HD75175

Quadruple Differential Line Receiver With 3 State Outputs

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Description

The HD75175 is a differential line receiver with three state outputs designed to meet the requirements of EIA standards RS-422A, RS-423A, RS-485 and several CCITT recommendations. The device features input sensitivity of ±200 mV over a common mode input voltage range of -12 V to $+12$ V. Each receiver features two active high enables, each common to two receivers.

Function Table (Each Receiver)

Differential Inputs A-B	Enable	Output
$V_{ID} \geq 0.2$ V	H	H
-0.2 V $< V_{ID} < 0.2$ V	H	?
$V_{ID} \leq -0.2$ V	H	L
X	L	Z

H : High Level
L : Low Level
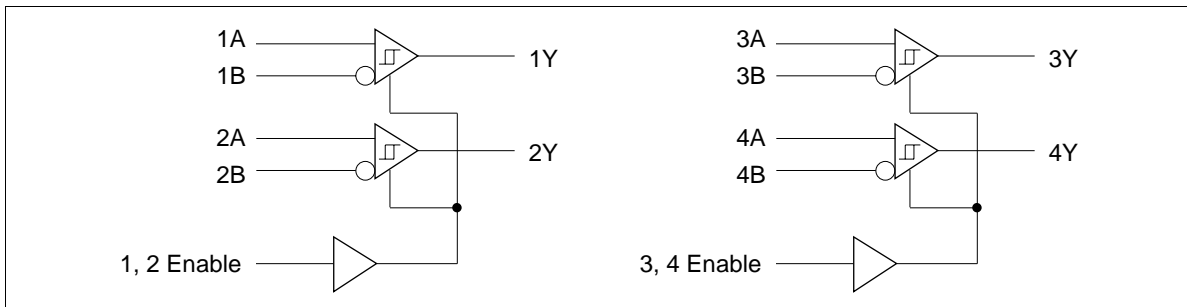X : Irrelevant
? : Indeterminate
Z : high impedance

