PI74FCT16841T
PI74FCT162841T

Fast CMOS 20-Bit Transparent Latch

Product Features:

Common Features:

- PI74FCT16841T and PI74FCT162841T are high-speed, low power devices with high current drive
- V_{CC} = 5V ±10%
- Hysteresis on all inputs
- Packages available:
  - 56-pin 240 mil wide plastic TSSOP (A)
  - 56-pin 300 mil wide plastic SSOP (V)

PI74FCT16841T Features:

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

PI74FCT162841T Features:

- Balanced output drivers: ±24 mA
- Reduced system switching noise
- Typical V_{OLP} (Output Ground Bounce) < 0.6V at V_{CC} = 5V, T_A = 25°C

Product Description:

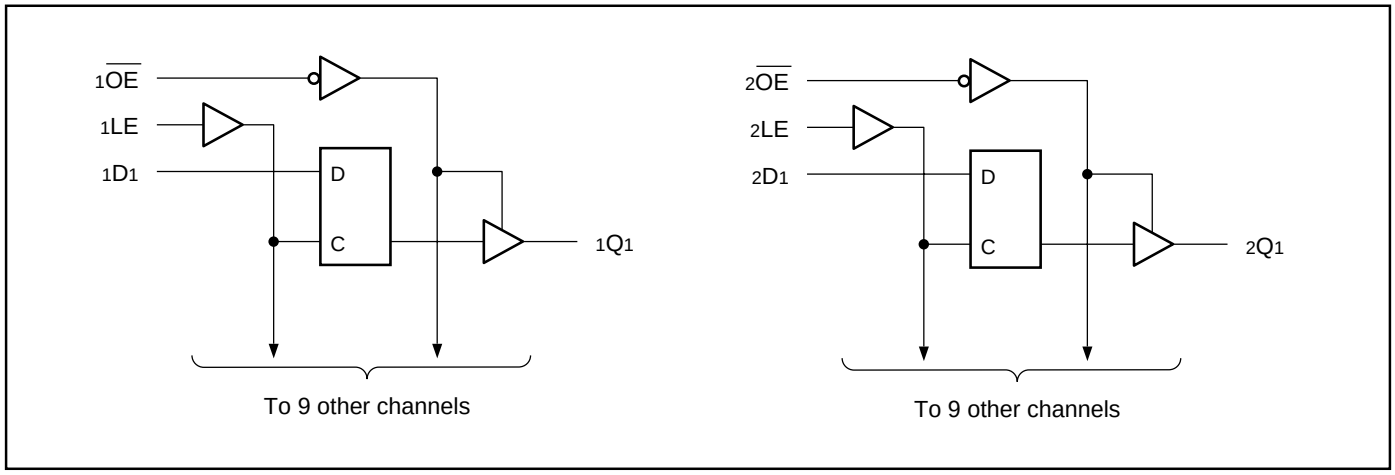
Pericom Semiconductor's PI74FCT series of logic circuits are produced in the Company's advanced 0.8 micron CMOS technology, achieving industry leading speed grades.

The PI74FCT16841T and PI74FCT162841T are 20-bit wide transparent latches designed to provide temporary storage of data and can be used as I/O ports, memory address latches, and bus drivers. The Output Enable and Latch Enable controls allow the devices to be operated as two 10-bit latches or one 20-bit latch. Signal pins are arranged in a flow-through organization for ease of layout and hysteresis is designed into all inputs to improve noise margin.

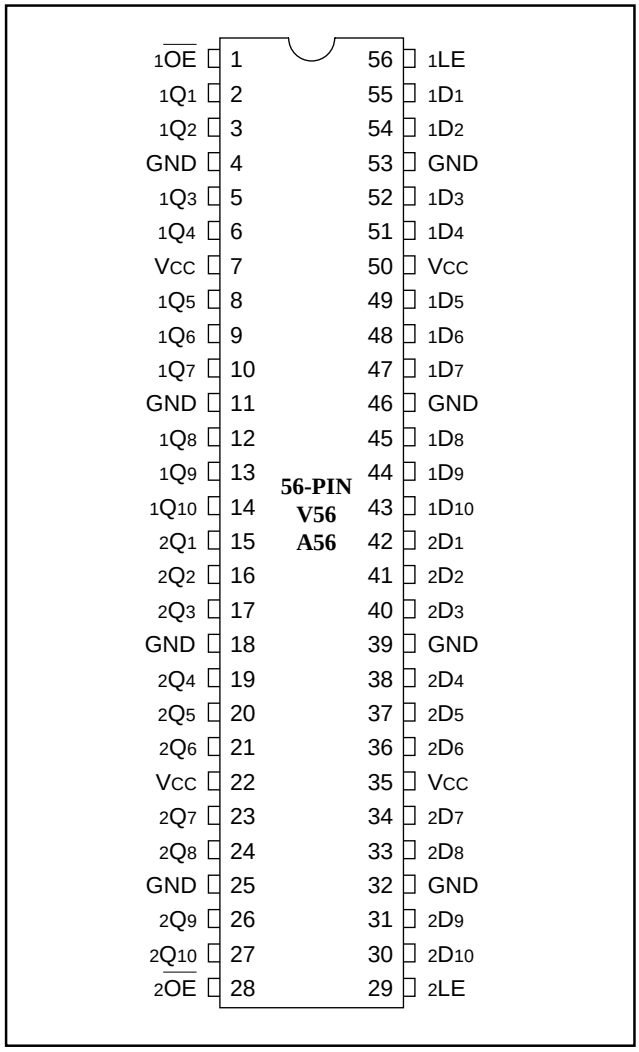
The output buffers on the PI74FCT16841T and PI74FCT162841T are especially designed for driving high-capacitance loads and low impedance backplanes and include a Power-Off Disable function allowing "live insertion" of boards when the devices are used as backplane drivers.

