

# Quad high speed differential line receiver

# 26LS33/26LS33A

### FEATURES

- Input voltage range of 30 volts differential for 26LS33 and 25 volts differential for 26LS33A
- $\pm 0.5V$  sensitivity on 26LS33
- 6k minimum input impedance
- 60mV input hysteresis
- Operation from single +5V supply
- Fail safe input-output relationship. Output always high when inputs are open.
- 3-state drive, with choice of complementary output enables, for receiving directly onto a data bus
- 3-state outputs disabled during power up and power down

### DESCRIPTION

The 26LS33/33A is a quad line receiver that provides an enable and disable function common to all four receivers. Both parts feature 3-State outputs with 8mA sink capability and incorporate a fail-safe input-output relationship which forces the outputs high when the inputs are open.

### ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
16-Pin Ceramic DIP	26LS33/BEA 26LS33A/BEA	GDIP1-T16

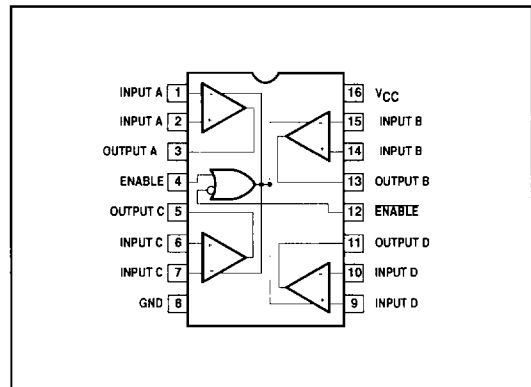
\* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

### FUNCTION TABLE (EACH RECEIVER)

DIFFERENTIAL INPUT	ENABLES		OUTPUT
	E	$\bar{E}$	
$V_{ID} \geq V_{TH}$	H X	X L	H H
$V_{TL} \leq V_{ID} \leq V_{TH}$	H X	X L	? ?
$V_{ID} \leq V_{TL}$	X	L	L
X	L	H	Z

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

### PIN CONFIGURATIONS



### ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

SYMBOL	PARAMETER	RATING	UNIT
$V_{CC}$	Power supply	7	V
$V_{IN}$	Input voltage	7	V
$I_O$	Output sink current	50	mA
$V_{CMV}$	Common mode range	$\pm 25$	V
$V_{TH}$	Differential input voltage	$\pm 25$	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

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**DC ELECTRICAL CHARACTERISTICS**

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

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP <sup>1</sup>	MAX	
V <sub>TH</sub>	Differential input voltage	-15V ≤ V <sub>CM</sub> ≤ +15V	-0.5	0.06	0.5	V
R <sub>IN</sub>	Input resistance	-15V ≤ V <sub>CM</sub> ≤ +15V, (One input AC ground)	6.0	9.8		kΩ
I <sub>IN</sub>	Input current (under test)	V <sub>IN</sub> = +15V (26LS33A) Other input -10V ≤ V <sub>IN</sub> ≤ +15V (26LS33) Other input -15V ≤ V <sub>IN</sub> ≤ +15V			2.3 2.3	mA mA
I <sub>IN</sub>	Input current (under test)	V <sub>IN</sub> = -15V (26LS33A) Other input -15V ≤ V <sub>IN</sub> ≤ +10V (26LS33) Other input -15V ≤ V <sub>IN</sub> ≤ +15V			-2.8 -2.8	mA mA
V <sub>OH</sub>	Output High voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = -440μA ΔV <sub>IN</sub> = +1.0V, V <sub>ENABLE</sub> = 0.8V	2.5	3.4		V
V <sub>OL</sub>	Output Low voltage	V <sub>CC</sub> = Min, V <sub>ENABLE</sub> = 0.8V, ΔV <sub>IN</sub> = +1.0V	I <sub>OL</sub> = 4.0mA	0.3	0.4	V
			I <sub>OL</sub> = 8.0mA		0.45	V
V <sub>IL</sub>	Enable Low voltage				0.8	V
V <sub>IH</sub>	Enable High voltage		2.0			V
V <sub>I</sub>	Enable clamp voltage	V <sub>CC</sub> = Min, I <sub>IN</sub> = -18mA			-1.5	V
I <sub>O</sub>	Off state (high impedance) output current	V <sub>CC</sub> = Max	V <sub>O</sub> = 2.4V		20	μA
			V <sub>O</sub> = 0.4V		-20	μA
I <sub>IL</sub>	Enable Low current	V <sub>IN</sub> = 0.4V		-0.2	-0.36	mA
I <sub>IH</sub>	Enable High current	V <sub>IN</sub> = 2.7V		0.5	20	μA
I <sub>I</sub>	Enable input High current	V <sub>IN</sub> = 5.5V		1	100	μA
I <sub>SC</sub>	Output short circuit current	V <sub>CC</sub> = Max, ΔV <sub>IN</sub> = +1V, V <sub>OUT</sub> = 0V	-15	-60	-85	mA
I <sub>CC</sub>	Power supply current	V <sub>CC</sub> = Max; All V <sub>IN</sub> = GND, outputs disabled		52	70	mA
V <sub>HYST</sub>	Input hysteresis	T <sub>amb</sub> = 25°C, V <sub>CC</sub> = 5.0V, V <sub>CM</sub> = 0V		120		mV

