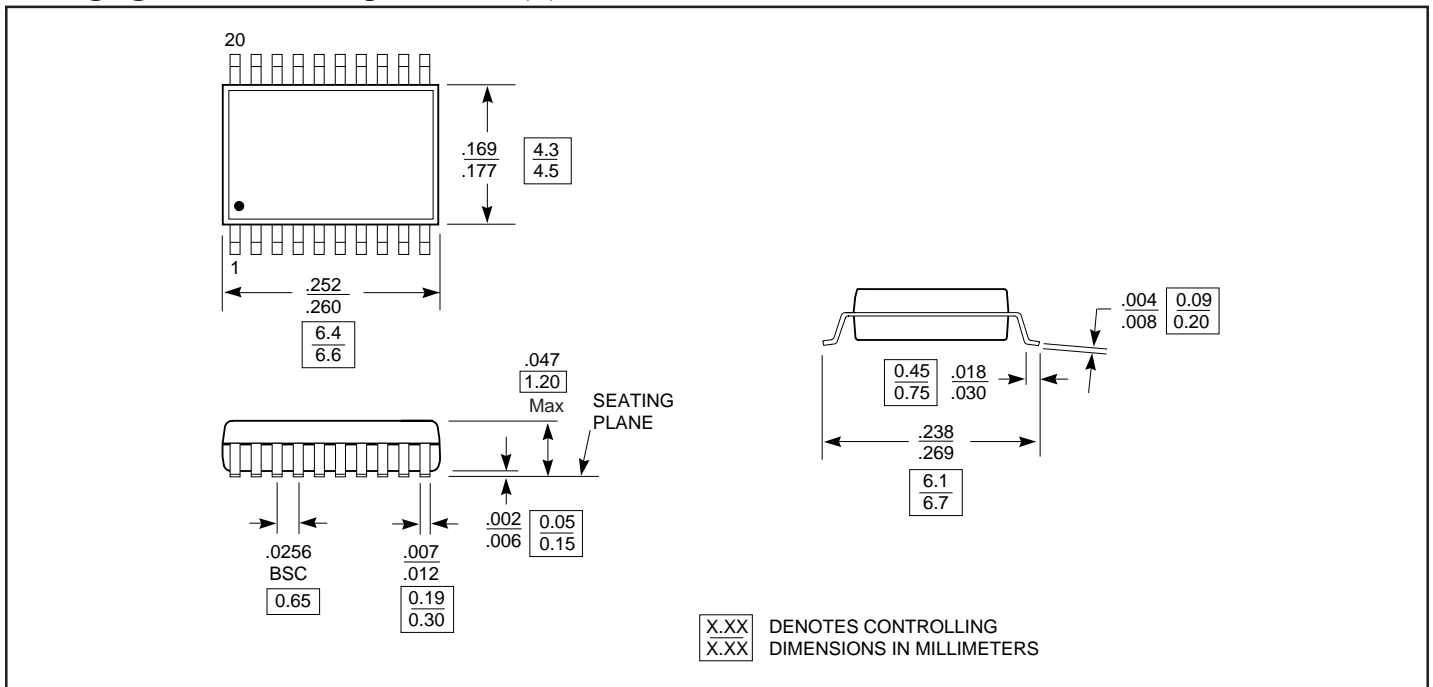
Notes:

