PI74LPT541

Fast CMOS 3.3V 8-Bit Buffer/Line Driver

Product Features

- Compatible with LCX™ and LVT™ families of products
- Supports 5V I/O Tolerant Mixed-Signal Mode Operation
  - Input can be 3V or 5V
  - Output can be 3V or connected to 5V bus
- Advanced Low-Power CMOS Operation
- Excellent output drive capability:
  Balanced drives (24mA sink and source)
- Low ground bounce outputs
- Hysteresis on all inputs
- Industrial operating temperature range: –40°C to +85°C
- Packages 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 300 mil wide plastic SOIC (S)

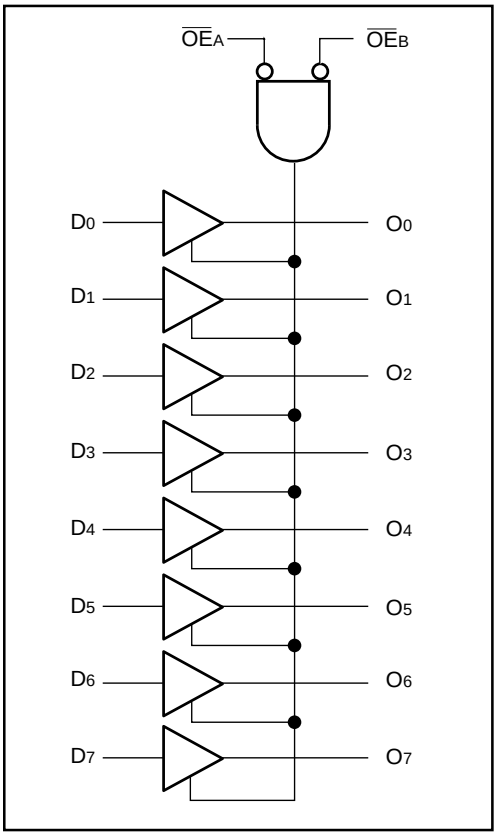
Product Description

Pericom Semiconductor's PI74LPT series of logic circuits are produced using the Company's advanced 0.6 micron CMOS technology, achieving industry leading speed grades.

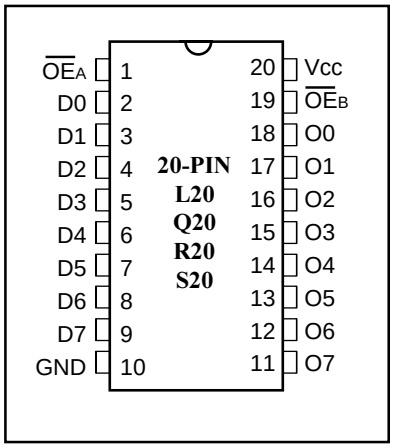
The PI74LPT541 is an 8-bit buffer/line driver designed for driving high-capacitive memory loads. With its balanced-drive characteristics, this high-speed, low-power device provides lower ground bounce, transmission line matching of signals, fewer line reflections, and lower EMI and RFI effects. This makes it ideal for driving on-board buses and transmission lines. This device offers a flow-through organization for ease of board layout.

The PI74LPT541, which can be driven from either 3.3V or 5.0V devices, can be used as a translator in mixed 3.3/5.0V systems.

Logic Block Diagram



Product Pin Configuration



Truth Table[1]

Inputs			Outputs
$\overline{OE}_A$	$\overline{OE}_B$	D_X	O_X
L	L	L	L
L	L	H	H
H	H	X	Z

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

Product Pin Description

Pin Name	Description
$\overline{OE}_A$, $\overline{OE}_B$	3-State Output Enable Inputs (Active LOW)
D7-D0	Inputs
O7-O0	Outputs
GND	Ground
V_{CC}	Power

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} = 2.7V to 3.6V)

