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74HCT245

Octal 3-State Noninverting Bus Transceiver with LSTTL-Compatible Inputs

High-Performance Silicon-Gate CMOS

The 74HCT245 is identical in pinout to LS245. The device has TTL-Compatible Inputs.

The HCT245 is a 3-state noninverting transceiver that is used for 2-way asynchronous communication between data buses. The device has an active-low Output Enable pin, which is used to place the I/O ports into high-impedance states. The Direction control determines whether data flows from A to B or from B to A.

Features

- Output Drive Capability: 15 LSTTL Loads
- TTL/NMOS-Compatible Input Levels
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 4.5 to 5.5 V
- Low Input Current: 1.0 μA
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements Defined by JEDEC Standard No. 7A
- ESD Performance: HBM > 2000 V; Machine Model > 200 V
- Chip Complexity: 308 FETs or 77 Equivalent Gates
- This is a Pb-Free Device

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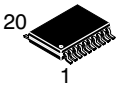
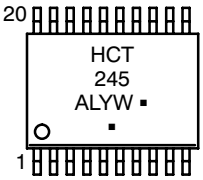
MARKING DIAGRAMS



TSSOP-20
DT SUFFIX
CASE 948E



HCT245	= Device Code
A	= Assembly Location
L	= Wafer Lot
Y	= Year
W	= Work Week
▪	= Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

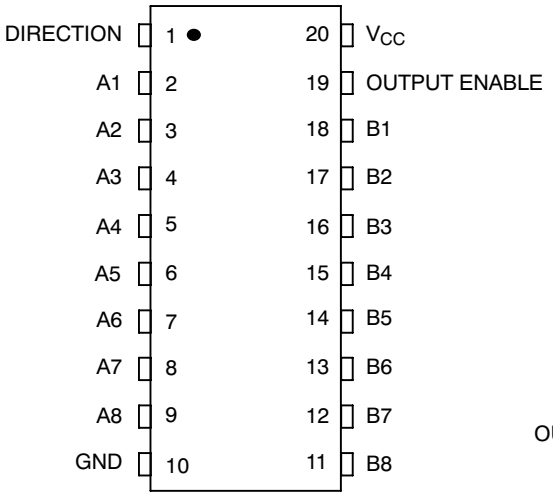


Figure 1. Pin Assignment

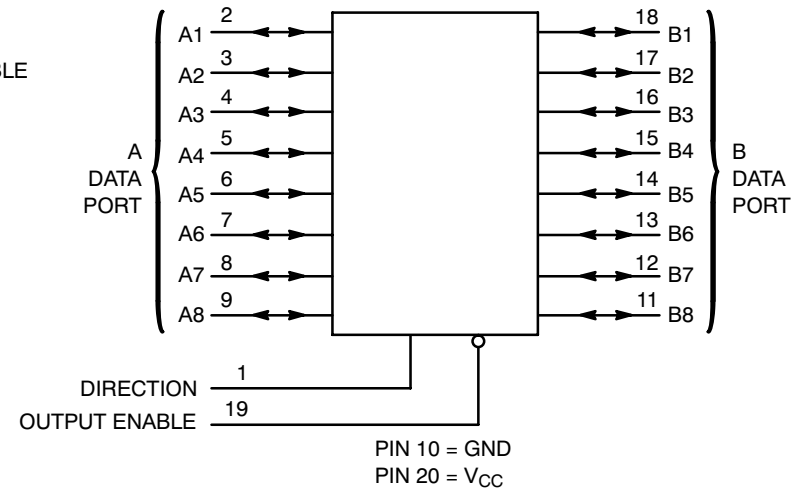


Figure 2. Logic Diagram

FUNCTION TABLE

Control Inputs		Operation
Output Enable	Direction	
L	L	Data Transmitted from Bus B to Bus A
L	H	Data Transmitted from Bus A to Bus B
H	X	Buses Isolated (High-Impedance State)

X = don't care

ORDERING INFORMATION

Device	Package	Shipping†
74HCT245DTR2G	TSSOP-20*	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
*This package is inherently Pb-Free.

