

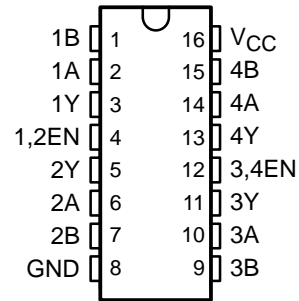
# MC3486

## QUADRUPLE DIFFERENTIAL LINE RECEIVER WITH 3-STATE OUTPUTS

SLLS097C – JUNE 1980 – REVISED FEBRUARY 2002

- Meets or Exceeds the Requirements of ANSI Standards EIA/TIA-422-B and EIA/TIA-423-B and ITU Recommendations V.10 and V.11
- 3-State, TTL-Compatible Outputs
- Fast Transition Times
- Operates From Single 5-V Supply
- Designed to Be Interchangeable With Motorola™ MC3486

D, N, OR NS PACKAGE  
(TOP VIEW)



### description

The MC3486 is a monolithic quadruple differential line receiver designed to meet the specifications of ANSI Standards TIA/EIA-422-B and TIA/EIA-423-B and ITU Recommendations V.10 and V.11. The MC3486 offers four independent differential-input line receivers that have TTL-compatible outputs. The outputs utilize 3-state circuitry to provide a high-impedance state at any output when the appropriate output enable is at a low logic level.

The MC3486 is designed for optimum performance when used with the MC3487 quadruple differential line driver. It is supplied in a 16-pin package and operates from a single 5-V supply.

The MC3486 is characterized for operation from 0°C to 70°C.

#### AVAILABLE OPTIONS

T <sub>A</sub>	PACKAGED DEVICES	
	PLASTIC SMALL OUTLINE (D, NS)	PLASTIC DIP (N)
0°C to 70°C	MC3486D MC3486NS	MC3486N

The D package is available taped and reeled. Add the suffix R to the device type (e.g., MC3486DR). The NS package is only available taped and reeled.



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# MC3486 QUADRUPLE DIFFERENTIAL LINE RECEIVER WITH 3-STATE OUTPUTS

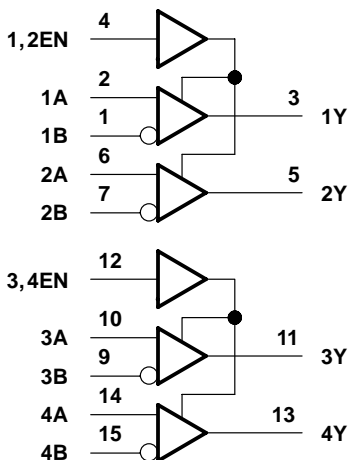
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**FUNCTION TABLE**  
(each receiver)

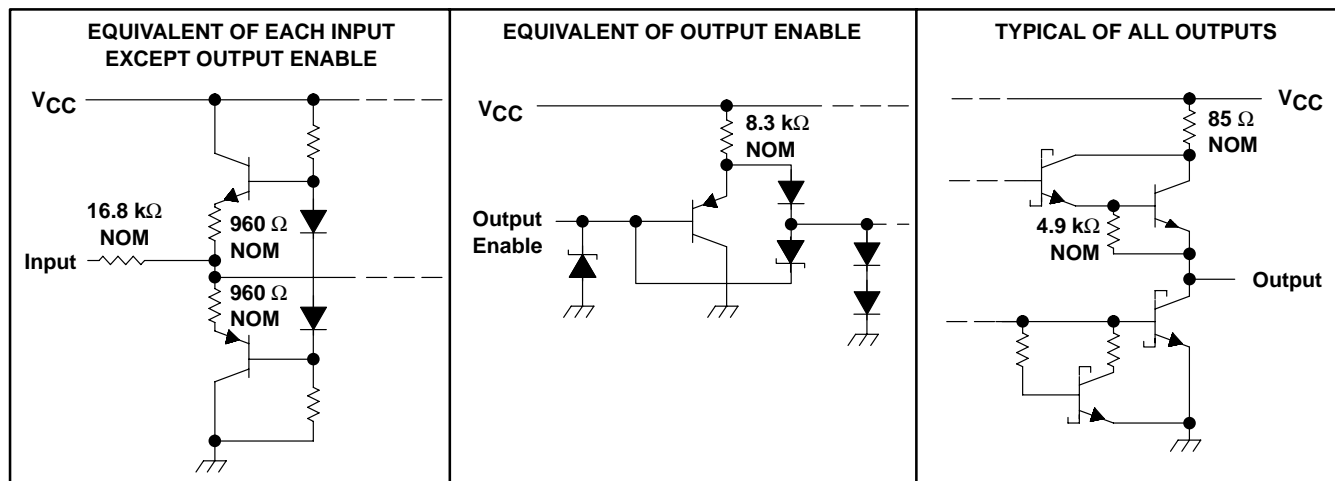
DIFFERENTIAL INPUTS A-B	ENABLE	OUTPUT Y
$V_{ID} \leq 0.2 \text{ V}$	H	H
$-0.2 \text{ V} < V_{ID} < 0.2 \text{ V}$	H	?
$V_{ID} \leq -0.2 \text{ V}$	H	L
Irrelevant	L	Z
Open	H	?