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Pin Arrangement

(Top view)
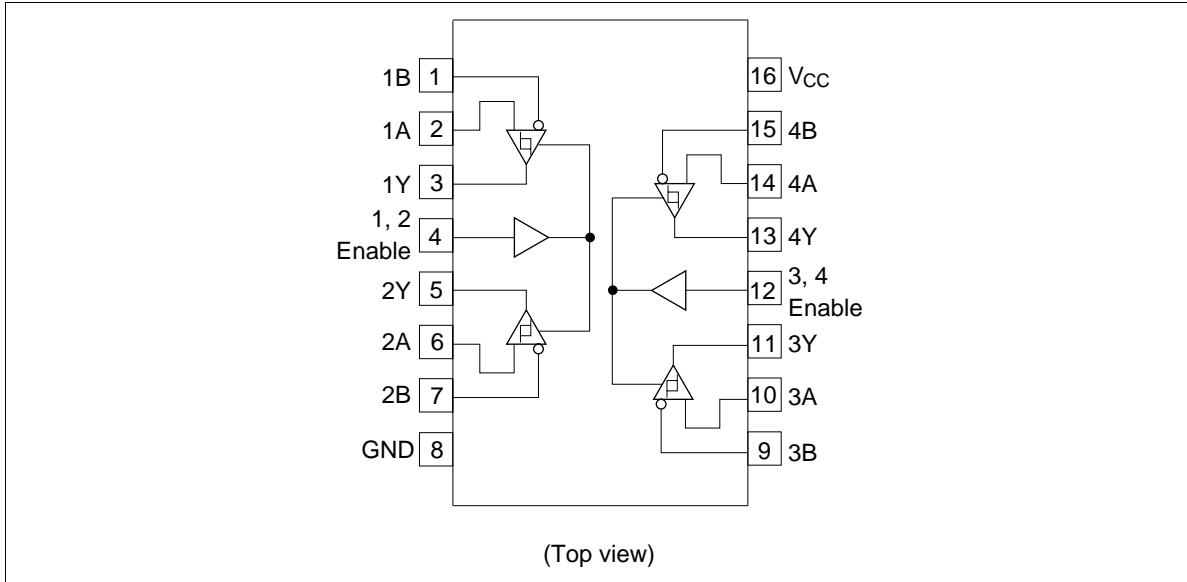
Logic Diagram

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Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol		Rating	Unit
Supply Voltage	V_{CC}		7	V
Input Voltage, A or B Inputs	V_{IN}		±25	V
Differential Input Voltage[2]	V_{ID}		±25	V
Enable Input Voltage	V_{IE}		7	V
Low Level Output Current	I_{OL}		50	mA
Power Dissipation	P_T[1]	DP	1150	mW
		FP	785	
Operating Temperature Range	Topr		0 to 70	°C
Storage Temperature Range	Tstg		−65 to +150	°C

Note: 1.   The above date were taken by the ΔV_{BE} method, mounting on a glass epoxy board ($40 \times 40 \times 1.6$ mm) of 10% wiring density.

2.   Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.

3.   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_{IC}	—	—	±12	V
Differential Input Voltage	V_{ID}	—	—	±12	V
Output Current	I_{OH}	—	—	−400	µA
	I_{OL}	—	—	16	mA
Operating Temperature	Topr	0	—	70	°C

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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 Input Low Threshold Voltage	V_{TL}	–0.2	—	—	V	V_O = 0.5 V, I_O = 16 mA
Hysteresis*[2]	$V_T^+ - V_T^-$	—	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		I_{OL} = 16 mA
High Impedance State Output	I_{OZ}	—	—	–20	µA	V_O = 0.4 V
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	I_{IH} = 2.7 V
	I_{IL}	—	—	–100	µA	I_{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. Hysteresis is the difference between the positive going input threshold voltage V_T^+ and the negative going input threshold voltage V_T^-.
3. Not more than one output should be shorted at a time.
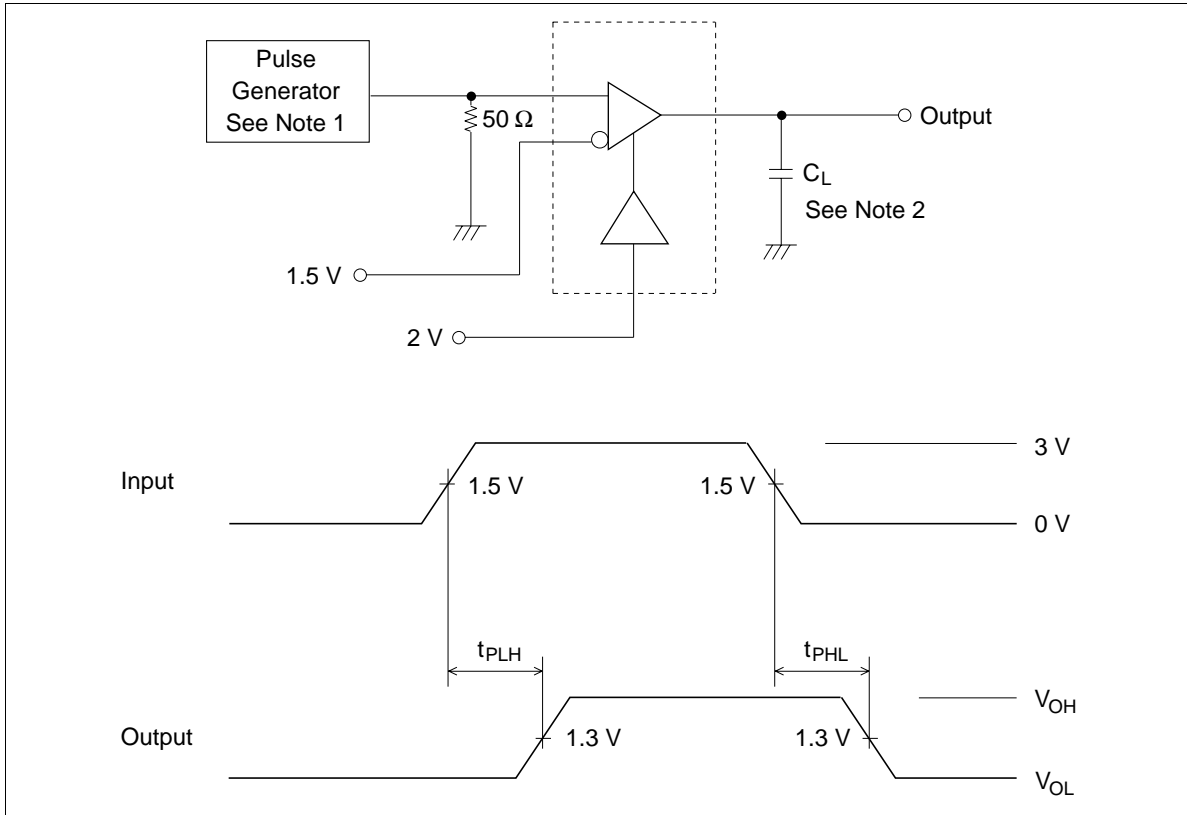4. Refer to EIA standards RS-422A and RS-485 for exact conditions.

