

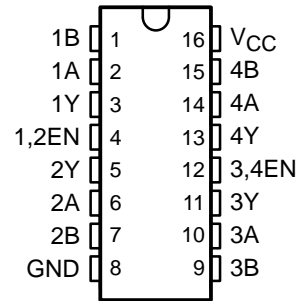
MC3486

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 _A	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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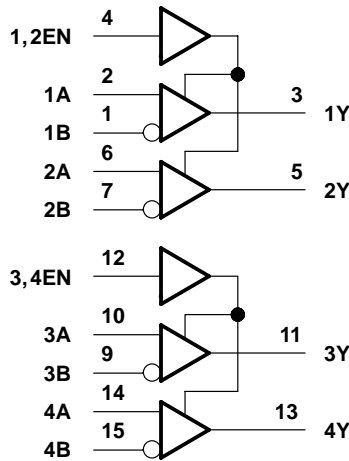
SLLS097C – JUNE 1980 – REVISED FEBRUARY 2002

FUNCTION TABLE
(each receiver)

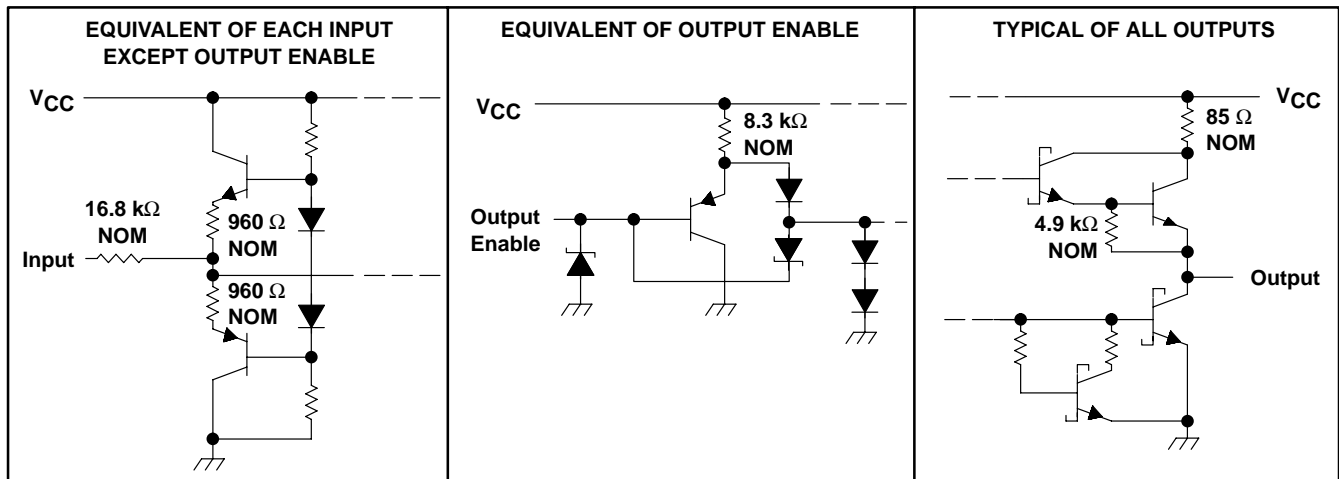
DIFFERENTIAL INPUTS A-B	ENABLE	OUTPUT Y
$V_{ID} \leq 0.2 \text{ V}$	H	H
$-0.2 \text{ V} < V_{ID} < 0.2 \text{ V}$	H	?
$V_{ID} \leq -0.2 \text{ V}$	H	L
Irrelevant	L	Z
Open	H	?

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

logic diagram (positive logic)



schematics of inputs and outputs



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SLLS097C – JUNE 1980 – REVISED FEBRUARY 2002

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)	± 15 V
Differential input voltage, V_{ID} (see Note 2)	± 25 V
Enable input voltage	8 V
Low-level output current, I_{OL}	50 mA
Package thermal impedance, θ_{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			± 7	V
V_{ID} Differential input voltage			± 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

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SLLS097C – JUNE 1980 – REVISED FEBRUARY 2002

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	μA
		$V_{IL} = 0.8\text{ V}$, $V_{ID} = 3\text{ V}$, $V_O = 0.5\text{ V}$		-40	
I_{IB}	Differential-input bias current	$V_{CC} = 0\text{ V}$ or 5.25 V , Other inputs at 0 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	μA
		$V_I = 2.7\text{ V}$		20	
I_{IL}	Low-level enable input current	$V_I = -0.5\text{ V}$		-100	μA
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