**AC ELECTRICAL CHARACTERISTICS**T<sub>amb</sub> = +25°C, V<sub>CC</sub> = 5.0V

SYMBOL	PARAMETER	TEST CONDITIONS	26LS33 LIMITS			26LS33A LIMITS		UNIT
			MIN	TYP <sup>1</sup>	MAX	MIN	MAX	
t <sub>PLH</sub>	Input to output	See switching test circuit and waveforms. C <sub>L</sub> = 15pF		9	25		35	ns
t <sub>PHL</sub>	Input to output	See switching test circuit and waveforms. C <sub>L</sub> = 15pF		10	25		35	ns
t <sub>LZ</sub>	Enable to output	See switching test circuit and waveforms. C <sub>L</sub> = 5pF		15	30		40	ns
t <sub>HZ</sub>	Enable to output	See switching test circuit and waveforms. C <sub>L</sub> = 5pF		12	22		30	ns
t <sub>ZL</sub>	Enable to output	See switching test circuit and waveforms. C <sub>L</sub> = 15pF		8	22		25	ns
t <sub>ZH</sub>	Enable to output	See switching test circuit and waveforms. C <sub>L</sub> = 15pF		8	22		25	ns

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## AC ELECTRICAL CHARACTERISTICS

$-55^{\circ}\text{C} \leq T_{\text{amb}} \leq +125^{\circ}\text{C}$ ,  $V_{\text{CC}} = 5.0\text{V}$

SYMBOL	PARAMETER	TEST CONDITIONS	26LS33 LIMITS		26LS33A LIMITS		UNIT
			MIN	MAX	MIN	MAX	
$t_{\text{PLH}}$	Input to output	See switching test circuit and waveforms. $C_L = 15\text{pF}$		38		53	ns
$t_{\text{PHL}}$	Input to output	See switching test circuit and waveforms. $C_L = 15\text{pF}$		38		53	ns
$t_{\text{LZ}}$	Enable to output	See switching test circuit and waveforms. $C_L = 5\text{pF}$		45		60	ns
$t_{\text{HZ}}$	Enable to output	See switching test circuit and waveforms. $C_L = 5\text{pF}$		33		45	ns
$t_{\text{ZL}}$	Enable to output	See switching test circuit and waveforms. $C_L = 15\text{pF}$		33		38	ns
$t_{\text{ZH}}$	Enable to output	See switching test circuit and waveforms. $C_L = 15\text{pF}$		33		38	ns

**NOTE:**

1. All typical values are  $T_A = 25^{\circ}\text{C}$ ,  $V_{\text{CC}} = 5.0\text{V}$ .

