# Quad high speed differential line receiver

# 26LS32/26LS32A

## FEATURES

- Input voltage range of 30 volts differential for 26LS32 and 25V differential for 26LS32A
- ±0.2V sensitivity over the input voltage range of -7V to +7V
- 6k minimum input impedance
- 60mV input hysteresis
- The 26LS32/32A meets all the requirements of RS-422 and RS-423
- Operation from single +5V
- Fail safe input-output relationship. Output always high when inputs are open.
- Three-state drive, with choice of complementary output enables, for receiving directly onto a data bus
- Three-state outputs disabled during power up and power down

## ORDERING INFORMATION

| DESCRIPTION | ORDER CODE | PACKAGE DESIGNATOR* |
|---|---|---|
| 16-Pin Ceramic DIP | 26LS32/BEA<br>26LS32A/BEA | GDIP1-T16 |
| 16-Pin Flat Pack | 26LS32/BFA<br>26LS32A/BFA | GDFP2-F16 |
| 20-Pin Ceramic LLCC | 26LS32/B2A<br>26LS32A/B2A | CQCC2-N20 |

* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

## FUNCTION TABLE (EACH RECEIVER)

| DIFFERENTIAL INPUT | ENABLES EN | ENABLES $\overline{EN}$ | OUTPUT |
|---|---|---|---|
| $V_{ID} \geq V_{TH}$ | H<br>X | X<br>L | H<br>H |
| $V_{TL} \leq V_{ID} \leq V_{TH}$ | H<br>X | X<br>L | ?<br>? |
| $V_{ID} \leq V_{TL}$ | X | L | L |
| X | L | H | Z |

H = High level
L = Low level
X = Irrelevant
Z = High impedance (off)
? = Indeterminate
EN = Enable
$\overline{EN}$ = Enable

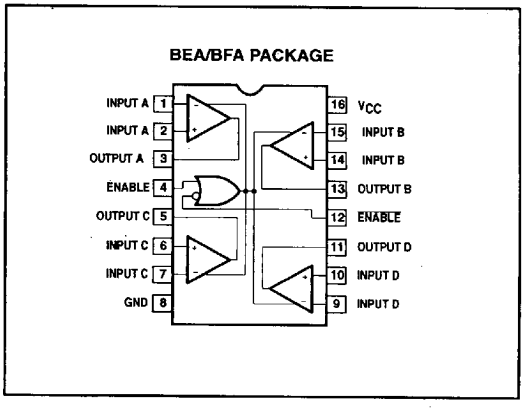
## DESCRIPTION

The 26LS32/32A is a quad line receiver designed to meet all of the requirements of RS-422 and RS-423 and Federal Standards 1020 and 1030 for balanced and unbalanced digital data transmission.

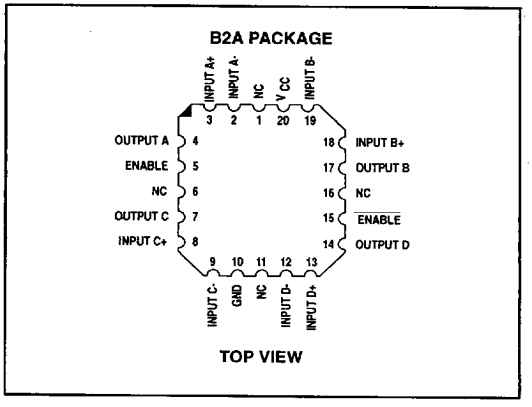
The 26LS32/32A features an input sensitivity of ±200mV over the common mode input range of ±7V.

The 26LS32/32A provides an enable and disable function common to all four receivers. Both the parts feature 3-State outputs with 8mA sink capability and incorporates a fail-safe input-output relationship which forces the outputs high when the inputs are open.

## PIN CONFIGURATION




## LLCC LEAD CONFIGURATION



## ABSOLUTE MAXIMUM RATINGS[1]

| SYMBOL | PARAMETER | RATING | UNIT |
|---|---|---|---|
| $V_{CC}$ | Power supply | 7 | V |
| $V_{EN}$ | Enable voltage | 7 | V |
| $I_O$ | Output sink current | 50 | mA |
| $V_{CMV}$ | Common mode range | ±25 | V |
| $V_{TH}$ | Differential input voltage | ±30 | V |
| $T_{STG}$ | Storage temperature range | -65 to +150 | °C |

## RECOMMENDED OPERATING CONDITIONS

| SYMBOL | PARAMETER | LIMITS | | | UNIT |
|---|---|---|---|---|---|
| | | MIN | NOM | MAX | |
| $V_{CC}$ | Supply voltage | 4.5 | 5.0 | 5.5 | V |
| $T_{amb}$ | Operating free-air temperature range | -55 | | +125 | °C |

## DC ELECTRICAL CHARACTERISTICS

(Over recommended operating temperature and supply voltage range unless otherwise specified.)