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}	—	13	30		C_L = 15 pF
	t_{ZL}	—	19	30		
Output Disable Time	t_{HZ}	—	26	35		C_L = 5 pF
	t_{LZ}	—	25	35		

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Switching Time Test Method

1. t_{PLH}, t_{PHL}

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2. t_{ZH}, t_{HZ}

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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 = 50 Ω
2. C_L includes probe and jig capacitance.
3. All diodes are 1S2074(H).
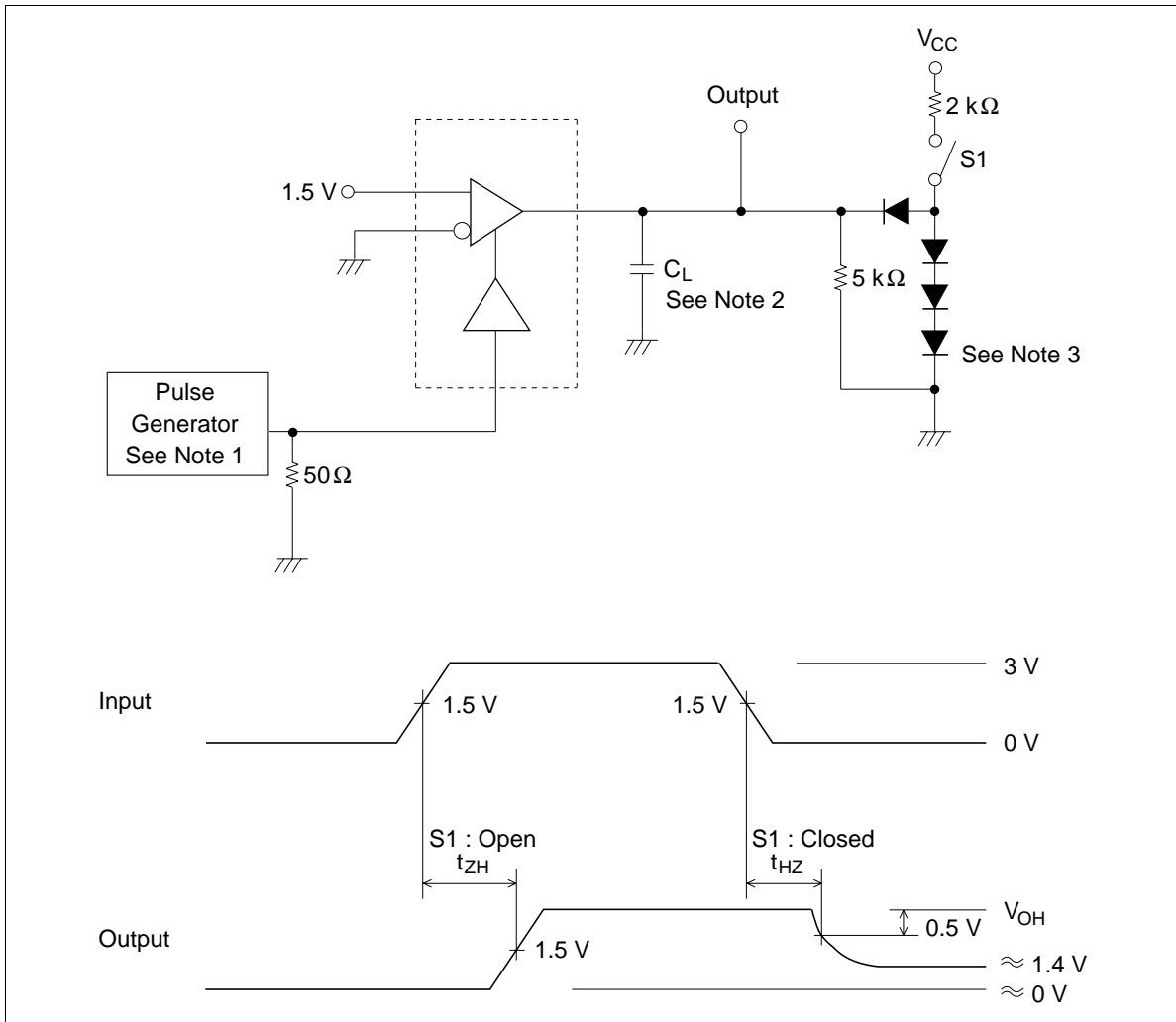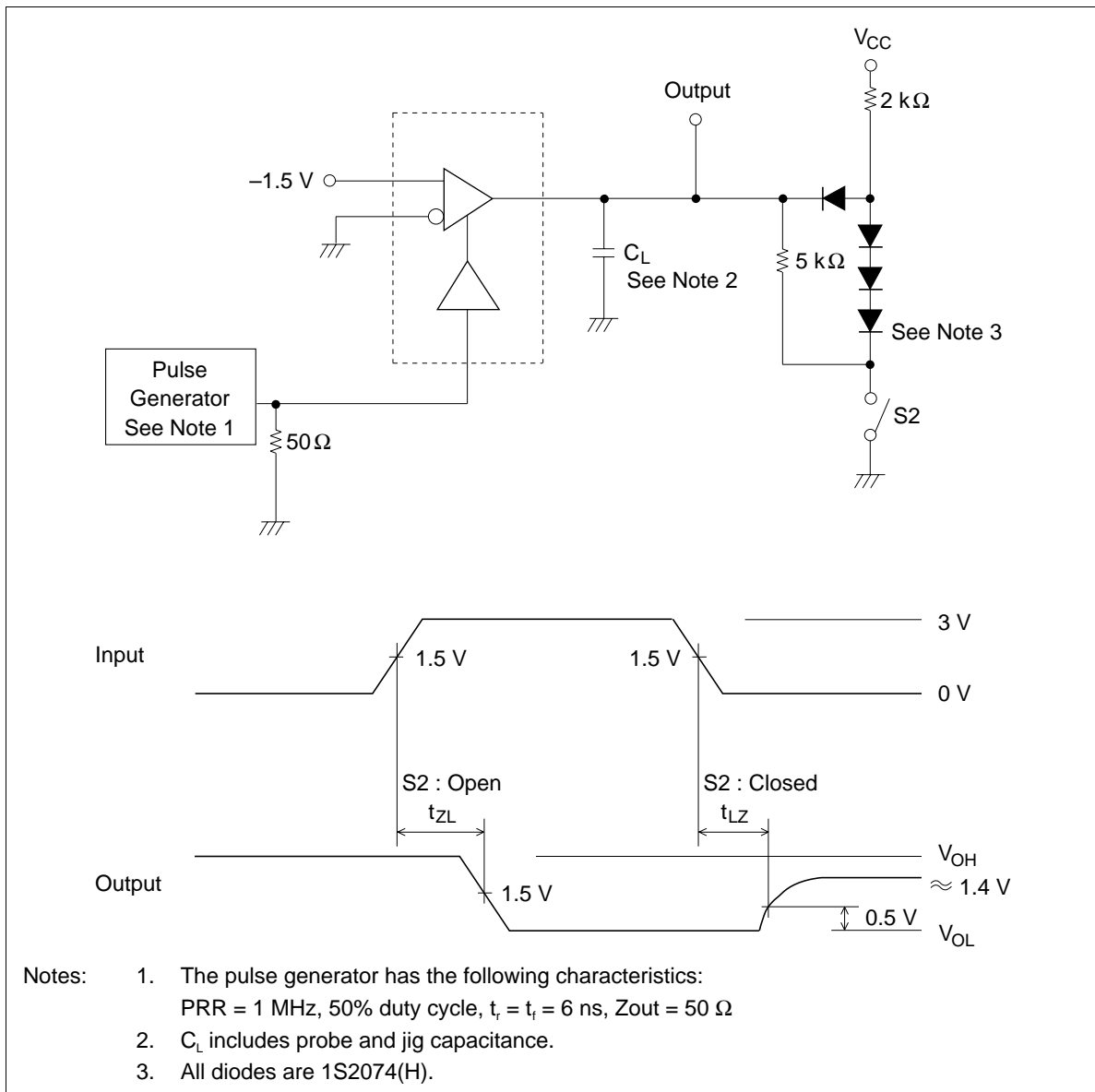
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Package Dimensions

