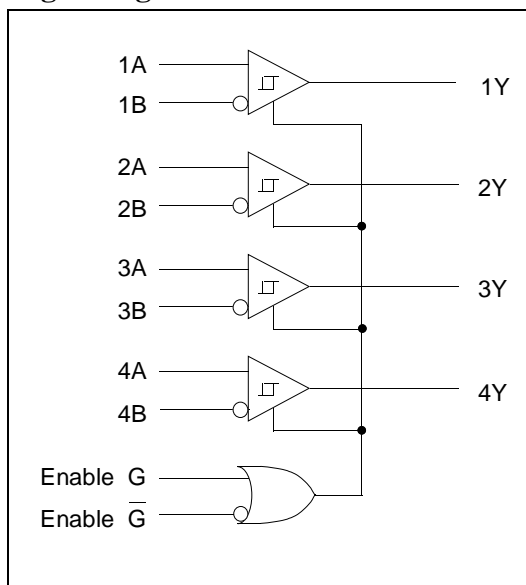


# HD26LS32A

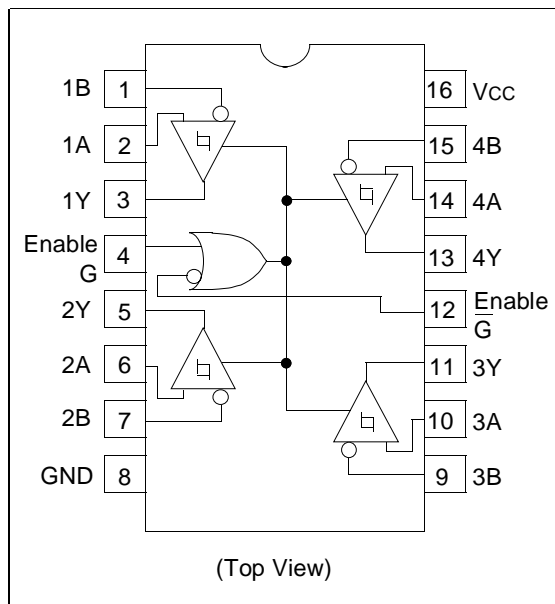
## Quadruple Differential Line Receivers With 3 State Outputs

The HD26LS32A features quadruple line receivers designed to meet the specs of EIA standard RS-422A and RS-423. This device operates from a single 5 V power supply. The enable function is common to all four receivers and offers a choice of active high or active low input. Fail safe design ensures that if the inputs are open, the outputs will always be high.

### Logic Diagram



### Pin Arrangement



### Function Table

| Differential Input<br>A – B | Enable |           | Output<br>Y |
|-----------------------------|--------|-----------|-------------|
|                             | G      | $\bar{G}$ |             |
| $V_{ID} \geq V_{TH}$        | 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

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

- 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 | $V_{IC}$  | —    | —    | $\pm 7.0$ | V           |
| Output Current         | $I_{OH}$  | —    | —    | - 440     | $\mu A$     |
|                        | $I_{OL}$  | —    | —    | 8         | mA          |
| Operating Temperature  | $T_{opr}$ | 0    | —    | 70        | $^{\circ}C$ |