MAXIMUM RATINGS (Note 1)

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +7.0	V
V_{IN}	DC Input Voltage		−0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage	(Note 2)	−0.5 to V_{CC} +0.5	V
I_{IK}	DC Input Diode Current		±20	mA
I_{OK}	DC Output Diode Current		±35	mA
I_{OUT}	DC Output Sink Current		±35	mA
I_{CC}	DC Supply Current per Supply Pin		±75	mA
I_{GND}	DC Ground Current per Ground Pin		±75	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature Under Bias		+150	°C
θ_{JA}	Thermal Resistance	TSSOP	128	°C/W
P_D	Power Dissipation in Still Air at 85°C	TSSOP	450	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 30% to 35%	UL 94 V-0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 3) Machine Model (Note 4)	>2000 >200	V
$I_{LATCHUP}$	Latchup Performance	Above V_{CC} and Below GND at 85°C (Note 5)	±300	mA

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 20 ounce copper trace with no air flow.
2. I_O absolute maximum rating must observed.
3. Tested to EIA/JESD22-A114-A.
4. Tested to EIA/JESD22-A115-A.
5. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)		4.5	5.5	V
V_{in}, V_{out}	DC Input Voltage, Output Voltage (Referenced to GND)		0	V_{CC}	V
T_A	Operating Temperature, All Package Types		–55	+125	°C
t_r, t_f	Input Rise and Fall Time (Figure 3)	V_{CC} = 4.5 V	0	500	ns

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Condition	V_{CC} (V)	Guaranteed Limit			Unit
				-55 to 25°C	≤85°C	≤125°C	
V_{IH}	Minimum High-Level Input Voltage	V_{out} = 0.1V $\|I_{out}\| \le 20\mu A$	4.5 5.5	2.0 2.0	2.0 2.0	2.0 2.0	V
V_{IL}	Maximum Low-Level Input Voltage	$V_{out} = V_{CC}$ - 0.1V $\|I_{out}\| \le 20\mu A$	4.5 5.5	0.8 0.8	0.8 0.8	0.8 0.8	V
V_{OH}	Minimum High-Level Output Voltage	$V_{in} = V_{IL}$ $\|I_{out}\| \le 20\mu A$	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		$V_{in} = V_{IL}$ $\|I_{out}\| \le 4.0mA$	4.5	3.98	3.84	3.70	
V_{OL}	Maximum Low-Level Output Voltage	$V_{in} = V_{IH}$ $\|I_{out}\| \le 20\mu A$	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		$V_{in} = V_{IH}$ $\|I_{out}\| \le 4.0mA$	4.5	0.26	0.33	0.40	
I_{in}	Maximum Input Leakage Current	$V_{in} = V_{CC}$ or GND	5.5	±0.1	±1.0	±1.0	μA
I_{OZ}	Maximum Three-State Leakage Current	Output in High- Impedance State $V_{in} = V_{IL}$ or V_{IH} $V_{out} = V_{CC}$ or GND	5.5	±0.5	±5.0	±10	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC}$ or GND I_{out} = 0μA	5.5	4.0	40	40	μA

				≥ -55°C	25 to 125°C	
ΔI_{CC}	Additional Quiescent Supply Current	V_{in} = 2.4V, Any One Input $V_{in} = V_{CC}$ or GND, Other Inputs I_{out} = 0μA	5.5	2.9	2.4	mA

6. Information on typical parametric values can be found in Chapter 2the ON Semiconductor High- Speed CMOS Data Book (DL129/D).
7. Total Supply Current = $I_{CC} + \Sigma\Delta I_{CC}$.

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input $t_r = t_f$ = 6 ns)

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			–55 to 25°C	≤ 85°C	≤ 125°C	
t_{PLH}, t_{PHL}	Maximum Propagation Delay, A to B, B to A (Figures 1 and 3)	4.5	15	19	22	ns
t_{PLZ}, t_{PHZ}	Maximum Propagation Delay, Direction or Output Enable to A or B (Figures 2 and 4)	4.5	22	28	33	ns
t_{PZL}, t_{PZH}	Maximum Propagation Delay, Output Enable to A or B (Figures 2 and 4)	4.5	22	28	33	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 3)	4.5	12	15	18	ns
C_{in}	Maximum Input Capacitance (Pin 1 or Pin 19)	-	10	10	10	pF
C_{out}	Maximum Three-State I/O Capacitance (I/O in High-Impedance State)	-	15	15	15	pF

8. For propagation delays with loads other than 50 pF, and information on typical parametric values, see the ON Semiconductor High- Speed CMOS Data Book (DL129/D).

		Typical @ 25°C, V_{CC} = 5.0 V	
C_{PD}	Power Dissipation Capacitance (Per Transceiver Channel) (Note 9)	40	pF

9. Used to determine the no-load dynamic power consumption: $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$. For load considerations, see the ON Semiconductor High- Speed CMOS Data Book (DL129/D).

