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

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HD293487

Quadruple Differential Line Drivers With 3 State Outputs



ADE-205-585 (Z)

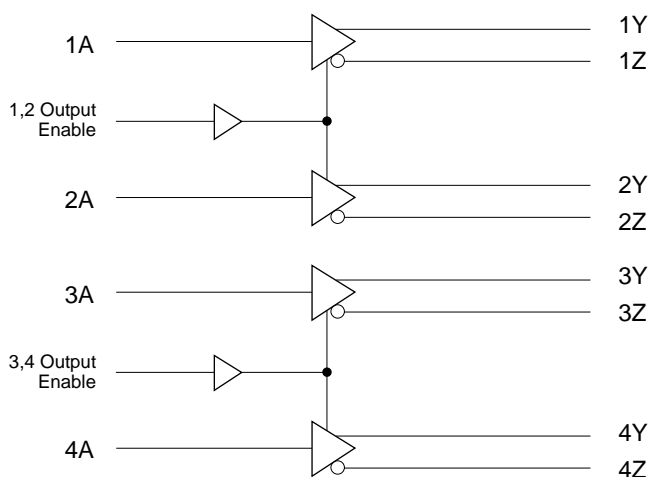
1st. Edition

Dec. 2000

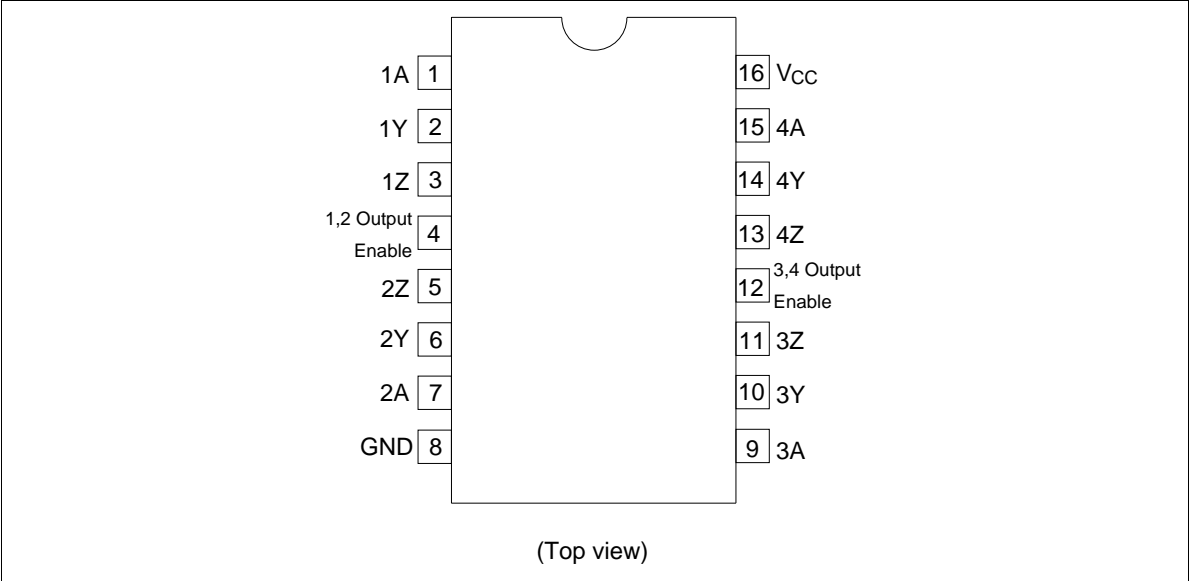
Description

The HD293487 features line drivers which satisfy the requirements of EIA RS-422 A. This device is designed to provide differential signals with high current capability on bus lines. When the enable input is low, the associated outputs are in a high impedance state. The output circuit has active pull up and pull down and is capable of sinking and sourcing 48 mA.

Logic Diagram



Pin Arrangement



Function Table

Input A	Output Enable	Output Y	Z
H	H	H	L
L	H	L	H
X	L	Z	Z

- H : High level
- L : Low level
- X : Irrelevant
- Z : High inpedance (Off state)

Absolute Maximum Ratings

Item	Symbol	Ratings		Unit
Supply Voltage	V_{CC}	7.0		V
Input Voltage	V_{IN}	5.5		V
Power Dissipation	P_T^{*1}	DP	1000	mW
		FP	785	
Operating Temperature	T_{opr}	0 to + 70		°C
Storage Temperature	T_{stg}	−65 to + 150		°C

Notes: 1. The above data were taken by the ΔV_{EB} method mounting on a glass epoxy board (40 × 40 × 1.6 mm) of 10% wiring density.

