HD75173

Quadruple Differential Line Receivers With 3 State Outputs

HITACHI

ADE-205-592 (Z)
1st. Edition
Dec. 2000

Description

The HD75173 is a quadruple differential line receiver with three state outputs. It is designed to satisfy the requirements of EIA standards RS-422A, RS-423A and several CCITT recommendations. Each receiver features an active high enable and an active low enable common to all four receivers. It also features differential input sensitivity of ±200 mV.

Function Table

Differential Inputs	**Enables**		**Output**
A-B	**G**	**$\overline{G}$**	**Y**
$V_{ID} \geq 0.2$ V	H	X	H
	X	L	H
–0.2 V < V_{ID} < 0.2 V	H	X	?
	X	L	?
$V_{ID} \leq$ –0.2 V	H	X	L
	X	L	L
X	L	H	Z

H : High level
L : Low level
X : Irrelenant
? : Indeterminate
Z : High impedance

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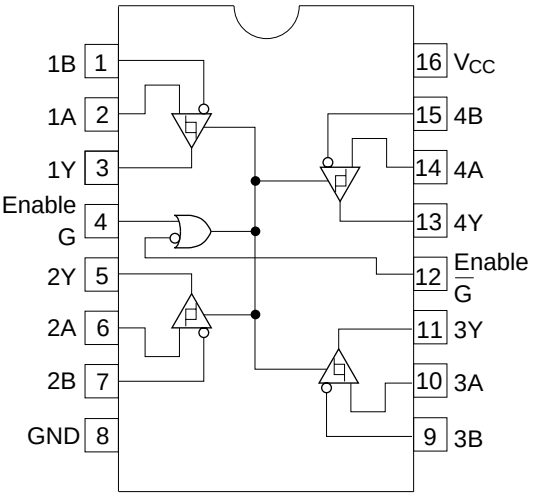
Pin Arrangement



(Top view)

Absolute Maximum Ratings (Ta = 0 to 70°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	7	V
Input Voltage, A or B Inputs	V_{IN}	±25	V
Differential Input Voltage*[1]	V_{ID}	±25	V
Enable Input Voltage	V_{IE}	7	V
Output Current	I_{OL}	50	mA
Power Dissipation (Ta = 25°C)	P_T	1150	mW
Operating temperature range	Topr	0 to 70	°C
Storage Temperature Range	Tstg	–65 to +150	°C

Notes: 1. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input

2. The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.75	5.00	5.25	V
Common Mode Input Voltage	V_{IN}	—	—	±12	V
Differential Input Voltage	V_{ID}	—	—	±12	V
Output Current	V_{OH}	—	—	–400	µA
	V_{OL}	—	—	16	mA
Operating Temperature	Topr	0	—	70	°C

DC Electrical Characteristics (Ta = 0 to 70°C)

Item	Symbol	Min	Typ *[1]	Max	Unit	Conditions
Differential Input High Threshold Voltage	V_{TH}	—	—	0.2	V	V_O = 2.7 V, I_O = –0.4 mA
Differential Output Low Threshold Voltage	V_{TL}	–0.2*[2]	—	—	V	V_O = 0.5 V, I_O = 16 mA
Hysteresis	$V_T^+ - V_T^-$	—	50	—	mV	
Enable Input Voltage	V_{IH}	2	—	—	V	
	V_{IL}	—	—	0.8		
Enable Input Clamp Voltage	V_{IK}	—	—	–1.5	V	II = –18 mA
Output Voltage	V_{OH}	2.7	—	—	V	V_{ID} = 200 mV, I_{OH} = –400 µA
	V_{OL}	—	—	0.45	V	V_{ID} = –200 mV, I_{OL} = 8 mA
		—	—	0.5		V_{ID} = –200 mV, I_{OL} = 16 mA
High Impedance State	V_{OZ}	—	—	–20	µA	V_O = 0.4 V
Output Current		—	—	+20		V_O = 2.4 V
Line Input Current	I_I	—	—	1	mA	Other Input at 0 V*[4] V_I = 12 V
		—	—	–0.8		V_I = –7 V
Enable Input Current	I_{IH}	—	—	20	µA	V_{IH} = 2.7 V
	I_{IL}	—	—	–100	µA	V_{IL} = 0.4 V
Input Resistance	ri	12	—	—	kΩ	
Short Circuit Output Current*[3]	I_{OS}	–15	—	–85	mA	
Supply Current	I_{CC}	—	—	70	mA	