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

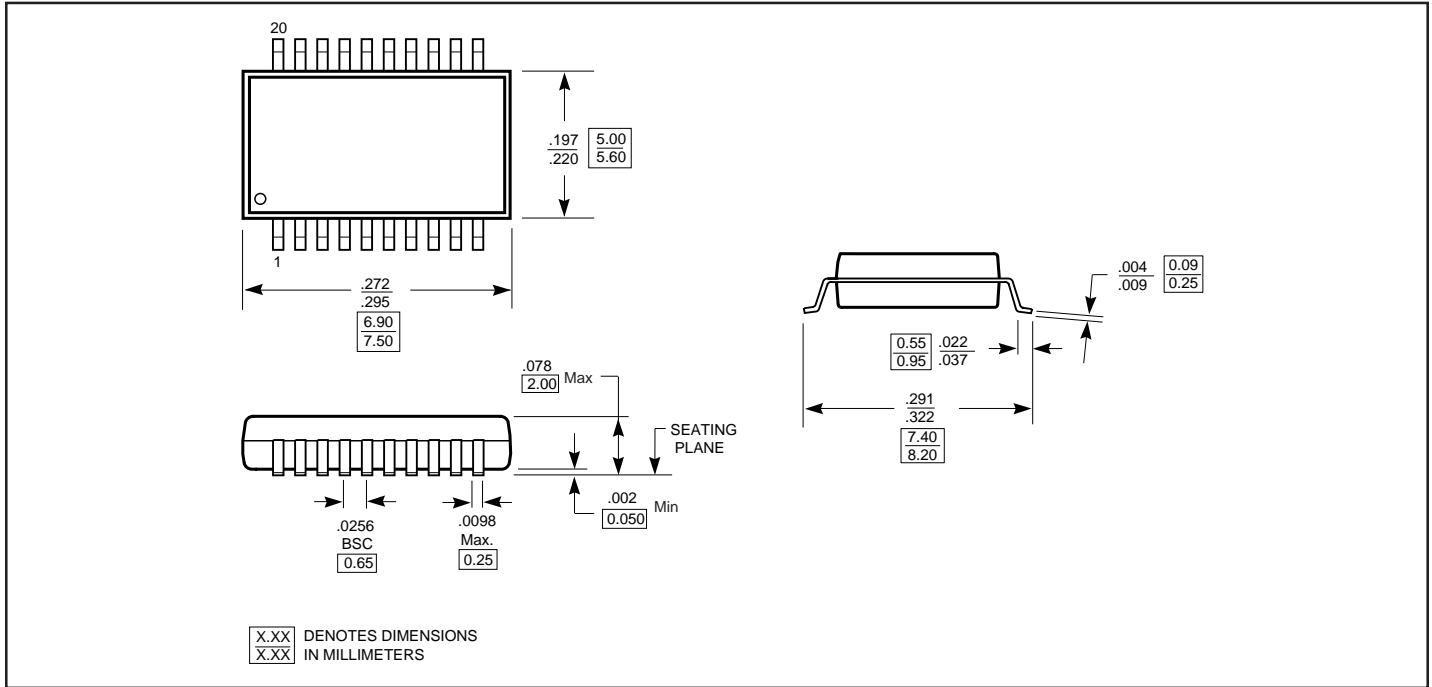
Packaging Mechanical: 20-pin QSOP (Q)



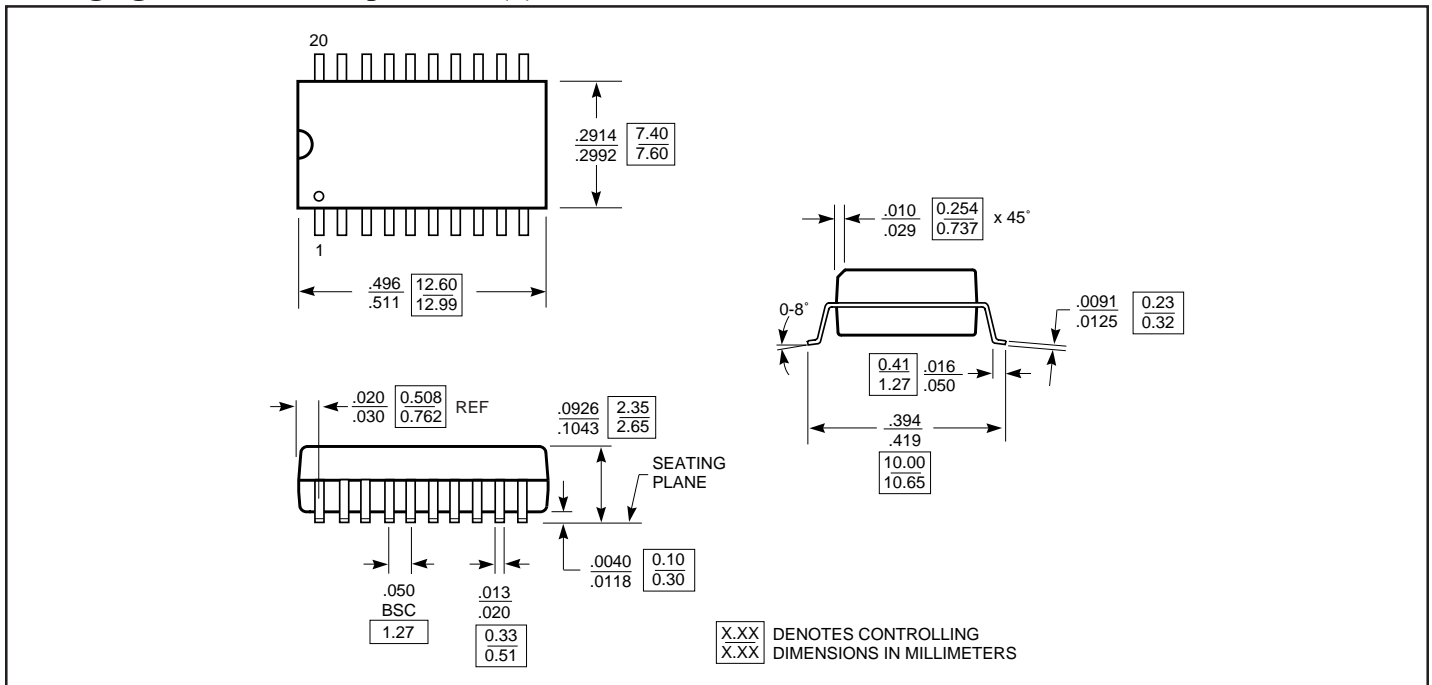
Packaging Mechanical: 20-pin TSSOP (L)



