

HD26LS33A

Quadruple Differential Line Receivers With 3 State Outputs

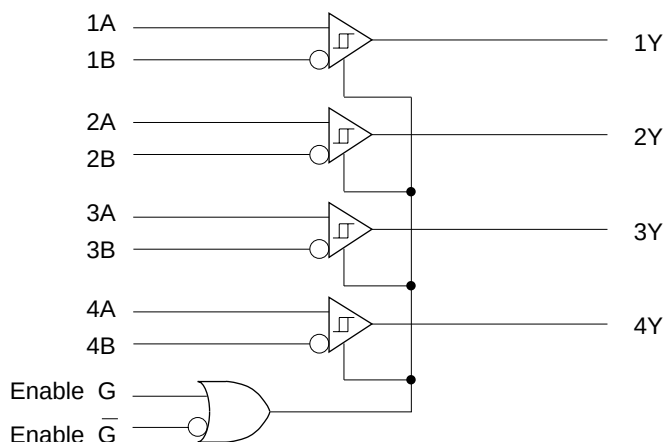
HITACHI

ADE-205-579 (Z)
1st. Edition
Dec. 2000

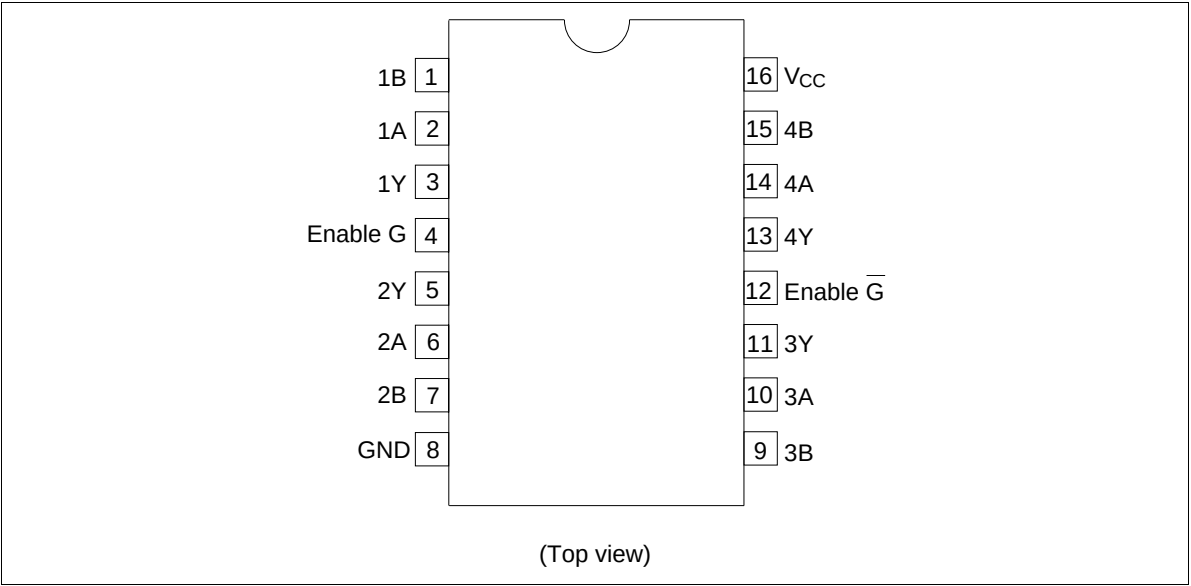
Description

The HD26LS33A is quadruple differential line receivers with three state outputs. This device has the function equivalent to the HD26LS32A, but different in phase voltage range of -15 V to $+15\text{ V}$. The sensitivity of differential input is $\pm 500\text{ mV}$.

Logic Diagram



Pin Arrangement



Function Table

Differential Input A – B	Enable		Output Y
	G	G̅	
$V_{ID} \geq V_{TH}$	H	X	H
	X	L	H
$V_{TL} < V_{ID} < V_{TH}$	H	X	?
	X	L	?
$V_{ID} \leq V_{TL}$	H	X	L
	X	L	L
X	L	H	Z

- H : High level
- L : Low level
- X : Immaterial
- ? : Irrelevant
- Z : High impedance

Absolute Maximum Ratings ($T_a = 0$ to $+70^{\circ}\text{C}$)