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.

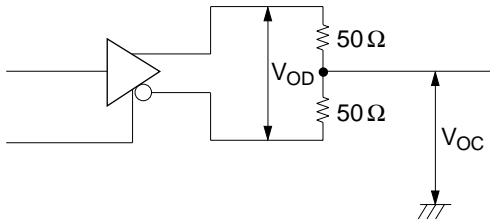
Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.75	5.00	5.25	V
Output Current	I_{OH}	—	—	−48	mA
	I_{OL}	—	—	48	
Operating Temperature	T_{opr}	0	25	70	°C

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

Item	Symbol	Min	Typ*1	Max	Unit	Conditions
Input Voltage	V_{IH}	2.0	—	—	V	
	V_{IL}	—	—	0.8		
Input Clamp Voltage	V_{IK}	—	—	-1.5	V	$V_{CC} = 4.75\text{ V}$, $I_I = -18\text{ mA}$
Output Voltage	V_{OH}	2.5	—	—	V	$V_{CC} = 4.75\text{ V}$, $V_{IH} = 2\text{ V}$, $V_{IL} = 0.8\text{ V}$, $I_{OH} = -20\text{ mA}$
		2.0	—	—		$V_{CC} = 4.75\text{ V}$, $V_{IH} = 2\text{ V}$, $V_{IL} = 0.8\text{ V}$, $I_{OH} = -48\text{ mA}$
	V_{OL}	—	—	0.5		$V_{CC} = 4.75\text{ V}$, $V_{IH} = 2\text{ V}$, $V_{IL} = 0.8\text{ V}$, $I_{OL} = 48\text{ mA}$
	$ V_{OD} $	2.0	—	—		$R_L = 100\text{ }\Omega^{*2}$
	$\Delta V_{OD} $	—	—	± 0.4		
	V_{OC}	—	—	3.0		
	$\Delta V_{OC} $	—	—	± 0.4		
Output Current	I_O	—	—	100	μA	$V_{CC} = 0\text{ V}$, $V_O = 6\text{ V}$
		—	—	-100		$V_{CC} = 0\text{ V}$, $V_O = -0.25\text{ V}$
	I_{OZ}	—	—	100		Output Enables = 0.8 V, $V_O = 2.7\text{ V}$
		—	—	-100		Output Enables = 0.8 V, $V_O = 0.5\text{ V}$
Input Current	I_I	—	—	100	μA	$V_I = 5.5\text{ V}$
	I_{IH}	—	—	50		$V_I = 2.7\text{ V}$
	I_{IL}	—	—	-400		$V_I = 0.5\text{ V}$
Short Circuit Output Current	I_{OS}	-40	—	-140	mA	$V_I = 2.0\text{ V}$
Supply Current	I_{CC}	—	—	105	mA	All Input GND without load
		—	—	85		Output Enable = 2 V

Notes: 1. All typical values are at $V_{CC} = 5\text{ V}$, $T_a = 25^\circ\text{C}$.
2. $\Delta |V_{OD}|$ or $\Delta |V_{OC}|$ denote the difference of V_{OD} or V_{OC} when input voltage is changed from “H” to “L”.