Packaging Mechanical: 20-pin SSOP (H)



Packaging Mechanical: 20-pin SOIC (S)



PI74FCT374T Ordering Information

| Ordering Code | Package Code | Package Type |
|----------------|--------------|-------------------------------|
| PI74FCT374TQ | Q | 20-pin QSOP |
| PI74FCT374TQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT374TS | S | 20-pin SOIC |
| PI74FCT374TSE | S | Pb-free & Green, 20-pin SOIC |
| PI74FCT374ATH | H | 20-pin SSOP |
| PI74FCT374ATHE | H | Pb-free & Green, 20-pin SSOP |
| PI74FCT374ATQ | Q | 20-pin QSOP |
| PI74FCT374ATQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT374ATS | S | 20-pin SOIC |
| PI74FCT374ATSE | S | Pb-free & Green, 20-pin SOIC |
| PI74FCT374ATL | L | 20-pin TSSOP |
| PI74FCT374ATLE | L | Pb-free & Green, 20-pin TSSOP |
| PI74FCT374CTH | H | 20-pin SSOP |
| PI74FCT374CTHE | H | Pb-free & Green, 20-pin SSOP |
| PI74FCT374CTQ | Q | 20-pin QSOP |
| PI74FCT374CTQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT374CTS | S | 20-pin SOIC |
| PI74FCT374CTSE | S | Pb-free & Green, 20-pin SOIC |
| PI74FCT374CTL | L | 20-pin TSSOP |
| PI74FCT374CTLE | L | Pb-free & Green, 20-pin TSSOP |
| PI74FCT374DTH | H | 20-pin SSOP |
| PI74FCT374DTHE | H | Pb-free & Green, 20-pin SSOP |
| PI74FCT374CTQ | Q | 20-pin QSOP |
| PI74FCT374CTQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT374CTL | L | 20-pin TSSOP |
| PI74FCT374CTLE | L | Pb-free & Green, 20-pin TSSOP |

Notes:

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/



PI74FCT574T Ordering Information

| Ordering Code | Package Code | Package Type |
|----------------|--------------|-------------------------------|
| PI74FCT574TL | L | 20-pin TSSOP |
| PI74FCT574TLE | L | Pb-free & Green, 20-pin TSSOP |
| PI74FCT574TQ | Q | 20-pin QSOP |
| PI74FCT574TQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT574TS | S | 20-pin SOIC |
| PI74FCT574TSE | S | Pb-free & Green, 20-pin SOIC |
| PI74FCT574ATL | L | 20-pin TSSOP |
| PI74FCT574ATLE | L | Pb-free & Green, 20-pin TSSOP |
| PI74FCT574ATQ | Q | 20-pin QSOP |
| PI74FCT574ATQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT574ATS | S | 20-pin SOIC |
| PI74FCT574ATSE | S | Pb-free & Green, 20-pin SOIC |
| PI74FCT574CTL | L | 20-pin TSSOP |
| PI74FCT574CTLE | L | Pb-free & Green, 20-pin TSSOP |
| PI74FCT574CTQ | Q | 20-pin QSOP |
| PI74FCT574CTQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT574CTS | S | 20-pin SOIC |
| PI74FCT574CTSE | S | Pb-free & Green, 20-pin SOIC |
| PI74FCT574DTQ | Q | 20-pin QSOP |
| PI74FCT574DTQE | Q | Pb-free & Green, 20-pin QSOP |
| PI74FCT574DTS | S | 20-pin SOIC |
| PI74FCT574DTSE | S | Pb-free & Green, 20-pin SOIC |

Notes:

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/