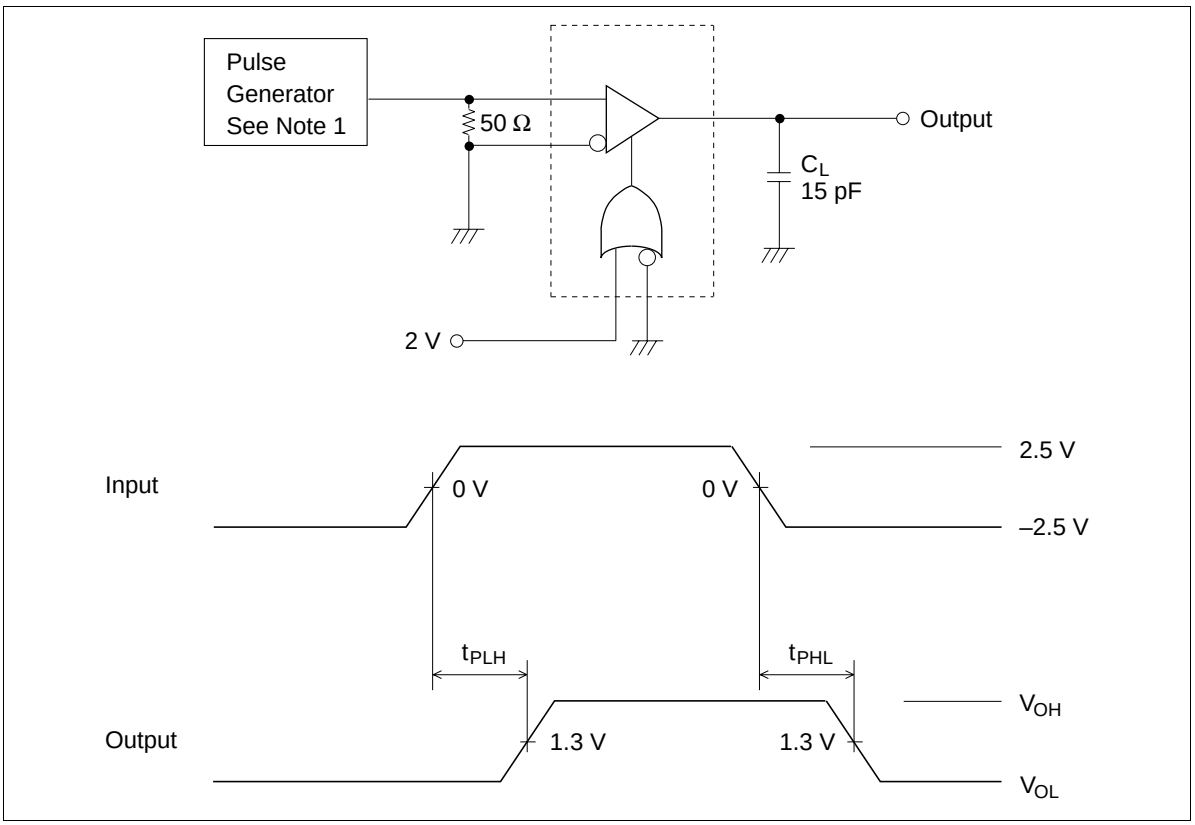
Notes: 1. All Typical Values are at V_{CC} = 5 V, Ta = 25°C
2. The algebraic convention is used in this data sheet for threshold voltage levels only.
3. Not more than one output should be shorted at a time.
4. Refer to EIA standards RS-422A and RS-423A for exact conditions.

Switching Characteristics (V_{CC} = 5 V, Ta = 25°C)