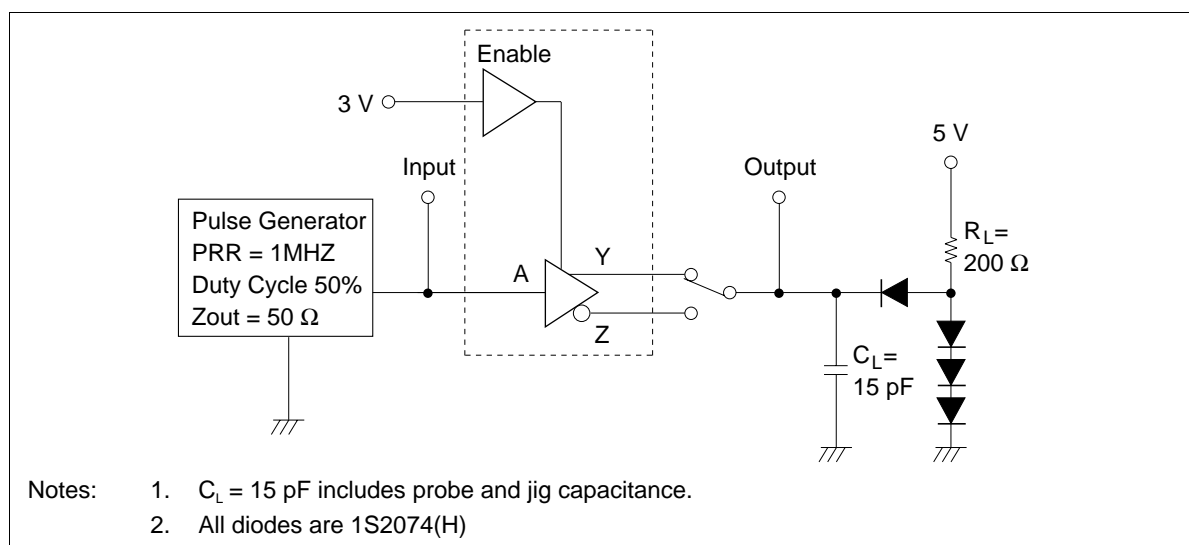


Switching Characteristics ($V_{CC} = 5\text{ V}$, $T_a = 25^\circ\text{C}$)

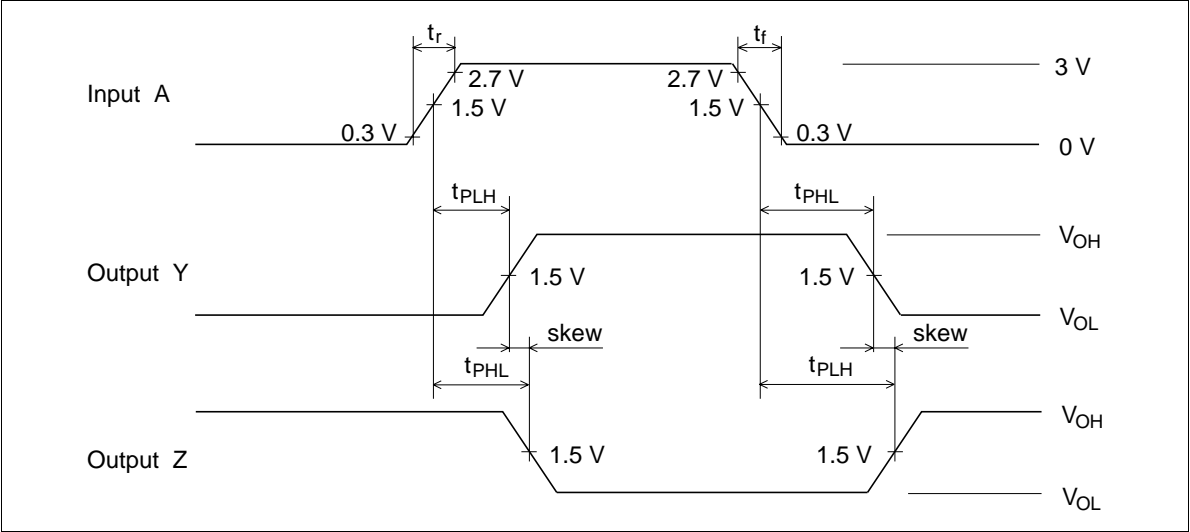
Item	Symbol	Min	Typ	Max	Unit	Conditions
Propagation Delay Time	t_{PLH}	—	—	20	ns	$C_L = 15\text{ pF}$
	t_{PHL}	—	—	20		
Output to Output Skew		—	—	6	ns	
Differential Output Transition Time	t_{TD}	—	—	20	ns	$C_L = 15\text{ pF}$, $R_L = 100\ \Omega$
Output Enable Time	t_{ZH}	—	—	30	ns	$C_L = 50\text{ pF}$
	t_{ZL}	—	—	30		
Output Disable Time	t_{HZ}	—	—	25	ns	
	t_{LZ}	—	—	25		