Item	Symbol	Ratings	Unit
Supply Voltage	V_{CC}^{*1}	7.0	V
Input Voltage A or B	V_{IN}	± 25	V
Differential Input Voltage	V_{ID}^{*2}	± 25	V
Enable Input Voltage	V_{IE}	7	V
Output Sink Current	I_{out}	50	mA
Continuous Total Dissipation	P_T	1	W
Operating Temperature	T_{opr}	0 to $+70$	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-65 to 150	$^{\circ}\text{C}$

- Notes: 1. All voltage values except for differential input voltage are with respect to network ground terminal.
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
In Phase Input Voltage	V_{IC}	—	—	± 15.0	V
Output Current	I_{OH}	—	—	-440	mA
	I_{OL}	—	—	8	mA
Operating Temperature	T_{opr}	0	—	70	$^{\circ}\text{C}$

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

Item	Symbol	Min	Typ*1	Max	Unit	Conditions
Differential Input High Threshold Voltage	V _{TH}	—	—	0.5	V	V _{IC} = −15 to +15 V V _{OH} = 2.7 V, I _{OH} = −440 μA
Differential Input Low Threshold Voltage	V _{TL}	—	—	−0.5		V _{OL} = 0.4 V, I _{OL} = 4 mA
		—	—	−0.5		V _{OL} = 0.45 V, I _{OL} = 8 mA
Input Hysteresis*2	V _{TH} − V _{TL}	—	50	—	mV	
Enable Input Voltage	V _{IH}	2.0	—	—	V	
	V _{IL}	—	—	0.8		
Enable Input Clamp Voltage	V _{IK}	—	—	−1.5		V _{CC} = 4.75 V, I _{IN} = −18 mA
Output Voltage	V _{OH}	2.7	—	—		V _{CC} = 4.75V V _{ID} = 1 V, I _{OH} = −440 mA
	V _{OL}	—	—	0.4		V _{IL} ($\overline{G}$) = 0.8 V V _{ID} = −1 V, I _{OL} = 4 mA
		—	—	0.45		V _{ID} = −1 V, I _{OL} = 8 mA
Off State (High Impedance) Output Current	I _{OZ}	—	—	20	mA	V _{CC} = 5.25 V V _O = 2.4 V
		—	—	−20		V _O = 0.4 V
Line Input Current	I _I	—	—	1.2	mA	V _I = 15 V, Other Inputs −10 to +15 V
		—	—	−1.7		V _I = −15 V, Other Inputs −15 to +10 V
Enable Input Current	I _I (EN)	—	—	100	μA	V _I = 5.5 V
	I _{IH}	—	—	20		V _I = 2.7 V
	I _{IL}	—	—	−0.36	mA	V _I = 0.4 V
Input Resistance	ri	12	15	—	KΩ	V _{IC} = −15 to +15 V (Other Inputs AC GND)
Short Circuit Output Current	I _{OS} *3	−15	—	−85	mA	V _{CC} = 5.25 V
Supply Current	I _{CC}	—	52	70		V _{CC} = 5.25 V, V _I = 0 V (All Outputs Disable)

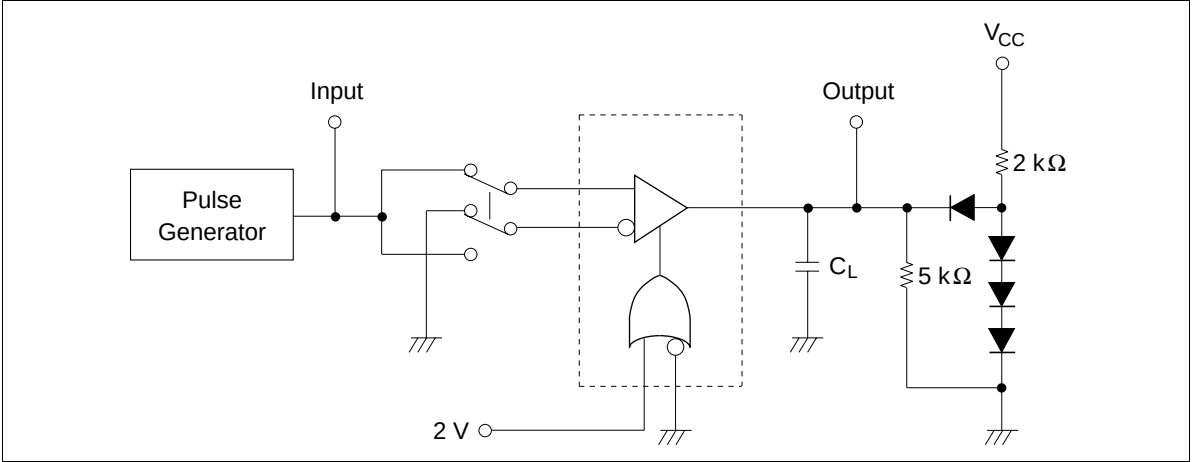
Note: 1. All typical values are at V_{CC} = 5 V, Ta = 25°C, V_{IC} = 0.
2. Hysteresis is the differential between the positive going input threshold voltage and the negative going input threshold voltage.
3. Not more than one output should be shorted at a time.

