P54/74PCT245/A—P54/74PCT545/A—P54/74PCT645/A OCTAL BIDIRECTIONAL TRANSCEIVERS WITH 3-STATE OUTPUTS

FEATURES

- **Function, Pinout, Speed and Drive Compatible with the Fastest Bipolar Logic**
- **"A" Versions for High Performance**
- **CMOS for Low Power Consumption—Typically 1/3 of Fast Bipolar Logic**
- **64 mA Sink Current A & B Outputs (Com'l), 48 mA (Mil)**
- **15 mA Source Current A & B Outputs (Com'l), 12 mA (Mil)**
- **3-State Outputs**

DESCRIPTION

The 'PCT245/A, 'PCT545/A, and 'PCT645/A contain eight non-inverting bidirectional buffers with 3-state outputs and is intended for bus oriented applications. For the 'PCT245/A, 'PCT545/A, and 'PCT645/A current sinking capability is 64 mA at the A & B ports. The 'PCT245/A and 'PCT645/A are identical. The 'PCT545/A is the same as the 'PCT245/A and 'PCT645/A except for the device pinout.

The Transmit/Receive ($T/\overline{R}$) input determines the direction of data flow through the bidirectional transceiver. Transmit (Active HIGH) enables data from A ports to B ports; receive (Active LOW) enables data from B ports to A ports. The output enable input, when HIGH, disables both the A and B ports by putting them in a high Z condition.

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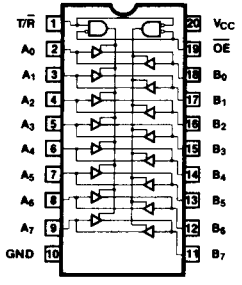
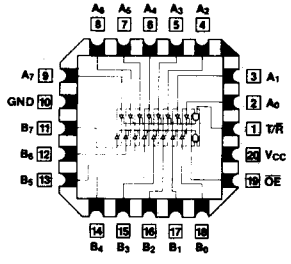
LOGIC BLOCK DIAGRAM

PIN CONFIGURATIONS

'PCT245/A—'PCT645/A

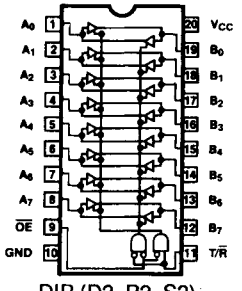


DIP (D2, P2, S2)



LCC (L2)

'PCT545/A



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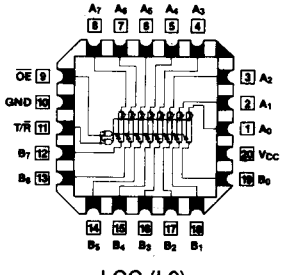

LCC (L2)

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ABSOLUTE MAXIMUM RATINGS[1,2]

Symbol	Parameter	Value	Unit
T_{STG}	Storage Temperature	–65 to +150	°C
T_A	Ambient Temperature Under Bias	–55 to +125	°C
V_{CC}	V_{CC} Potential to Ground	–0.5 to +7.0	V
I_{IN}	Input Current	–30 to +5.0	mA

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Symbol	Parameter	Value	Unit
I_{OUTPUT}	Current Applied to Output	100	mA
V_{IN}	Input Voltage	–0.5 to V_{CC} + 0.5	V
V_{OUT}	Voltage Applied to Output	–0.5 to V_{CC} + 0.5	V

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Notes:

1. Operation beyond the limits set forth in the above table may impair the useful life of the device. Unless otherwise noted, these limits are over the operating free-air temperature range.
2. Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.

RECOMMENDED OPERATING CONDITIONS

Free Air Ambient Temperature	Min	Max
Military	–55°C	+125°C
Commercial	0°C	+70°C

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Supply Voltage (V_{CC})	Min	Max
Military	+4.5V	+5.5V
Commercial	+4.75V	+5.25V

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DC ELECTRICAL CHARACTERISTICS (Over recommended operating conditions)