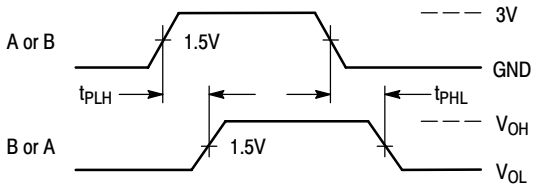


Figure 3. Switching Waveform

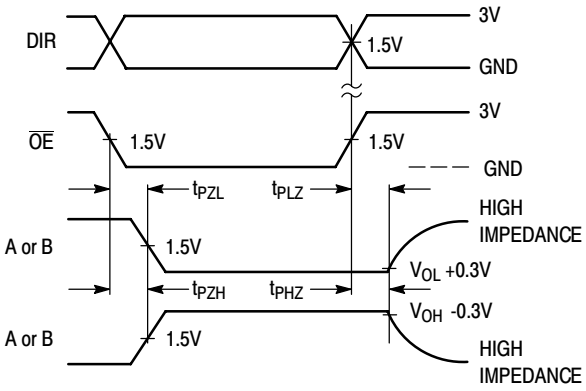
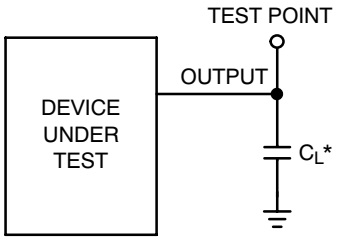
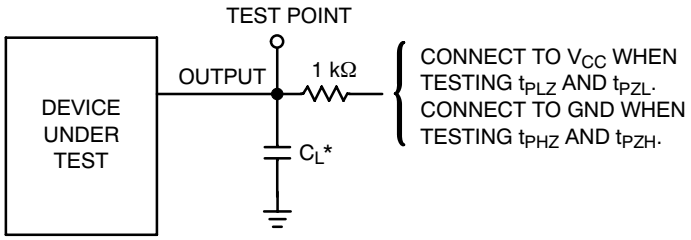