Switching Time Test Method

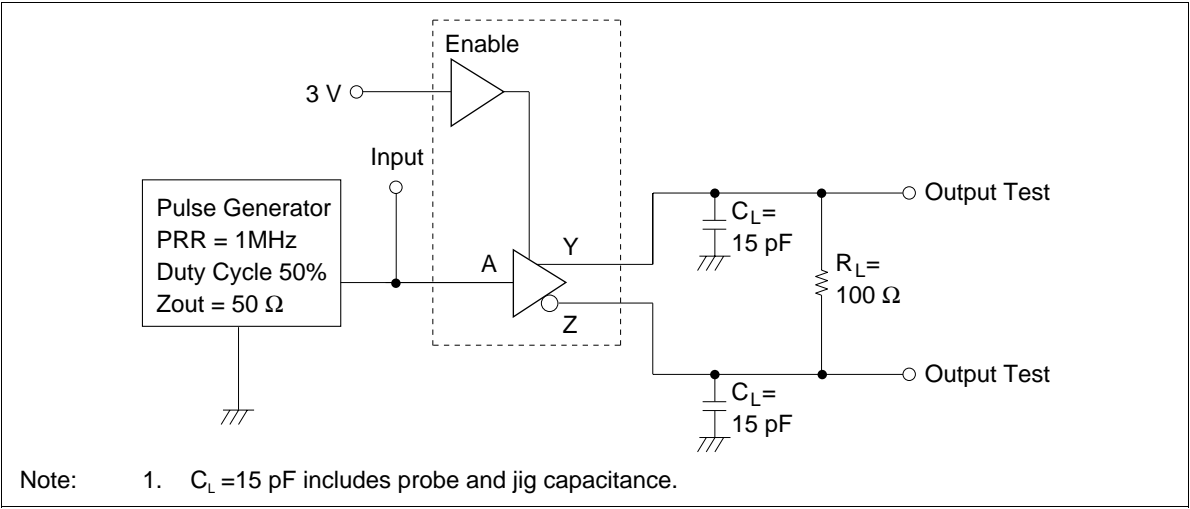
Test Circuit 1



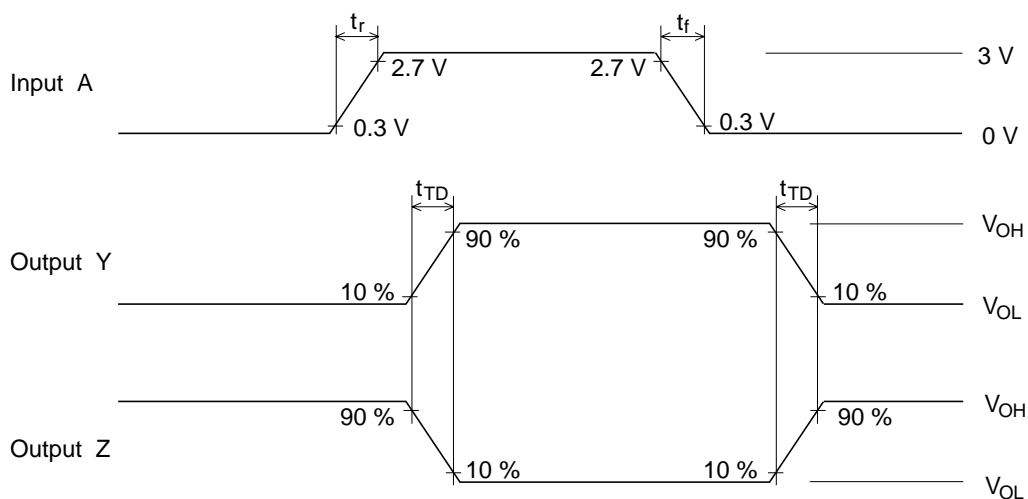
Waveforms



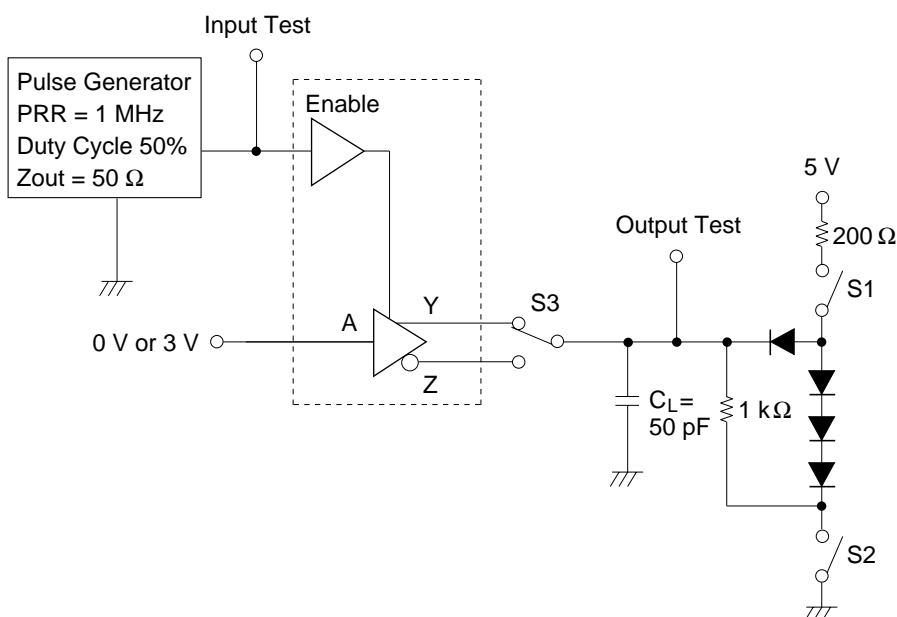
Test Circuit 2



Waveforms

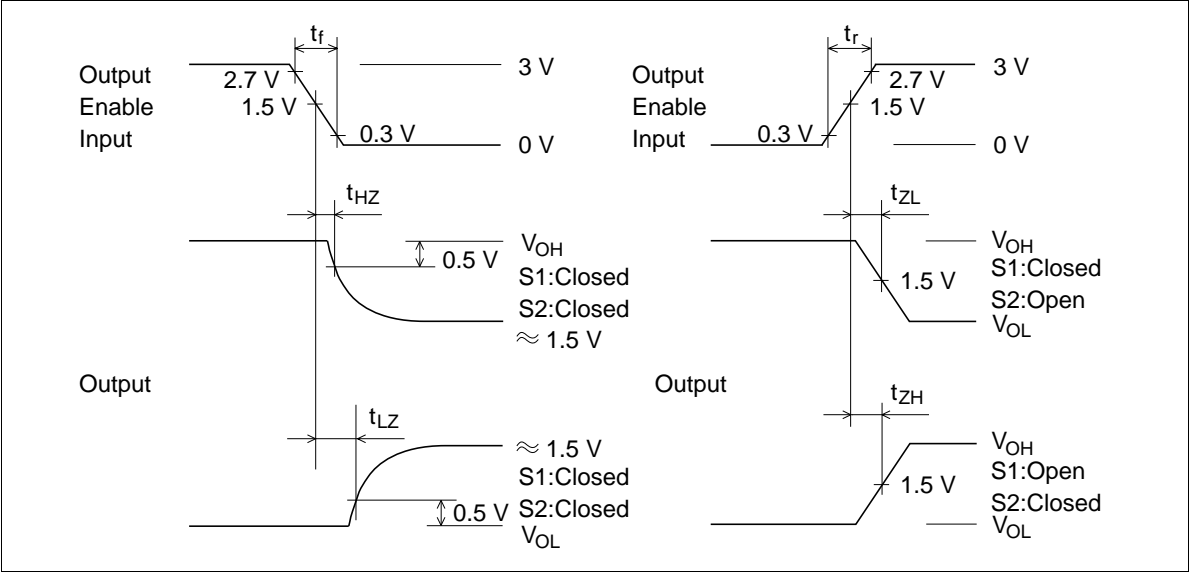


Test Circuit 3