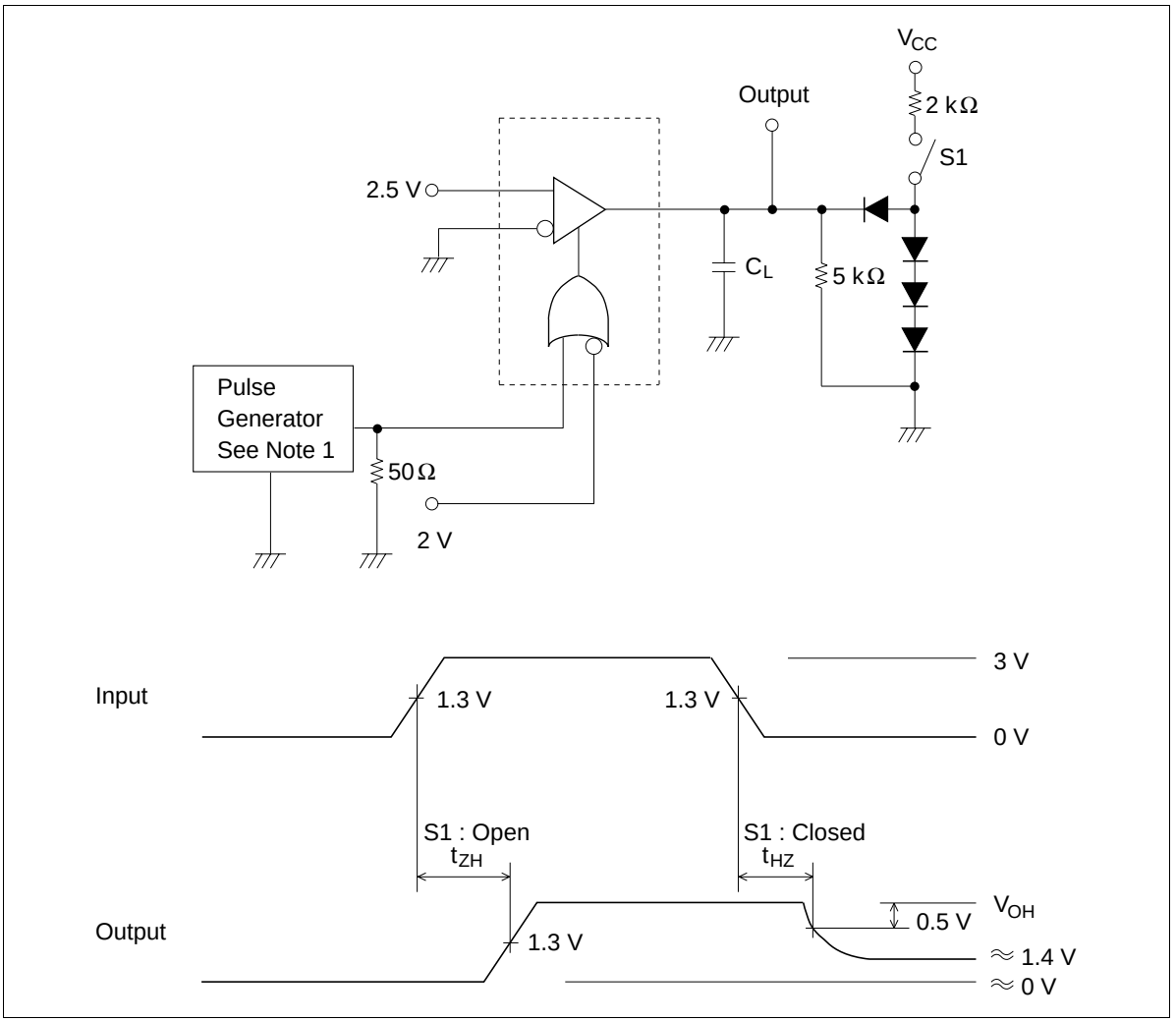
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Propagation Delay Time	t_{PLH}	—	20	35	ns	C_L = 15 pF
	t_{PHL}	—	22	35		
Output Enable Time	t_{ZH}	—	17	22		C_L = 15 pF
	t_{ZL}	—	20	25		
Output Disable Time	t_{HZ}	—	21	30		C_L = 5 pF
	t_{LZ}	—	30	40		