Figure 4. Switching Waveform



*Includes all probe and jig capacitance

Figure 5. Test Circuit



*Includes all probe and jig capacitance

Figure 6. Test Circuit

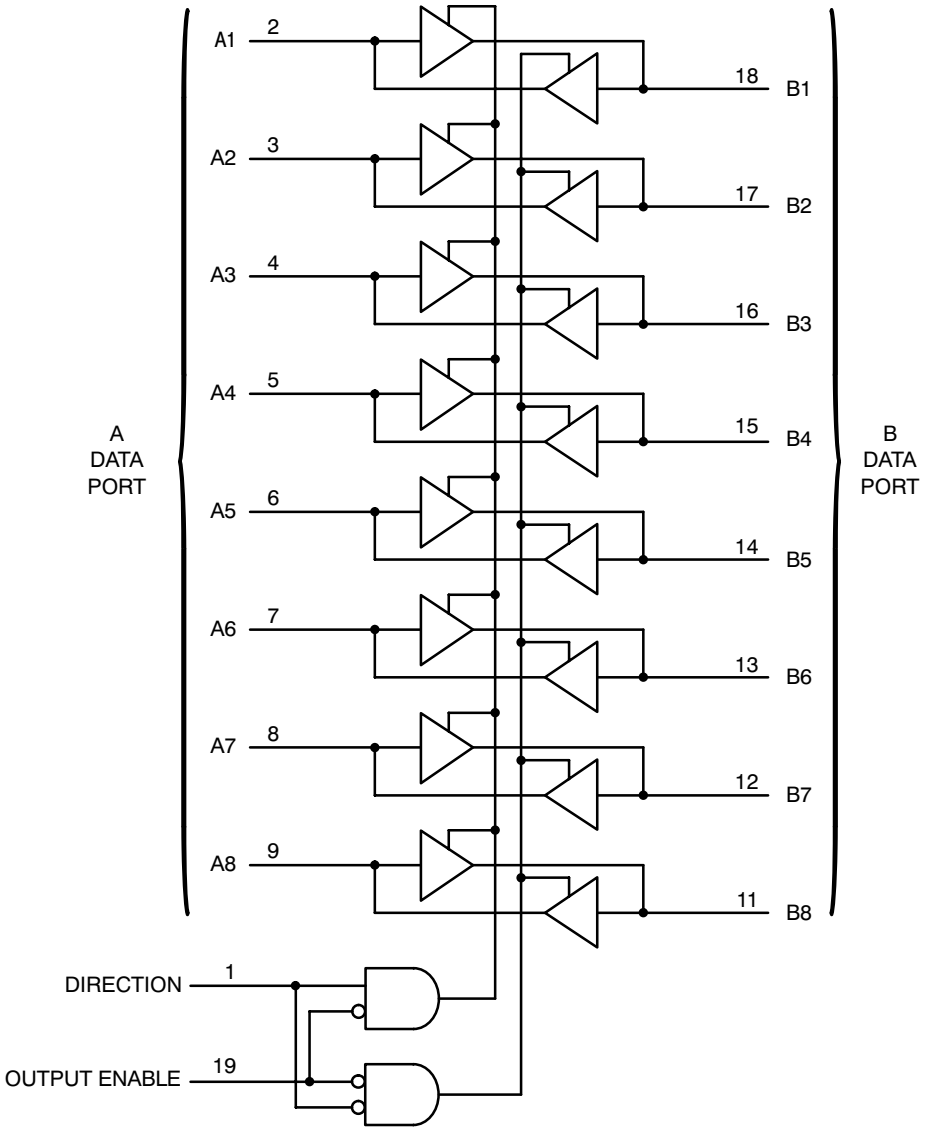
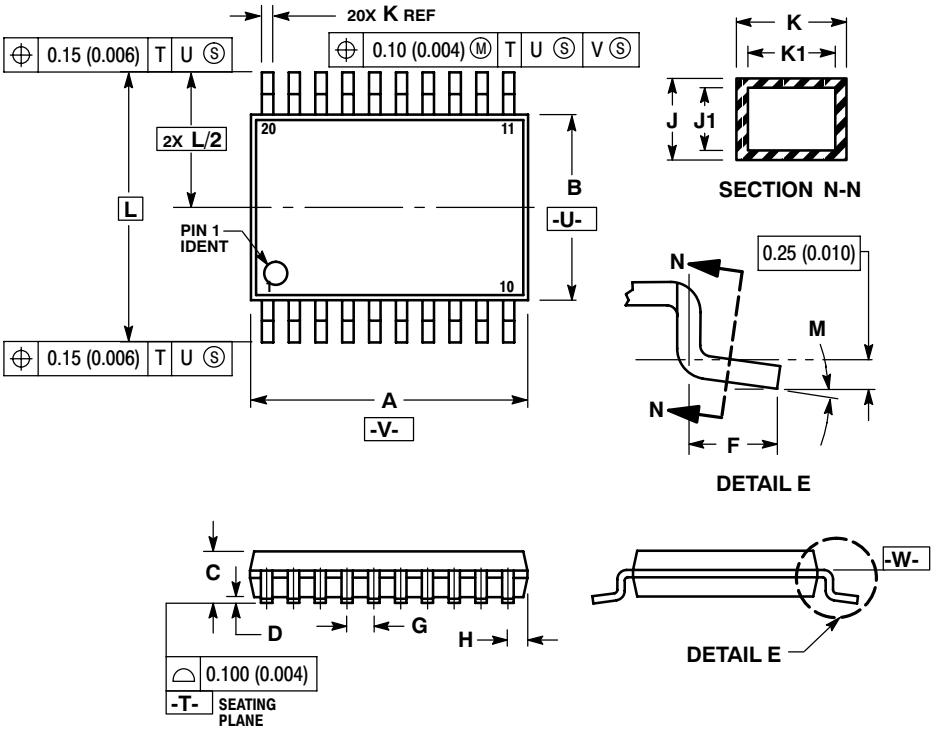


Figure 7. Expanded Logic Diagram

PACKAGE DIMENSIONS

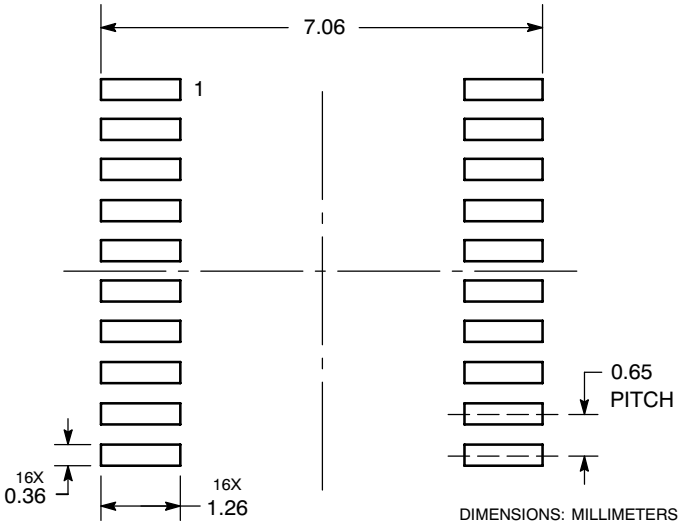
TSSOP-20
CASE 948E-02
ISSUE C



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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