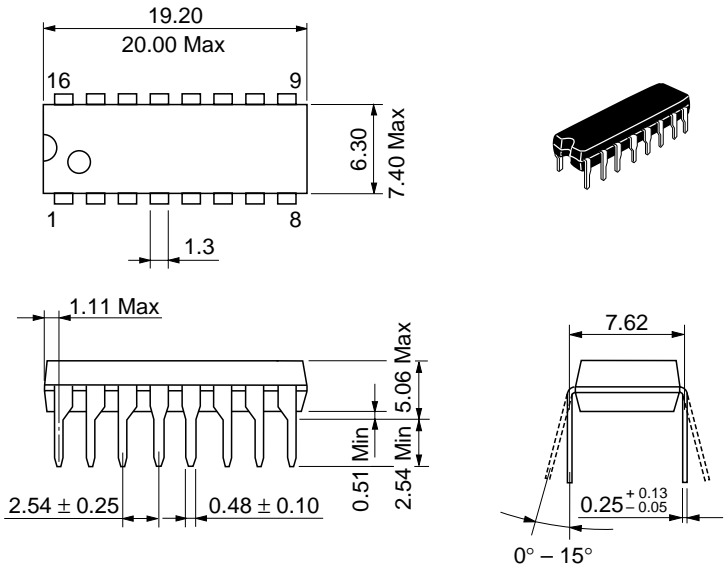
- Notes:
1. $C_L = 15 \text{ pF}$ includes probe and jig capacitance.
 2. All diodes are 1S2074(H)

Waveforms



Package Dimensions

Unit: mm



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

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