Parameters	Description	Test Conditions[1]		Min.	Typ[2]	Max.	Units
V_{IH}	Input HIGH Voltage (Input pins)	Guaranteed Logic HIGH Level		2.2	—	5.5	V
	Input HIGH Voltage (I/O pins)			2.0	—	5.5	V
V_{IL}	Input LOW Voltage (Input and I/O pins)	Guaranteed Logic LOW Level		–0.5	—	0.8	V
I_{IH}	Input HIGH Current (Input pins)	V_{CC} = Max.	V_{IN} = 5.5V	—	—	±1	µA
	Input HIGH Current (I/O pins)	V_{CC} = Max.	V_{IN} = V_{CC}	—	—	±1	µA
I_{IL}	Input LOW Current (Input pins)	V_{CC} = Max.	V_{IN} = GND	—	—	±1	µA
	Input LOW Current (I/O pins)	V_{CC} = Max.	V_{IN} = GND	—	—	±1	µA
I_{OZH}	High Impedance Output Current	V_{CC} = Max.	V_{OUT} = 5.5V	—	—	±1	µA
I_{OZL}	(3-State Output pins)	V_{CC} = Max.	V_{OUT} = GND	—	—	±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18mA		—	–0.7	–1.2	V
I_{ODH}	Output HIGH Current	V_{CC} = 3.3V, V_{IN} = V_{IH} or V_{IL}, V_O = 1.5V[3]		–36	–60	–110	mA
I_{ODL}	Output LOW Current	V_{CC} = 3.3V, V_{IN} = V_{IH} or V_{IL}, V_O = 1.5V[3]		50	90	200	mA
V_{OH}	Output HIGH Voltage	V_{CC} = Min.	I_{OH} = –0.1mA	Vcc-0.2	—	—	V
		V_{IN} = V_{IH} or V_{IL}	I_{OH} = –3mA	2.4	3.0	—	V
		V_{CC} = 3.0V, V_{IN} = V_{IH} or V_{IL}	I_{OH} = –8mA	2.4[5]	3.0	—	V
			I_{OH} = –24mA	2.0	—	—	
V_{OL}	Output LOW Voltage	V_{CC} = Min.	I_{OL} = 0.1mA	—	—	0.2	V
		V_{IN} = V_{IH} or V_{IL}	I_{OL} = 16mA	—	0.2	0.4	V
			I_{OL} = 24mA	—	0.3	0.5	V
I_{OS} mA	Short Circuit Current[4]	V_{CC} = Max.[3], V_{OUT} = GND			–60	–85	–240
I_{OFF}	Power Down Disable	V_{CC} = 0V, V_{IN} or V_{OUT} ≤ 4.5V		—	—	±100	µA
V_H	Input Hysteresis			—	150	—	mV

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 = 3.3V, +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 guaranteed but not tested.
5. V_{OH} = V_{CC} – 0.6V at rated current.

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[1]	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

Note:
1. 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	10	µA
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	V_{CC} = Max.	V_{IN} = V_{CC} – 0.6V[3]		—	100	
I_{CCD}	Dynamic Power Supply[4]	V_{CC} = Max., Outputs Open $\overline{OE}_X$ = GND One Bit Toggling 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND		50	75	µA/ MHz
I_C	Total Power Supply Current[6]	V_{CC} = Max., Outputs Open f_i = 10 MHz 50% Duty Cycle $\overline{OE}_X$ = GND One Bit Toggling	V_{IN} = V_{CC} – 0.6V V_{IN} = GND		0.6	2.3	mA
		V_{CC} = Max., Outputs Open f_i = 2.5 MHz 50% Duty Cycle $\overline{OE}_X$ = GND 8 Bits Toggling	V_{IN} = V_{CC} – 0.6V V_{IN} = GND		2.1	4.7[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 = 3.3V, +25°C ambient.
3. Per TTL driven input; 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 (I_{CCL}, I_{CCH} and I_{CCZ})
   ΔI_{CC} = Power Supply Current for a TTL High Input
   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)
   N_{CP} = Number of Clock Inputs at f_{CP}
   f_i = Input Frequency
   N_I = Number of Inputs at f_i
   All currents are in milliamps and all frequencies are in megahertz.

Switching Characteristics over Operating Range[1]

Parameters	Description	Conditions[2]	LPT541 Com. Min.[3]	LPT541 Com. Max.	LPT541A Com. Min.[3]	LPT541A Com. Max.	LPT541C Com. Min.[3]	LPT541C Com. Max.	Units
t_{PLH} t_{PHL}	Propagation Delay D_X to O_X	C_L = 50pF R_L = 500Ω	1.5	6.0	1.5	4.8	1.5	4.1	ns
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}x$ to Ox		1.5	9.5	1.5	6.2	1.5	5.8	
t_{PHZ} t_{PLZ}	Output Disable Time[4] $\overline{OE}x$ to Ox		1.5	6.5	1.5	5.6	1.5	5.2	
$t_{SK}(o)$	Output Skew[5]			0.5		0.5		0.5	

Notes:
1. Propagation Delays and Enable/Disable times are with Vcc = 3.3V ± 0.3V, normal range.
   For Vcc = 2.7V, extended range, all Propagation Delays and Enable/Disable times should be degraded by 20%.
2. See test circuit and waveforms.
3. Minimum limits are guaranteed but not tested on Propagation Delays.
4. This parameter is guaranteed but not production tested.
5. Skew between any two outputs, of the same package, switching in the same direction.
   This parameter is guaranteed by design.