Unit: mm

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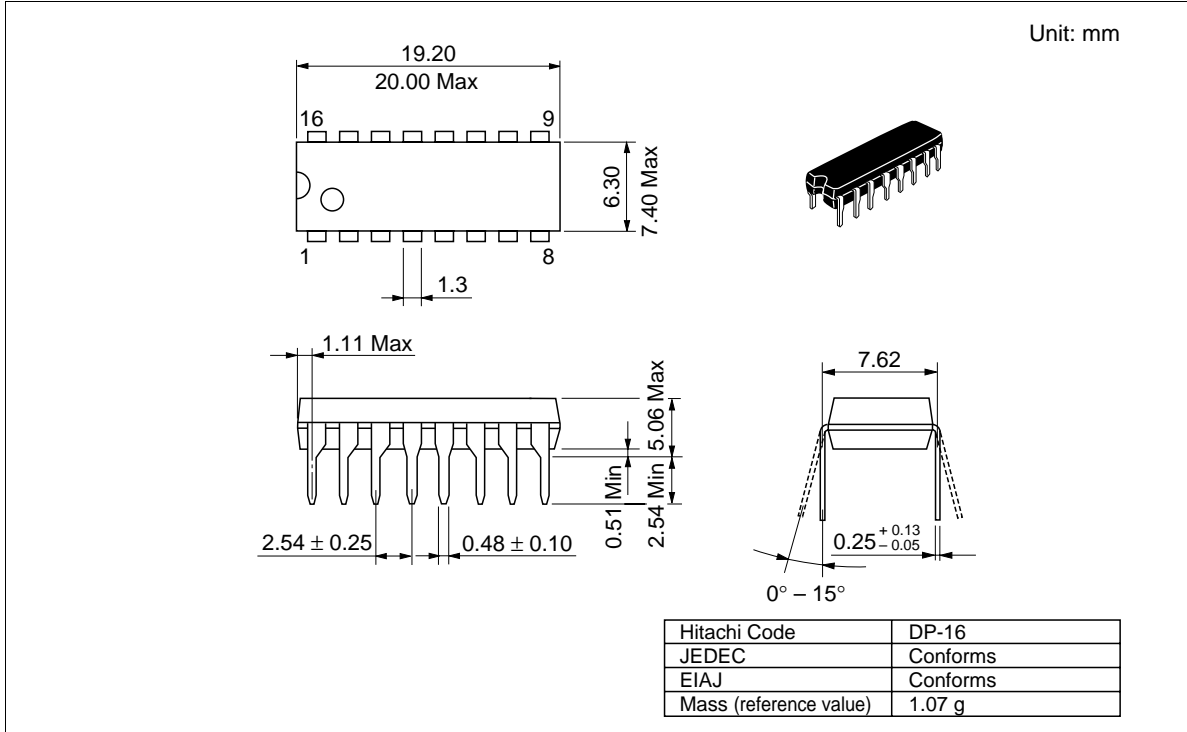
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