

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

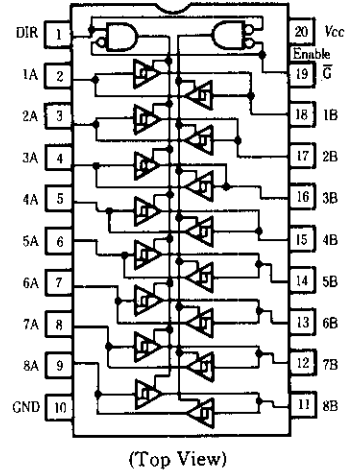
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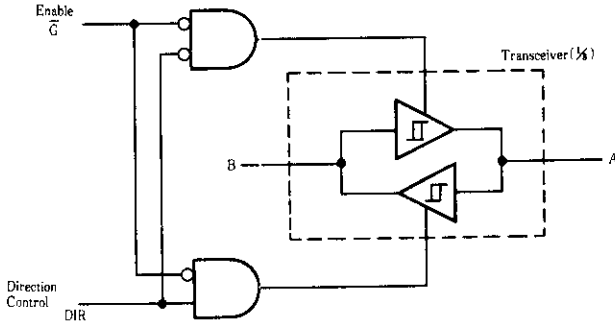
# HD74LS645 ● Octal Bus Transceivers (non-inverted 3-state outputs)

This octal bus transceiver is designed for asynchronous two-way communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction control (DIR) input. The enable input ( $\bar{G}$ ) can be used to disable the device so that the buses are effectively isolated.

## ■ PIN ARRANGEMENT



## ■ BLOCK DIAGRAM



## ■ RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	unit
Supply voltage	$V_{CC}$	4.75	5.00	5.25	V
Output current	$I_{OH}$	—	—	-15	mA
Output current	$I_{OL}$	—	—	24	mA
Operating temperature range	$T_{opr}$	-20	25	75	°C

## ■ FUNCTIONAL TABLE

Enable $\bar{G}$	Direction Control DIR	Operation
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

H; high level,  
L; low level,  
X; irrelevant

# HD74LS645

## ■ ELECTRICAL CHARACTERISTICS ( $T_a = -20 \sim +75^\circ\text{C}$ )

Item	Symbol	Test Conditions		min	typ*	max	Unit
Input voltage	$V_{IH}$			2.0			V
	$V_{IL}$			—	—	0.8	
Hysteresis	$V_T^+ - V_T^-$	$V_{CC} = 4.75\text{V}$		0.2	—	—	V
Output voltage	$V_{OH}$	$V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V},$ $V_{IL} = 0.8\text{V}$	$I_{OH} = -3\text{mA}$	2.4	—	—	V
			$I_{OH} = -15\text{mA}$	2	—	—	
	$V_{OL}$	$V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V},$ $V_{IL} = 0.8\text{V}$	$I_{OL} = 12\text{mA}$	—	—	0.4	V
			$I_{OL} = 24\text{mA}$	—	—	0.5	
Output current	$I_{OZH}$	$V_{CC} = 5.25\text{V}$	$V_O = 2.7\text{V}$	—	—	20	$\mu\text{A}$
	$I_{OZL}$	$\bar{G}$ input = 2V	$V_O = 0.4\text{V}$	—	—	-400	
Input current	$I_{IH}$	$V_{CC} = 5.25\text{V}, V_I = 2.7\text{V}$		—	—	20	$\mu\text{A}$
	$I_{IL}$	$V_{CC} = 5.25\text{V}, V_I = 0.4\text{V}$		—	—	-400	$\mu\text{A}$
	A or B	$V_{CC} = 5.25\text{V}$	$V_I = 5.5\text{V}$	—	—	0.1	mA
	DIR or $\bar{G}$		$V_I = 7\text{V}$	—	—	0.1	
Short-circuit output current	$I_{OS}^{***}$	$V_{CC} = 5.25\text{V}$		-40	—	-225	mA
Supply current **	$I_{CCH}$	$V_{CC} = 5.25\text{V}, \text{OUTPUT OPEN}$		—	48	70	mA
	$I_{CCL}$			—	62	90	
	$I_{CCZ}$			—	64	95	
Input clamp voltage	$V_{IK}$	$V_{CC} = 4.75\text{V}, I_{IN} = -18\text{mA}$		—	—	-1.5	V

\*  $V_{CC} = 5\text{V}, T_a = 25^\circ\text{C}$

\*\*  $I_{CC}$  is measured with all outputs open.