| SYMBOL | PARAMETER | TEST CONDITIONS | | LIMITS | | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP[2] | MAX | |
| $V_{TH}$ | Differential input voltage | $V_{OUT} = V_{OL}$ or $V_{OH}$, $-7V \le V_{CM} \le +7V$ | | -0.2 | 0.06 | +0.2 | V |
| $R_{IN}$ | Input resistance[3] | $V_{CC}$ = Nom, $-15V \le V_{CM} \le +15V$, (One input AC ground) | | 6.0 | 9.8 | | kΩ |
| $I_{IN}$ | Input current | $V_{IN} = +15V$, $V_{CC}$ = Nom; Other input[7] $-15V \le V_{IN} \le +15V$ | | | | 2.3 | mA |
| $I_{IN}$ | Input current | $V_{IN} = -15V$, $V_{CC}$ = Nom; Other input[8] $-15V \le V_{IN} \le +15V$ | | | | -2.8 | mA |
| $V_{OH}$ | Output High voltage | $V_{CC}$ = MIN, $I_{OH} = -440\mu A$; $\Delta V_{IN} = +1.0V$, $\overline{ENABLE} = 0.8V$ | | 2.5 | 3.4 | | V |
| $V_{OL}$ | Output Low voltage | $V_{CC}$ = MIN, $\overline{ENABLE} = 0.8V$, $\Delta V_{IN} = -1.0V$ | $I_{OL} = 4.0mA$ | | 0.3 | 0.4 | V |
| | | | $I_{OL} = 8.0mA$ | | | 0.45 | V |
| $V_{IL}$ | Enable Low voltage | $V_{CC} = 5.5V$ | | | | 0.8 | V |
| $V_{IH}$ | Enable High voltage | $V_{CC} = 5.5V$ | | 2.0 | | | V |
| $V_I$ | Enable clamp voltage | $V_{CC}$ = MIN, $I_{IN} = -18mA$ | | | | -1.5 | V |
| $I_O$ | Off state (high impedance) output current | $V_{CC}$ = MAX | $V_O = 2.4V$ | | | 20 | µA |
| | | | $V_O = 0.4V$ | | | -20 | µA |
| $I_{IL}$ | Enable Low current | $V_{IN} = 0.4V$, $V_{CC}$ = MAX | | | -0.2 | -0.36 | mA |
| $I_{IH}$ | Enable High current | $V_{IN} = 2.7V$, $V_{CC}$ = MAX | | | 0.5 | 20 | µA |
| $I_I$ | Enable input High current | $V_{IN} = 5.5V$, $V_{CC}$ = MAX | | | 1 | 100 | µA |
| $I_{SC}$ | Output short circuit current | $V_{CC}$ = MAX, $\Delta V_{IN} = +1V$, $V_{OUT} = 0V$ | | -15 | -60 | -85 | mA |
| $I_{CC}$ | Power supply current | $V_{CC}$ = MAX; All $V_{IN}$ = GND, outputs disabled | | | 52 | 70 | mA |
| $V_H$ | Input hysteresis | $T_{amb} = 25°C$, $V_{CC} = 5.0V$, $V_{CM} = 0V$ | | | 60 | | mV |

## AC ELECTRICAL CHARACTERISTICS

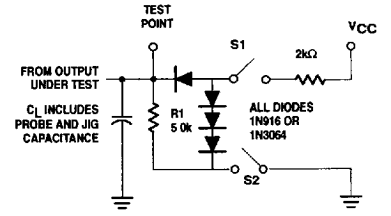
$T_{amb}$ = +25°C, $V_{CC}$ = 5.0V

| SYMBOL | PARAMETER | TEST CONDITIONS | 26LS32 LIMITS | | | 26LS32A LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP[1] | MAX | MIN | MAX | |
| $t_{PLH}$ | Input to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 9 | 25 | | 35 | ns |
| $t_{PHL}$ | Input to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 10 | 25 | | 35 | ns |
| $t_{LZ}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 15 | 30 | | 40 | ns |
| $t_{HZ}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 12 | 22 | | 30 | ns |
| $t_{ZL}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 8 | 22 | | 25 | ns |
| $t_{ZH}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 8 | 22 | | 25 | ns |

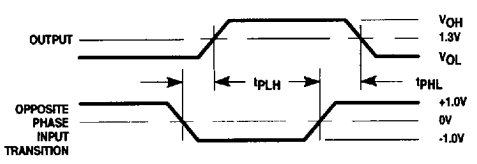
## AC ELECTRICAL CHARACTERISTICS

-55°C ≤ $T_{amb}$ ≤ +125°C, $V_{CC}$ = 5.0V

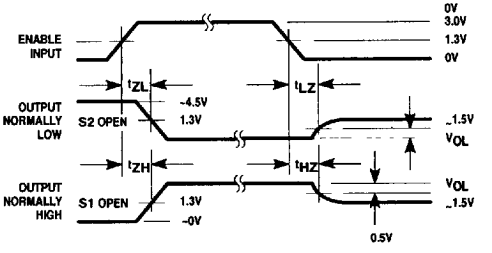
| SYMBOL | PARAMETER | TEST CONDITIONS | 26LS32 LIMITS | | 26LS32A LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | MIN | MAX | MIN | MAX | |
| $t_{PLH}$ | Input to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 38 | | 53 | ns |
| $t_{PHL}$ | Input to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 38 | | 53 | ns |
| $t_{LZ}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 45 | | 60 | ns |
| $t_{HZ}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 33 | | 45 | ns |
| $t_{ZL}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 33 | | 38 | ns |
| $t_{ZH}$ | Enable to output | See switching test circuit and waveforms. $C_L$ = 15pF | | 33 | | 38 | ns |




**Switching Test Circuit**




**Propagation Delay[4, 6]**




**Enable and Disable Times[5, 6]**

**NOTES:**
1. Stresses above those listed under "Absolute Maximum Ratings" may cause malfunction or permanent damage to the device.
2. Typical values are at $T_{amb}$ = +25°C, $V_{CC}$ = 5.0V.
3. This parameter is guaranteed by correlation, but not tested.
4. Diagram shown for $\overline{\text{Enable}}$ Low.
5. S1 and S2 of load circuit are closed except where shown.
6. Pulse Generator for all pulses: Rate ≤ 1.0MHz, Zo = 50Ω, tr ≤ 15ns, tf ≤ 6.0ns.
7. For 26LS32A other input -10V ≤ $V_{IN}$ ≤ +15V.
8. For 26LS32A other input -15V ≤ $V_{IN}$ ≤ +10V.