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

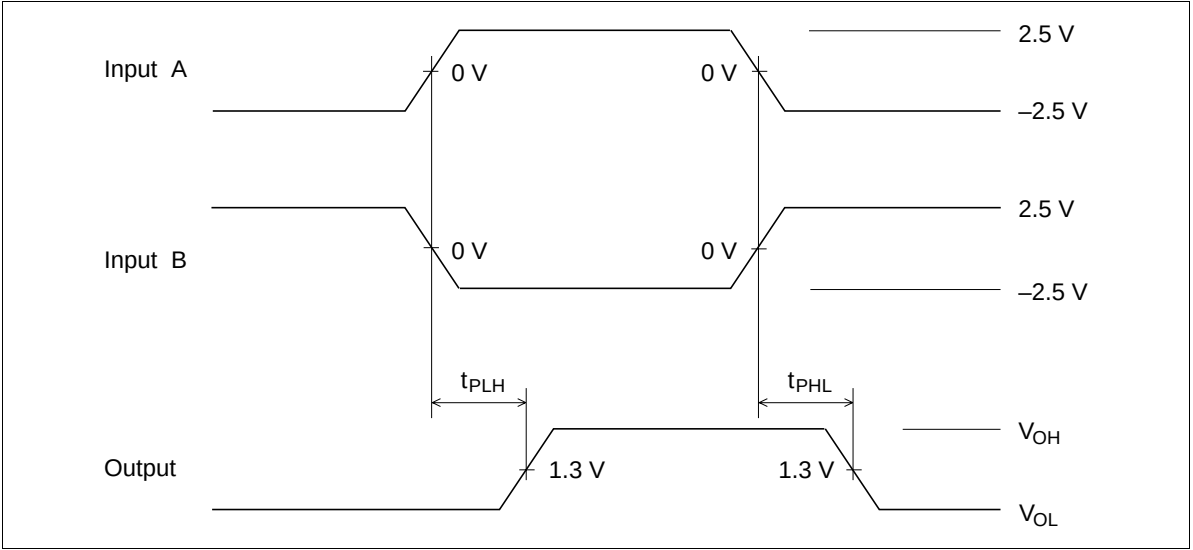
Item	Symbol	Min	Typ	Max	Unit	Conditions
Propagation Delay Time	t _{PLH}	—	20	35	ns	C _L = 15 pF
	t _{PHL}	—	22	35		
Output Enable Time	t _{ZH}	—	17	22	ns	C _L = 15 pF
	t _{ZL}	—	20	25		
Output Disable Time	t _{HZ}	—	21	30	ns	C _L = 5 pF
	t _{LZ}	—	30	40		