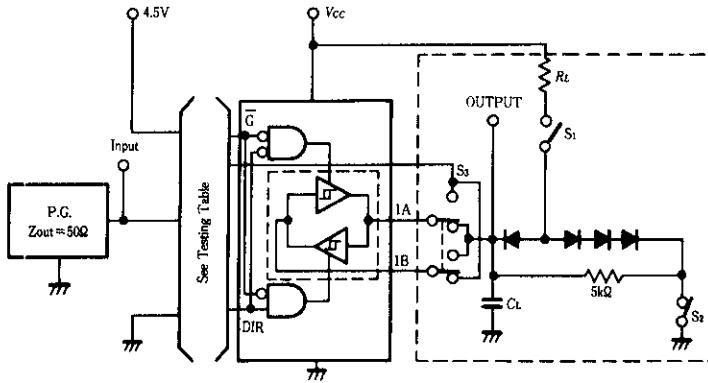
\*\*\* Not more than one output should be shorted at a time, duration of short-circuit should not exceed one second.

## ■ SWITCHING CHARACTERISTICS ( $V_{CC} = 5\text{V}, T_a = 25^\circ\text{C}$ )

Item	Symbol	Input	Output	Test Condition	min	typ	max	Unit
Propagation delay time	$t_{PLH}$	A	B	$C_L = 45\text{pF},$ $R_L = 667\ \Omega$	—	8	15	ns
		B	A		—	8	15	ns
	$t_{PHL}$	A	B		—	11	15	ns
		B	A		—	11	15	ns
Output enable time	$t_{ZL}$	$\bar{G}$	A		—	31	40	ns
		$\bar{G}$	B		—	31	40	ns
	$t_{ZH}$	$\bar{G}$	A		—	26	40	ns
		$\bar{G}$	B		—	26	40	ns
Output disable time	$t_{LZ}$	$\bar{G}$	A	$C_L = 5\text{pF},$ $R_L = 667\ \Omega$	—	15	25	ns
		$\bar{G}$	B		—	15	25	ns
	$t_{HZ}$	$\bar{G}$	A		—	15	25	ns
		$\bar{G}$	B		—	15	25	ns

## TESTING METHOD

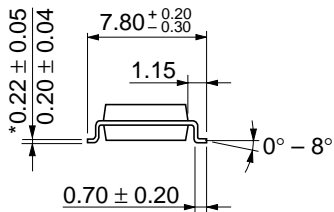
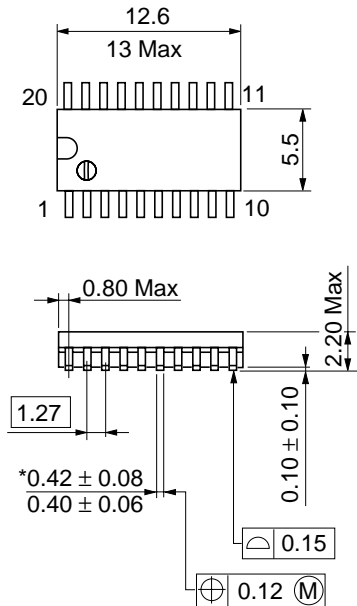
### Test Circuit



- Notes)
1.  $C_L$  includes probe and jig capacitance.
  2. All diodes are 1S2074  $\text{Ⓢ}$ .
  3. 2A-2B, 3A-3B, 4A-4B, 5A-5B, 6A-6B, 7A-7B, 8A-8B are identical to above load circuit.
  4.  $S_2$  is an input-output switch.

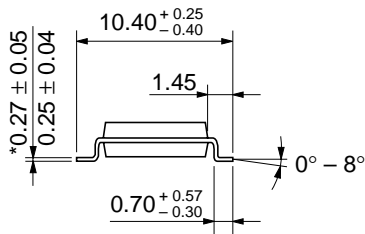
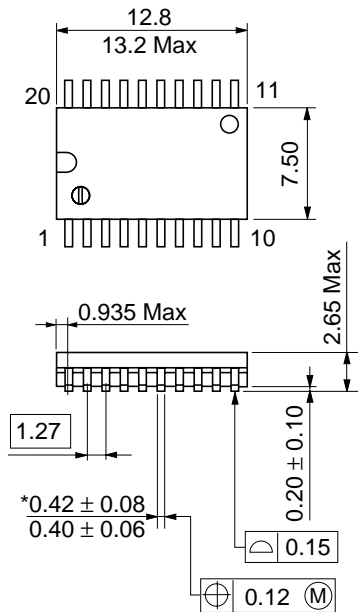


Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Weight (reference value)	1.26 g



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.31 g



Hitachi Code	FP-20DB
JEDEC	Conforms
EIAJ	—
Weight (reference value)	0.52 g

\*Dimension including the plating thickness  
 Base material dimension



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