Symbol	Parameter		Min	Typ[1]	Max	Units	V_{CC}	Conditions
V_{IH}	Input HIGH Voltage		2.0		V_{CC} + 0.5	V		
V_{IL}	Input LOW Voltage		–0.5		0.8	V		
V_H	Hysteresis			.35		V		All inputs
V_{CD}	Input Clamp Diode Voltage				–1.2	V	MIN	I_{IN} = –18mA
V_{OH}	Output HIGH Voltage	V_{CC} = 3V, V_{IN} = 0.2V, or V_{CC} – 0.2V	V_{CC} – 0.2			V		I_{OH} = –300µA
		Military/Commercial (CMOS)	V_{CC} – 0.2			V	MIN	I_{OH} = –300µA
		Military (TTL)	2.4			V	MIN	I_{OH} = –12mA
		Commercial (TTL)	2.7			V	MIN	I_{OH} = –15mA
V_{OL}	Output LOW Voltage	V_{CC} = 3V, V_{IN} = 0.2V, or V_{CC} – 0.2V			0.2	V		I_{OL} = 300µA
		Military/Commercial (CMOS)			0.2	V	MIN	I_{OL} = 300µA
		Military (TTL)			0.55	V	MIN	I_{OL} = 48mA
		Commercial (TTL)			0.55	V	MIN	I_{OL} = 64mA
I_{IH}	Input HIGH Current				5	µA	MAX	V_{IN} = V_{CC}
I_{IL}	Input LOW Current				–5	µA	MAX	V_{IN} = GND
I_{IH}	Input HIGH Current[3]				5	µA	MAX	V_{IN} = 2.7V
I_{IL}	Input LOW Current[3]				–5	µA	MAX	V_{IN} = 0.5V
I_{IH}	Input HIGH Current (I/O Pins only)				15	µA	MAX	V_{IN} = V_{CC}
I_{IL}	Input LOW Current (I/O Pins only)				–15	µA	MAX	V_{IN} = GND
I_{IH}	Input HIGH Current[3] (I/O Pins only)				15	µA	MAX	V_{IN} = 2.7V
I_{IL}	Input LOW Current[3] (I/O Pins only)				–15	µA	MAX	V_{IN} = 0.5V
I_{OS}	Output Short Circuit Current[2]		–60			mA	MAX	V_{OUT} = 0.0V
C_{IN}	Input Capacitance[3]			5	10	pF		All inputs
C_{OUT}	Output Capacitance[3]			9	12	pF		All outputs

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Notes:

1. Typical limits are at V_{CC} = 5.0V, T_A = +25°C ambient.
2. Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high speed test apparatus and/or sample and hold techniques are preferable in order to minimize internal chip heating and more accurately reflect operational values. Otherwise prolonged shorting of a high output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.
3. This parameter is guaranteed but not tested.

DC CHARACTERISTICS (Over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Typ[1]	Max	Units	Conditions
I_{CCQC}	Quiescent Power Supply Current (CMOS inputs) Com'l Mil	.003 .003	0.3 0.5	mA mA	V_{CC} = MAX, $V_{IN} \leq$ 0.2V or $V_{IN} \geq V_{CC}$ – 0.2V, f = 0, Outputs Open
I_{CCQT}	Quiescent Power Supply Current (TTL inputs)		2.0	mA	V_{CC} = MAX, V_{IN} = 3.4V[2], f = 0, Outputs Open
I_{CCD}	Dynamic Power Supply Current[3]		0.25	mA/ mHz	V_{CC} = MAX, One Input Toggling, 50% Duty Cycle, $\overline{OE}$ = GND, $V_{IN} \leq$ 0.2V or $V_{IN} \geq V_{CC}$ – 0.2V, Outputs Open, T/$\overline{R}$ = GND or V_{CC}
I_{CC}	Total Power Supply Current[5]		4.0	mA	V_{CC} = MAX, 50% Duty Cycle, Outputs Open, One Bit Toggling at f_1 = 10MHz, T/$\overline{R}$ = $\overline{OE}$ = GND and $V_{IN} \leq$ 0.2V or $V_{IN} \geq V_{CC}$ – 0.2V
			5.0	mA	V_{CC} = MAX, 50% Duty Cycle, Outputs Open, One Bit Toggling at f_1 = 10MHz, T/$\overline{R}$ = $\overline{OE}$ = GND and V_{IN} = 3.4V or V_{IN} = GND
			6.5[4]	mA	V_{CC} = MAX, 50% Duty Cycle, Outputs Open, Eight Bits Toggling at f_1 = 2.5MHz, T/$\overline{R}$ = $\overline{OE}$ = GND and $V_{IN} \leq$ 0.2V or $V_{IN} \geq V_{CC}$ – 0.2V
			14.5[4]	mA	V_{CC} = MAX, 50% Duty Cycle, Outputs Open, Eight Bits Toggling at f_1 = 2.5MHz, T/$\overline{R}$ = $\overline{OE}$ = GND and V_{IN} = 3.4V or V_{IN} = GND