The PI74FCT162841T has ±24 mA balanced output drivers. It is designed with current limiting resistors at its outputs to control the output edge rate resulting in lower ground bounce and undershoot. This eliminates the need for external terminating resistors for most interface applications.

Logic Block Diagram



Product Configuration



Product Pin Description

Pin Name	Description
xDx	Data Inputs
xLE	Latch Enable Input (Active LOW)
$x\overline{OE}$	Output Enable Input (Active LOW)
xQx	3-State Outputs

Truth Table(1)

Inputs			Outputs
xDx	**xLE**	**$x\overline{OE}$**	**xQx**
H	H	L	H
L	H	L	L
X	L	L	Q(2)
X	X	H	Z

1. H = High Voltage Level
   L = Low Voltage Level
   X = Don't Care
   Z = High Impedance
2. Output level before xLE HIGH-to-LOW Transition.

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	120mA
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°C to +85°C, V_{CC} = 5.0V ± 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	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_{CC} = Max.	V_{OUT} = 0.5V			–1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18 mA			–0.7	–1.2	V
I_{OS}	Short Circuit Current	V_{CC} = Max.[3], V_{OUT} = GND		–80	–140	–200	mA
I_O	Output Drive Current	V_{CC} = Max.[3], V_{OUT} = 2.5V		–50		–180	mA
V_H	Input Hysteresis				100		mV

PI74FCT16841T Output Drive Characteristics (Over the Operating Range)

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} = –3.0 mA	2.5	3.5		V
			I_{OH} = –15.0 mA	2.4	3.5		
			I_{OH} = –32.0 mA	2.0	3.0		
V_{OL}	Output LOW Voltage	V_{CC} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OL} = 64 mA		0.2	0.55	V
I_{OFF}	Power Down Disable	V_{CC} = 0V, V_{IN} or V_{OUT} ≤ 4.5V		—	—	±100	µA

PI74FCT162841T Output Drive Characteristics (Over the Operating Range)

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} = –24.0 mA	2.4	3.3		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OL} = 24 mA		0.3	0.55	V
I_{ODL}	Output LOW Current	V_{CC} = 5V, V_{IN} = V_{IH} OR V_{IL}, V_{OUT} = 1.5V[3]		60	115	150	mA
I_{ODH}	Output HIGH Current	V_{CC} = 5V, V_{IN} = V_{IH} OR V_{IL}, V_{OUT} = 1.5V[3]		–60	–115	–150	mA

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[4]	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	4.5	6	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	5.5	8	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	2.5	mA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max., Outputs Open $\overline{OE}$ = GND; LE = Vcc 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 $\overline{OE}$ = GND; LE = Vcc f_I = 5 MHz One Bit Toggling	V_{IN} = V_{CC} V_{IN} = GND		1.7	4.0[5]	mA
			V_{IN} = 3.4V V_{IN} = GND		2.0	5.0[5]	
		V_{CC} = Max., Outputs Open f_{CP} = 10 MHz 50% Duty Cycle $\overline{OE}$ = GND; LE = Vcc Eight Bits Toggling f_I = 2.5 MHz 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND		3.2	6.5[5]	
			V_{IN} = 3.4V V_{IN} = GND		5.2	14.5[5]	

Notes:
1. For Max. or Min. conditions, 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.