H = high level, L = low level, Z = high impedance (off),  
? = indeterminate

## logic diagram (positive logic)



## schematics of inputs and outputs



# MC3486 QUADRUPLE DIFFERENTIAL LINE RECEIVER WITH 3-STATE OUTPUTS

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## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, $V_{CC}$ (see Note 1)	8 V
Input voltage, $V_I$ (A or B inputs)	$\pm 15$ V
Differential input voltage, $V_{ID}$ (see Note 2)	$\pm 25$ V
Enable input voltage	8 V
Low-level output current, $I_{OL}$	50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 3): D package	73°C/W
N package	67°C/W
NS package	67°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, $T_{stg}$	–65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. All voltage values, except 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 package thermal impedance is calculated in accordance with JESD 51-7.

## recommended operating conditions

	MIN	NOM	MAX	UNIT
$V_{CC}$ Supply voltage	4.75	5	5.25	V
$V_{IC}$ Common-mode input voltage			$\pm 7$	V
$V_{ID}$ Differential input voltage			$\pm 6$	V
$V_{IH}$ High-level enable input voltage	2			V
$V_{IL}$ Low-level enable input voltage			0.8	V
$T_A$ Operating free-air temperature	0		70	°C

# MC3486

## QUADRUPLE DIFFERENTIAL LINE RECEIVER WITH 3-STATE OUTPUTS

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electrical characteristics over recommended ranges of common-mode input voltage, supply voltage, and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
$V_{IT+}$	Differential input high-threshold voltage	$V_O = 2.7\text{ V}$ , $I_O = -0.4\text{ mA}$		0.2	V
$V_{IT-}$	Differential input low-threshold voltage	$V_O = 0.5\text{ V}$ , $I_O = -8\text{ mA}$	$-0.2^\dagger$		V
$V_{IK}$	Enable-input clamp voltage	$I_I = -10\text{ mA}$		-1.5	V
$V_{OH}$	High-level output voltage	$V_{ID} = 0.4\text{ V}$ , $I_O = -0.4\text{ mA}$ , See Note 4 and Figure 1	2.7		V
$V_{OL}$	Low-level output voltage	$V_{ID} = -0.4\text{ V}$ , $I_O = 8\text{ mA}$ , See Note 4 and Figure 1		0.5	V
$I_{OZ}$	High-impedance-state output current	$V_{IL} = 0.8\text{ V}$ , $V_{ID} = -3\text{ V}$ , $V_O = 2.7\text{ V}$		40	$\mu\text{A}$
		$V_{IL} = 0.8\text{ V}$ , $V_{ID} = 3\text{ V}$ , $V_O = 0.5\text{ V}$		-40	
$I_{IB}$	Differential-input bias current	$V_{CC} = 0\text{ V}$ or $5.25\text{ V}$ , Other inputs at $0\text{ V}$	$V_I = -10\text{ V}$	-3.25	mA
			$V_I = -3\text{ V}$	-1.5	
			$V_I = 3\text{ V}$	1.5	
			$V_I = 10\text{ V}$	3.25	
$I_{IH}$	High-level enable input current	$V_I = 5.25\text{ V}$		100	$\mu\text{A}$
		$V_I = 2.7\text{ V}$		20	
$I_{IL}$	Low-level enable input current	$V_I = -0.5\text{ V}$		-100	$\mu\text{A}$
$I_{OS}$	Short-circuit output current	$V_{ID} = 3\text{ V}$ , $V_O = 0$ , See Note 5	-15	-100	mA
$I_{CC}$	Supply current	$V_{IL} = 0$		85	mA

† The algebraic convention, in which the least positive (most negative) limit is designated as minimum, is used in this data sheet for threshold voltages only.

NOTES: 4. Refer to ANSI Standards TIA/EIA-422-B and TIA/EIA-423-B for exact conditions.