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

| Item                                      | Symbol                           | Conditions  | Min | Typ <sup>*1</sup> | Max   | Unit |
|---|----------------------------------|---|-----|-------------------|-------|------|
| Differential Input High Threshold Voltage | V <sub>TH</sub>                  | V <sub>OH</sub> = 2.7V, I <sub>OH</sub> = -440μA                                | —   | —                 | 0.2   | V    |
| Differential Input Low Threshold Voltage  | V <sub>TL</sub>                  | V <sub>IC</sub> = -7 to +7 V<br>V <sub>OL</sub> = 0.4 V, I <sub>OL</sub> = 4 mA | —   | —                 | -0.2  |      |
|   |                                  | V <sub>OL</sub> = 0.45 V, I <sub>OL</sub> = 8 mA                                | —   | —                 | -0.2  |      |
| Input Hysteresis <sup>*2</sup>            | V <sub>TH</sub> -V <sub>TL</sub> |   | —   | 50                | —     | mV   |
| Enable Input Voltage                      | V <sub>IH</sub>                  |   | 2.0 | —                 | —     | V    |
|   | V <sub>IL</sub>                  |   | —   | —                 | 0.8   |      |
| Enable Input Clamp Voltage                | V <sub>IK</sub>                  | V <sub>CC</sub> = 4.75 V, I <sub>IN</sub> = -18 mA                              | —   | —                 | -1.5  |      |
| Output Voltage                            | V <sub>OH</sub>                  | V <sub>CC</sub> = 4.75V, V <sub>ID</sub> = 1V, I <sub>OH</sub> = -440μA         | 2.7 | —                 | —     |      |
|   | V <sub>OL</sub>                  | V <sub>IL</sub> (G) = 0.8V, V <sub>ID</sub> = -1 V, I <sub>OL</sub> = 4 mA      | —   | —                 | 0.4   |      |
|   |                                  | V <sub>ID</sub> = -1 V, I <sub>OL</sub> = 8 mA                                  | —   | —                 | 0.45  |      |
| Off State(High Impedance) Output Current  | I <sub>OZ</sub>                  | V <sub>CC</sub> = 5.25V, V <sub>O</sub> = 2.4 V                                 | —   | —                 | 20    | μA   |
|   |                                  | V <sub>O</sub> = 0.4 V  | —   | —                 | -20   |      |
| Line Input Current                        | I <sub>I</sub>                   | V <sub>I</sub> = 15 V, Other Inputs -10 to +15 V                                | —   | —                 | 2.3   | mA   |
|   |                                  | V <sub>I</sub> = -15 V, Other Inputs -15 to +10 V                               | —   | —                 | -2.8  |      |
| Enable Input Current                      | I <sub>I</sub> (EN)              | V <sub>I</sub> = 5.5 V  | —   | —                 | 100   | μA   |
|   | I <sub>IH</sub>                  | V <sub>I</sub> = 2.7 V  | —   | —                 | 20    |      |
|   | I <sub>IL</sub>                  | V <sub>I</sub> = 0.4 V  | —   | —                 | -0.36 | mA   |
| Input Resistance                          | r <sub>i</sub>                   | V <sub>IC</sub> = -15 to +15 V (Other Inputs AC GND)                            | 6   | 9.8               | —     | KΩ   |
| Short Circuit Output Current              | I <sub>OS</sub> <sup>*3</sup>    | V <sub>CC</sub> = 5.25 V  | -15 | —                 | -85   | mA   |
| Supply Current                            | I <sub>CC</sub>                  | V <sub>CC</sub> = 5.25V, V <sub>I</sub> = 0V (All Outputs Disable)              | —   | 52                | 70    |      |

Notes: 1. All typical values are at V<sub>CC</sub>=5V, Ta=25°C, V<sub>IC</sub>=0.

2. Hysteresis is the differential between the positive going input threshold voltage and the negative going input threshold voltage.

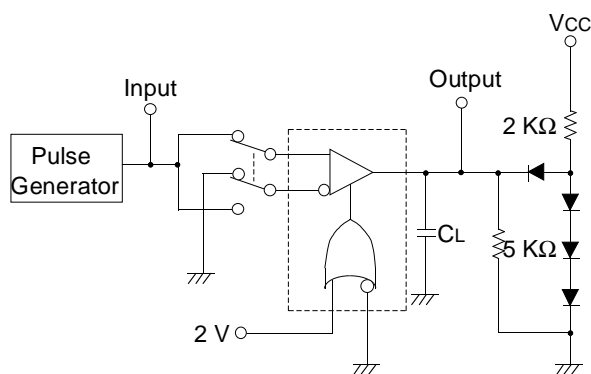
3. Not more than one output should be shorted at a time.