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Notes:
1. Typical values are at V_{CC} = 5.0V, +25°C ambient and maximum loading.
2. Per TTL driven input (V_{IN} = 3.4V); all other inputs at V_{CC} or GND.
3. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
4. Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.
5. $I_{CC} = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_{CC} = I_{CCQC} + I_{CCQT} D_H N_T + I_{CCD}(f_0/2 + f_1 N_1)$
   I_{CCQC} = Quiescent Current with CMOS input levels
   I_{CCQ} = 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_0 = Clock Frequency for Register Devices (Zero for Non-Register Devices)
   f_1 = Input Frequency
   N_1 = Number of Inputs at f_1
   All currents are in milliamps and all frequencies are in megahertz.

TRUTH TABLE

Inputs		Output
$\overline{OE}$	T/$\overline{R}$	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	High Z State

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H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care

AC CHARACTERISTICS

Symbol	Parameter	P54/74PCT245 P54/74PCT545 P54/74PCT645					P54/74PCT245A P54/74PCT545A P54/74PCT645A					Units	Fig. No.
		T_A=+25°C V_{CC}=+5.0V	MIL		COM'L		T_A=+25°C V_{CC}=+5.0V	MIL		COM'L			
		Typ.	Min.[1]	Max.	Min.[1]	Max.	Typ.	Min.[1]	Max.	Min.[1]	Max.		
t_{PLH}	Propagation Delay	3.7	1.5	7.5	1.5	6.5	3.3	1.5	4.9	1.5	4.6	ns	1
t_{PHL}	A_n to B_n or B_n to A_n	4.0	1.5	7.5	1.5	6.5	3.3	1.5	4.9	1.5	4.6	ns	3
t_{PZH}	Output	5.0	1.5	9.5	1.5	8.0	4.8	1.5	6.5	1.5	6.2	ns	1
t_{PZL}	Enable Time	5.0	1.5	9.5	1.5	8.0	4.8	1.5	6.5	1.5	6.2	ns	7
t_{PHZ}	Output	4.8	1.5	9.0	1.5	7.5	4.5	1.5	6.0	1.5	5.0	ns	8
t_{PLZ}	Disable Time	4.5	1.5	9.0	1.5	7.5	4.5	1.5	6.0	1.5	5.0	ns	

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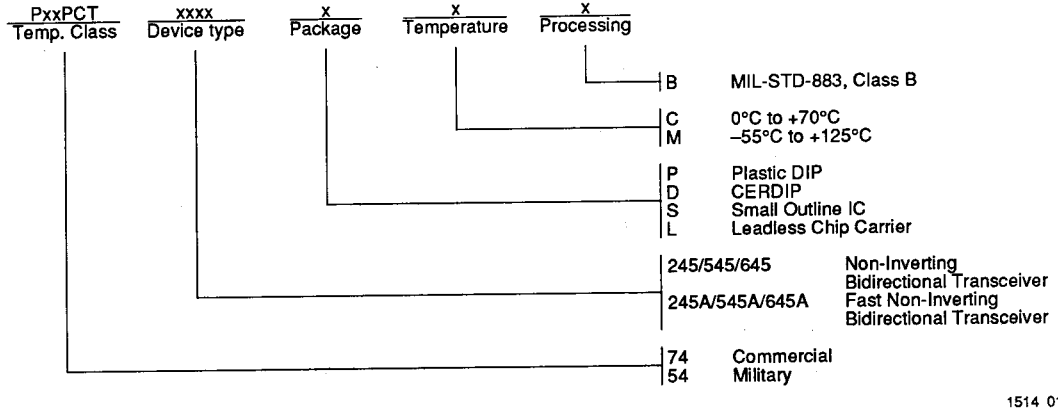
Notes:
1. Minimum limits are guaranteed but not tested on Propagation Delays.
AC Characteristics guaranteed with C_L = 50pF as shown in Figure 1.

ORDERING INFORMATION



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