1. t_{PLH} , t_{PHL}

Test circuit

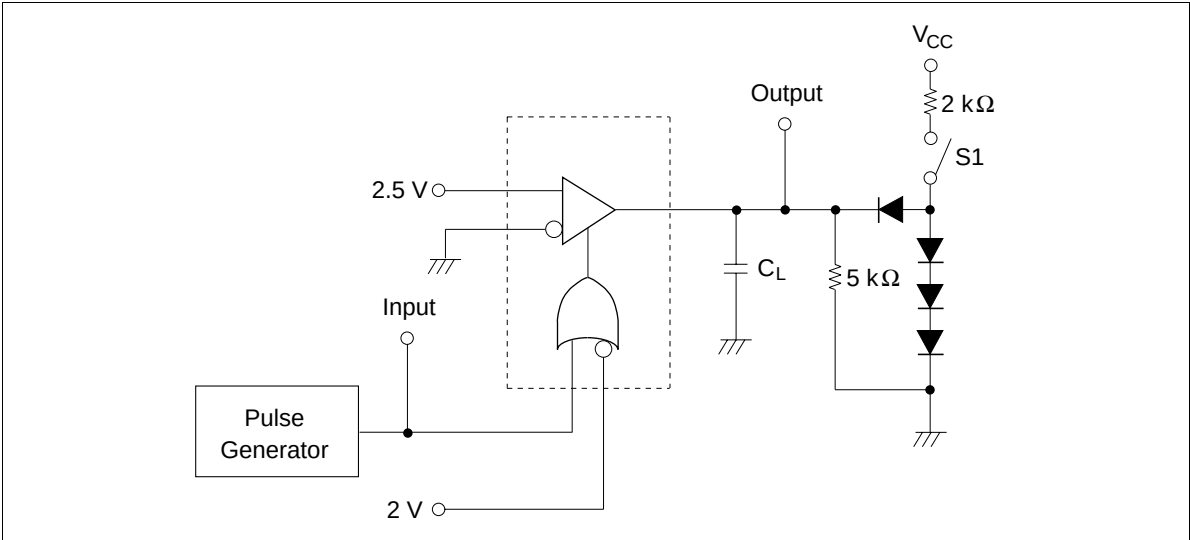


Waveforms

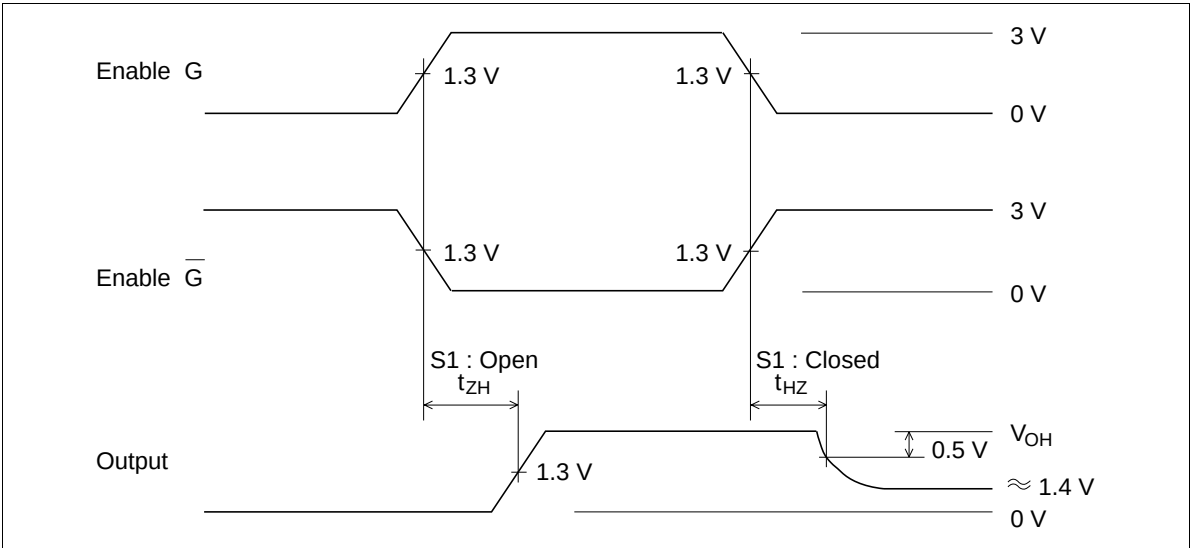


2. t_{HZ}, t_{ZH}

Test circuit

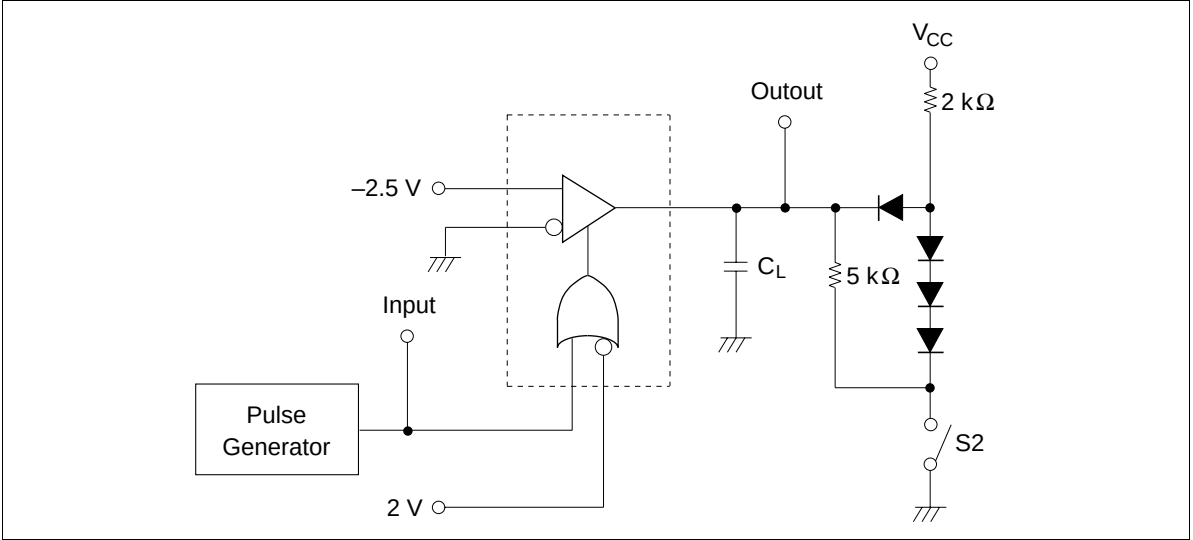


Waveforms

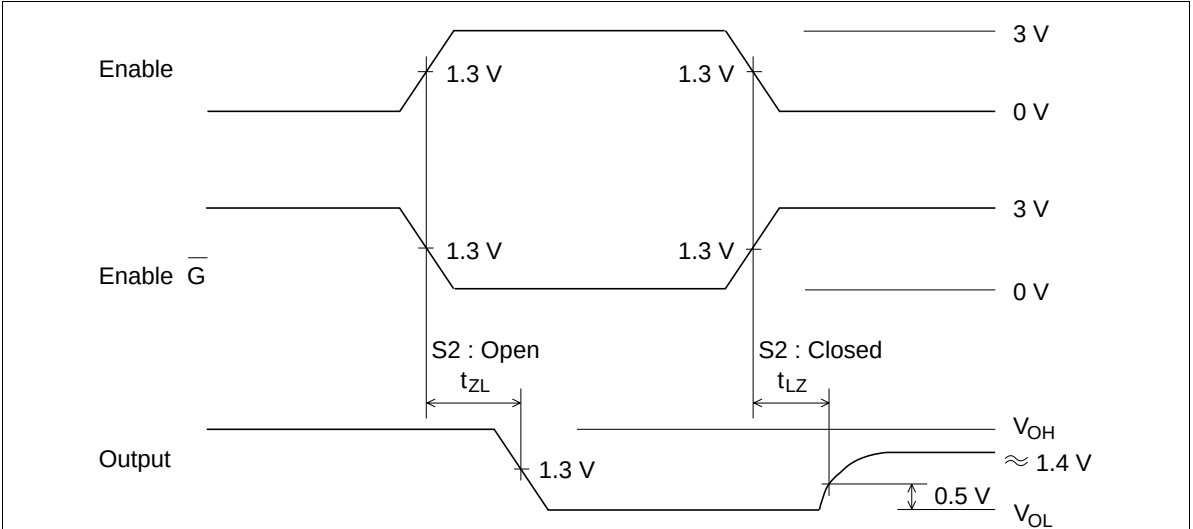


3. t_{LZ} , t_{ZL}

Test circuit