5. Only one output should be shorted at a time.

### switching characteristics, $V_{CC} = 5\text{ V}$ , $C_L = 15\text{ pF}$ , $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PHL}$	Propagation delay time, high- to low-level output	See Figure 2		28	35	ns
$t_{PLH}$	Propagation delay time, low- to high-level output			27	30	ns
$t_{PZH}$	Output enable time to high level	See Figure 3		13	30	ns
$t_{PZL}$	Output enable time to low level			20	30	ns
$t_{PHZ}$	Output disable time from high level			26	35	ns
$t_{PLZ}$	Output disable time from low level			27	35	ns



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## PARAMETER MEASUREMENT INFORMATION

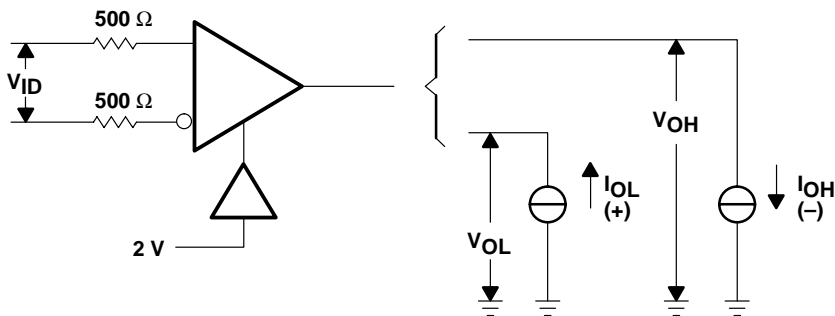
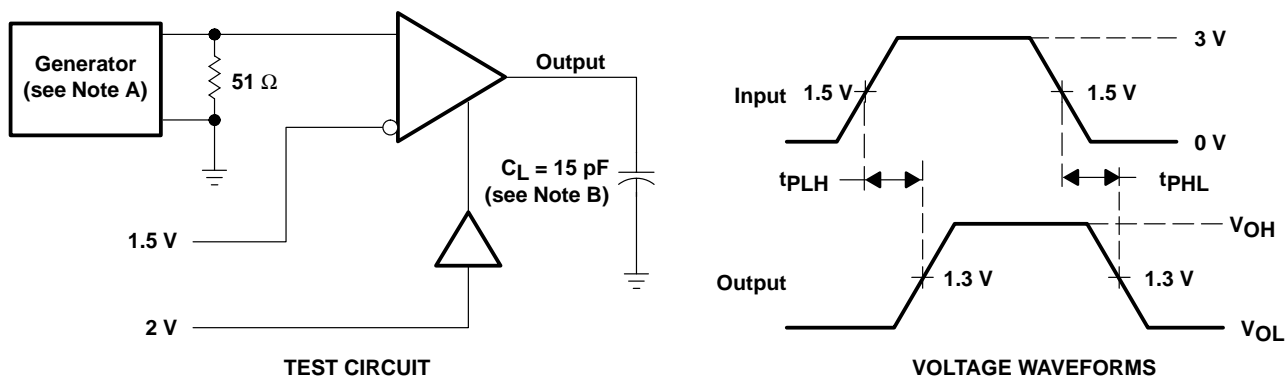


Figure 1.  $V_{OH}$ ,  $V_{OL}$



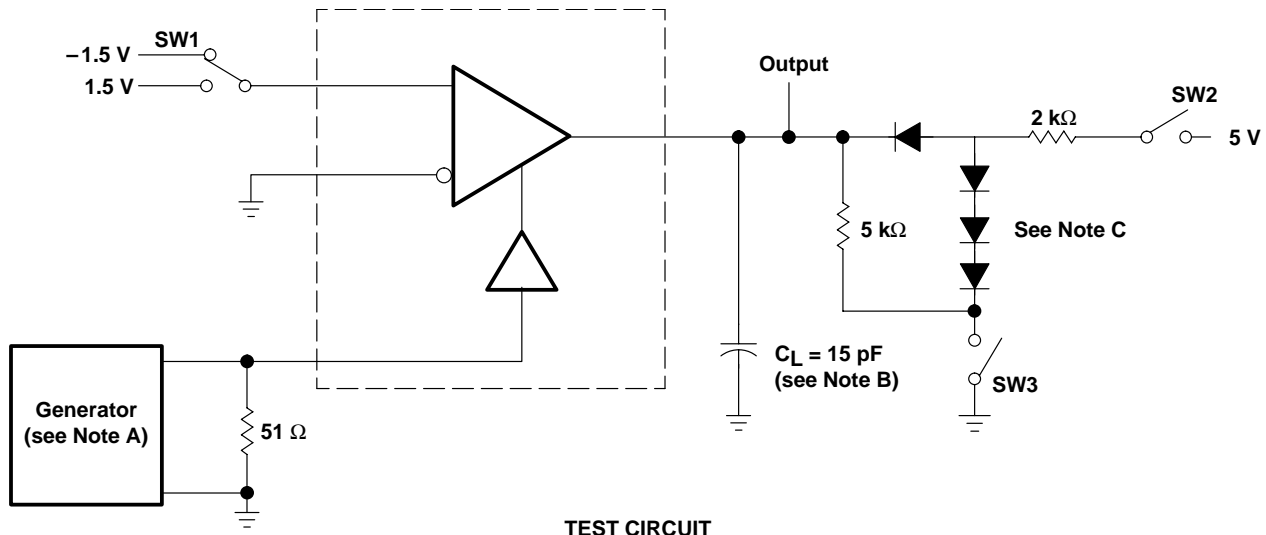
- NOTES: A. The input pulse is supplied by a generator having the following characteristics:  $PRR \leq 1$  MHz, duty cycle = 50%,  $t_r \leq 6$  ns,  $t_f \leq 6$  ns.  
 B.  $C_L$  includes probe and stray capacitance.