PI74FCT16841 Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	16841AT Com.		16841BT Com.		16841CT Com.		16841DT Com.		16841ET Com.		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay xDx to xQx (LE = HIGH)	C_L = 50 pF R_L = 500Ω	1.5	9.0	1.5	6.5	1.5	5.5	1.5	4.2	1.5	3.4	ns
		C_L = 300 pF[3] R_L = 500Ω	1.5	13.0	1.5	13.0	1.5	13.0	1.5	13.0	1.5	7.5	ns
t_{PLH} t_{PHL}	Propagation Delay xLE to xQx	C_L = 50 pF R_L = 500Ω	1.5	12.0	1.5	8.0	1.5	6.4	1.5	4.0	1.5	3.7	ns
		C_L = 300 pF[3] R_L = 500Ω	1.5	16.0	1.5	15.5	1.5	15.0	1.5	8.0	1.5	7.5	ns
t_{PZH} t_{PZL}	Output Enable Time x$\overline{OE}$ to xQx	C_L = 50 pF R_L = 500Ω	1.5	11.5	1.5	8.0	1.5	6.5	1.5	4.8	1.5	4.4	ns
		C_L = 300 pF[4] R_L = 500Ω	1.5	23.0	1.5	14.0	1.5	12.0	1.5	9.0	1.5	9.0	ns
t_{PHZ} t_{PLZ}	Output Disable Time[3] x$\overline{OE}$ to xQx	C_L = 5 pF[3] R_L = 500Ω	1.5	7.0	1.5	6.0	1.5	5.7	1.5	4.0	1.5	4.0	ns
		C_L = 50 pF R_L = 500Ω	1.5	8.0	1.5	7.0	1.5	6.0	1.5	5.4	1.5	4.0	ns
t_{SU}	Setup Time HIGH or LOW, xDx to xLE	C_L = 50 pF R_L = 500Ω	2.5	—	2.5	—	2.5	—	1.0	—	1.0	—	ns
t_H	Hold Time HIGH or LOW, xDx to xLE		2.5	—	2.5	—	2.5	—	1.0	—	1.0	—	ns
t_W	xLE Pulse Width HIGH[3]		4.0	—	4.0	—	4.0	—	4.0	—	3.0	—	ns
$t_{SK(O)}$	Output Skew[4]		—	0.5	—	0.5	—	0.5	—	0.5	—	0.5	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.
4. Skew between any two outputs, of the same package, switching in the same direction. This parameter is guaranteed by design.

PI74FCT16841 Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	162841AT Com. Min	162841AT Com. Max	162841BT Com. Min	162841BT Com. Max	162841CT Com. Min	162841CT Com. Max	162841DT Com. Min	162841DT Com. Max	162841ET Com. Min	162841ET Com. Max	Unit
t_{PLH} t_{PHL}	Propagation Delay xDx to xQx (LE = HIGH)	C_L = 50 pF R_L = 500Ω	1.5	9.0	1.5	6.5	1.5	5.5	1.5	4.2	1.5	3.4	ns
		C_L = 300 pF[3] R_L = 500Ω	1.5	13.0	1.5	13.0	1.5	13.0	1.5	13.0	1.5	7.5	ns
t_{PLH} t_{PHL}	Propagation Delay xLE to xQx	C_L = 50 pF R_L = 500Ω	1.5	12.0	1.5	8.0	1.5	6.4	1.5	4.0	1.5	3.7	ns
		C_L = 300 pF[3] R_L = 500Ω	1.5	16.0	1.5	15.5	1.5	15.0	1.5	8.0	1.5	7.5	ns
t_{PZH} t_{PZL}	Output Enable Time x$\overline{OE}$ to xQx	C_L = 50 pF R_L = 500Ω	1.5	11.5	1.5	8.0	1.5	6.5	1.5	4.8	1.5	4.4	ns
		C_L = 300 pF[4] R_L = 500Ω	1.5	23.0	1.5	14.0	1.5	12.0	1.5	9.0	1.5	9.0	ns
t_{PHZ} t_{PLZ}	Output Disable Time[3] x$\overline{OE}$ to xQx	C_L = 5 pF[3] R_L = 500Ω	1.5	7.0	1.5	6.0	1.5	5.7	1.5	4.0	1.5	4.0	ns
		C_L = 50 pF R_L = 500Ω	1.5	8.0	1.5	7.0	1.5	6.0	1.5	5.4	1.5	4.0	ns
t_{SU}	Setup Time HIGH or LOW, xDx to xLE	C_L = 50 pF R_L = 500Ω	2.5	—	2.5	—	2.5	—	1.0	—	1.0	—	ns
t_H	Hold Time HIGH or LOW, xDx to xLE		2.5	—	2.5	—	2.5	—	1.0	—	1.0	—	ns
t_W	xLE Pulse Width HIGH[3]		4.0	—	4.0	—	4.0	—	4.0	—	3.0	—	ns
$t_{SK(O)}$	Output Skew[4]		—	0.5	—	0.5	—	0.5	—	0.5	—	0.5	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.
4. Skew between any two outputs, of the same package, switching in the same direction. This parameter is guaranteed by design.