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

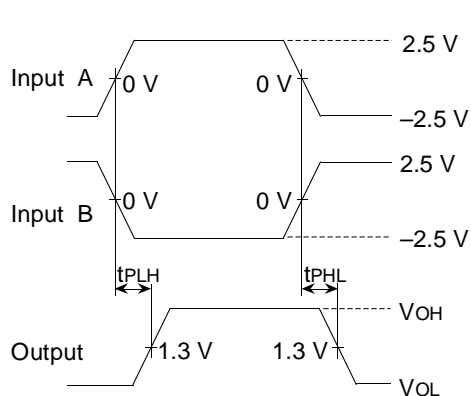
| Item                   | Symbol    | Conditions           | Min | Typ | Max | Unit |
|------------------------|-----------|----------------------|-----|-----|-----|------|
| Propagation Delay Time | $t_{PLH}$ | $C_L = 15\text{ pF}$ | —   | 20  | 35  | ns   |
|                        | $t_{PHL}$ | 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

1.  $t_{PLH}$ ,  $t_{PHL}$ 

Test circuit

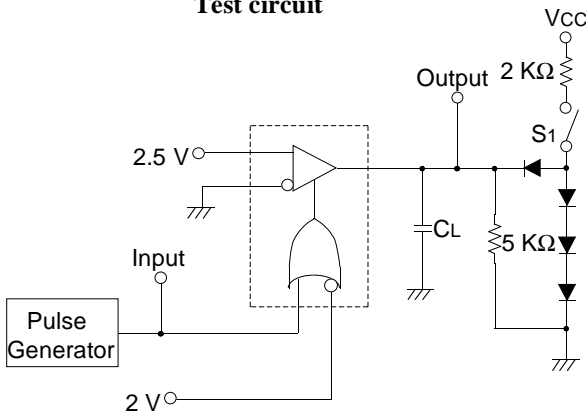


Waveforms

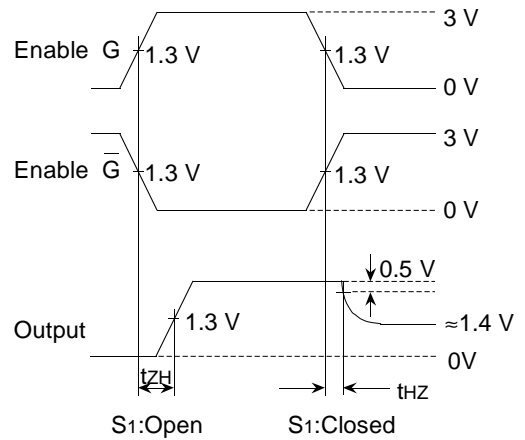


## 2. tHZ, tZH

Test circuit

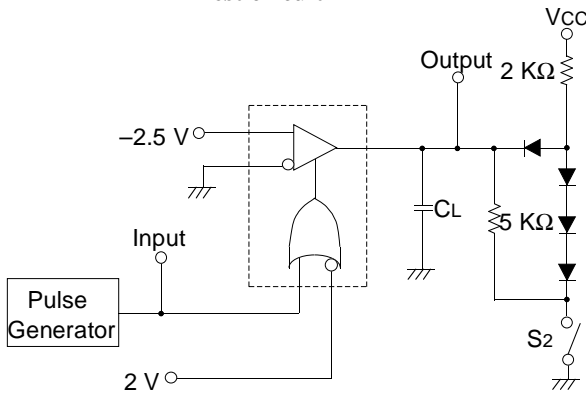


Waveforms

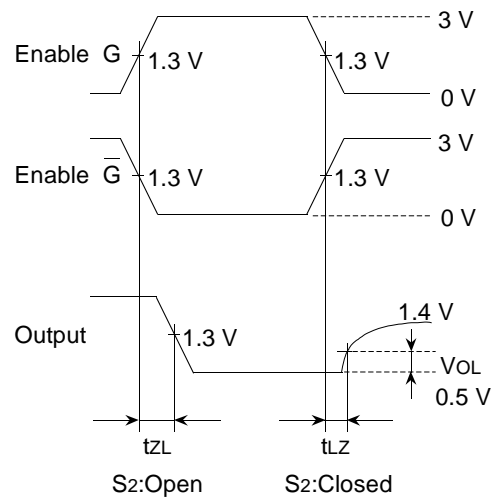


## 3. tLZ, tZL

Test circuit



Waveforms



- Notes: 1. The pulse generator has the following characteristics :  
 PRR=1 MHz, 50 % duty cycle,  $t_r \leq 6\text{ns}$ ,  $t_f \leq 6\text{ns}$ ,  $Z_{out}=50\ \Omega$ .
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.