Figure 2. Test Circuit and Voltage Waveforms

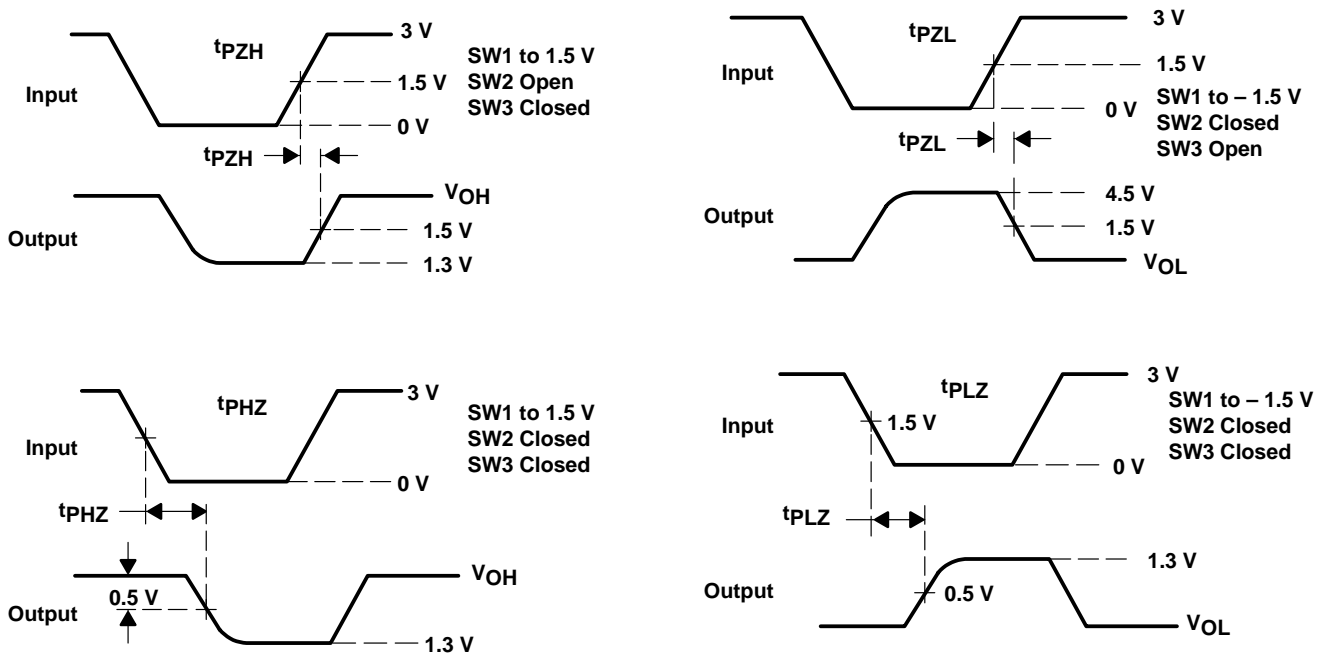
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## PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



- NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  1 MHz, duty cycle = 50%,  $t_r \leq$  6 ns,  $t_f \leq$  6 ns.  
 B.  $C_L$  includes probe and stray capacitance.  
 C. All diodes are 1N916 or equivalent.

Figure 3. Test Circuit and Voltage Waveforms

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