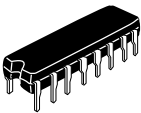
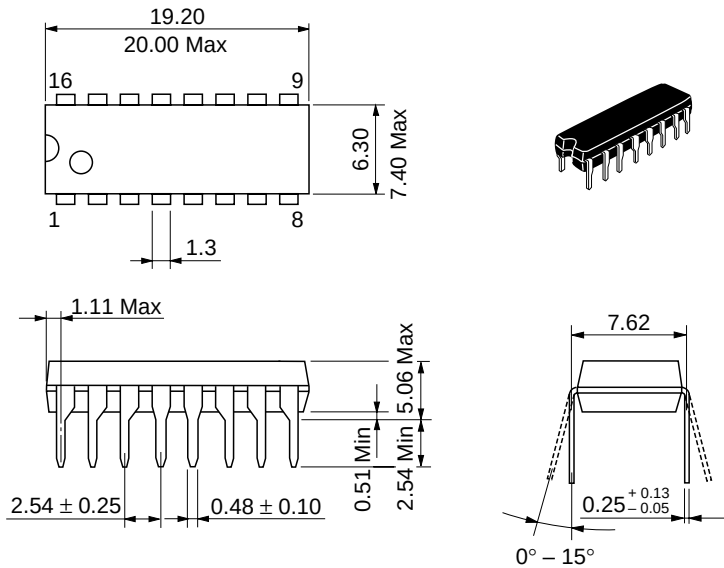
Waveforms



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

Package Dimensions

Unit: mm



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

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