Switching Time Test Method

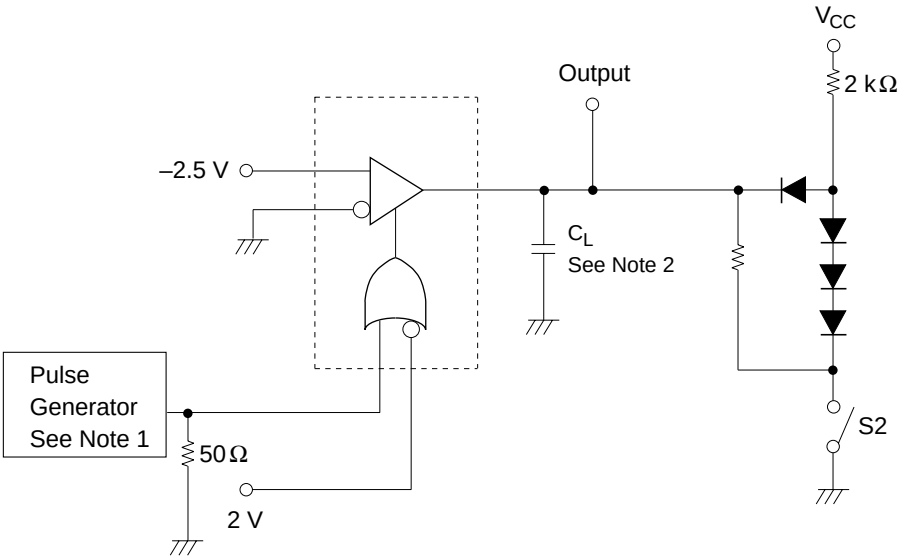
1. t_{PLH}, t_{PHL}

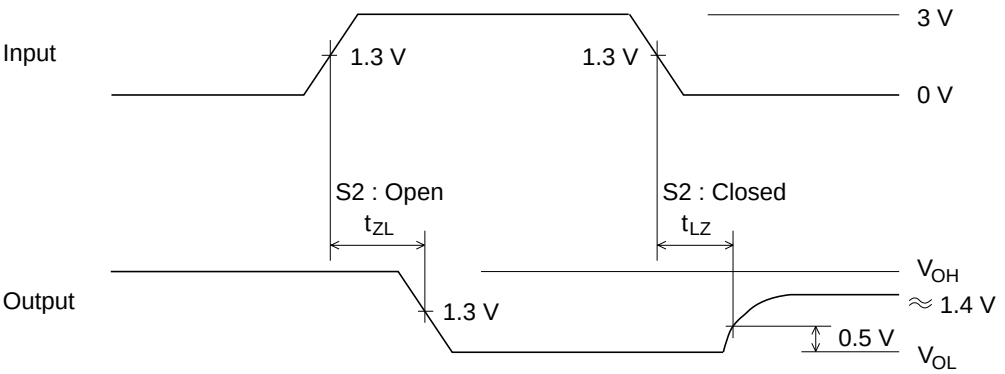


2. t_{ZH}, t_{ZL}


V_{CC}
Output
2 kΩ
S1
2.5 V
C_L
5 kΩ
Pulse
Generator
See Note 1
50 Ω
2 V
Input
3 V
1.3 V
1.3 V
0 V
S1 : Open
t_{ZH}
S1 : Closed
t_{HZ}
V_{OH}
0.5 V
Output
1.3 V
≈ 1.4 V
≈ 0 V

3. t_{ZL}, t_{LZ}

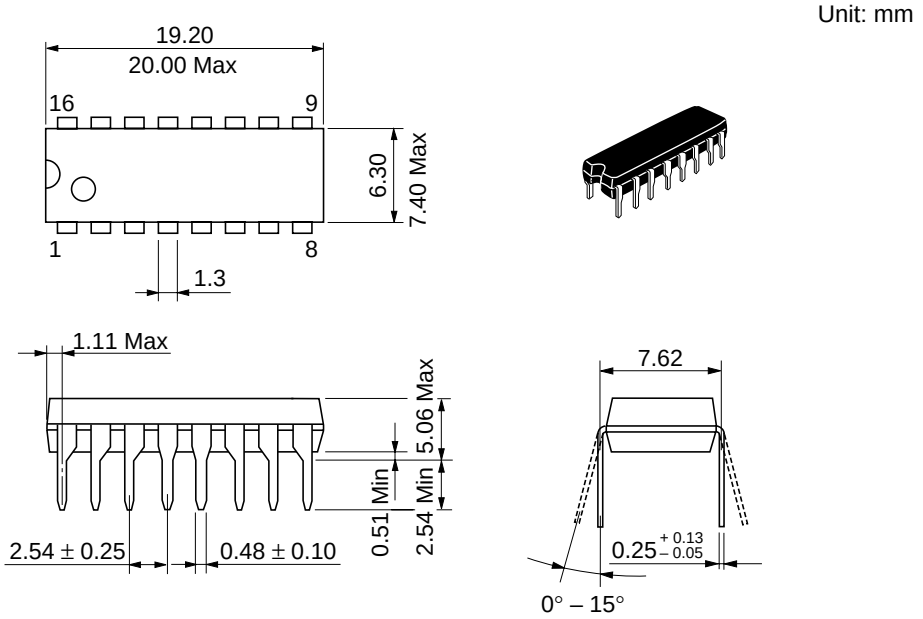




Notes:
1. The pulse generator has the following characteristics:
   PRR = 1 MHz, 50% duty cycle, $t_r = t_f = 6$ ns, Zout = 50Ω
2. C_L includes probe and jig capacitance.
3. All diodes are 1S2074(H).
4. To test the active low enable $\overline{G}$, ground G and apply an inverted input waveform to $\overline{G}$.

Package Dimensions

Unit: mm



Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	1.07 g

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