MC3486 QUADRUPLE DIFFERENTIAL LINE RECEIVER WITH 3-STATE OUTPUTS

SLLS097C – JUNE 1980 – REVISED FEBRUARY 2002

PARAMETER MEASUREMENT INFORMATION

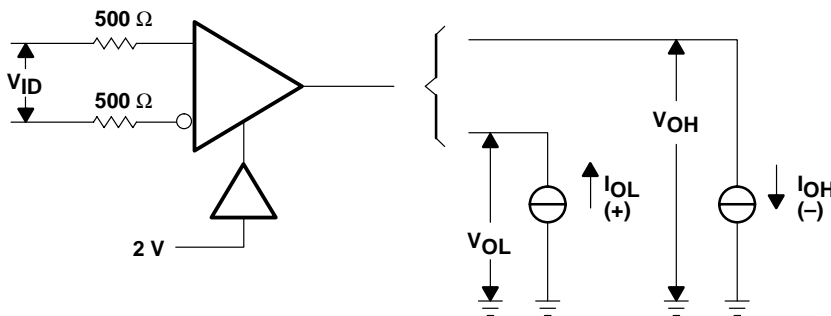
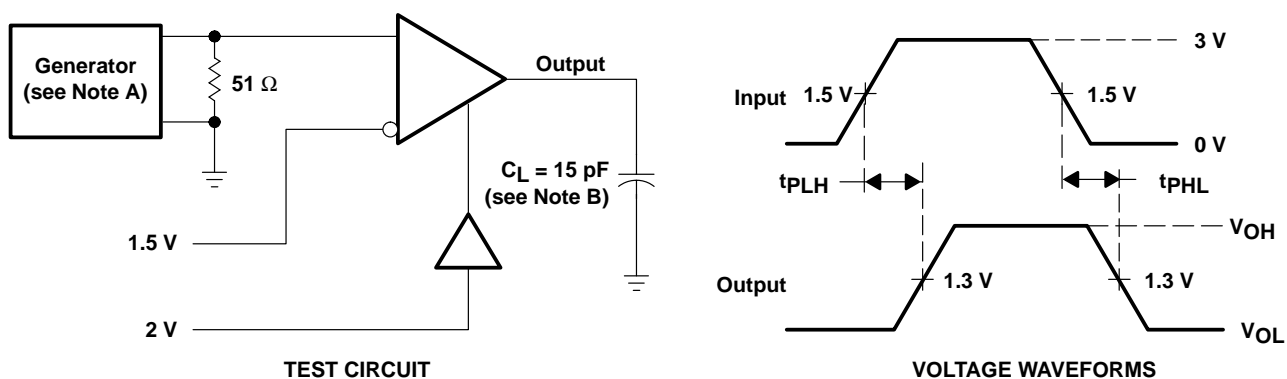


Figure 1. V_{OH} , V_{OL}



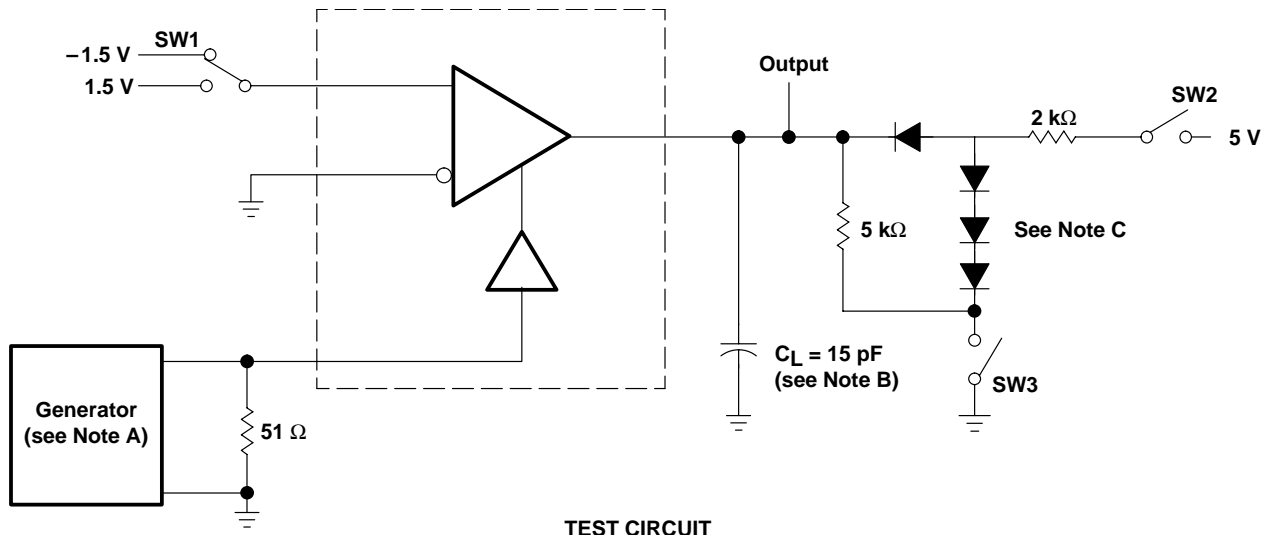
- NOTES: A. The input pulse is supplied by a generator having the following characteristics: $PRR \leq 1 \text{ MHz}$, duty cycle = 50%, $t_r \leq 6 \text{ ns}$, $t_f \leq 6 \text{ ns}$.
 B. C_L includes probe and stray capacitance.

Figure 2. Test Circuit and Voltage Waveforms

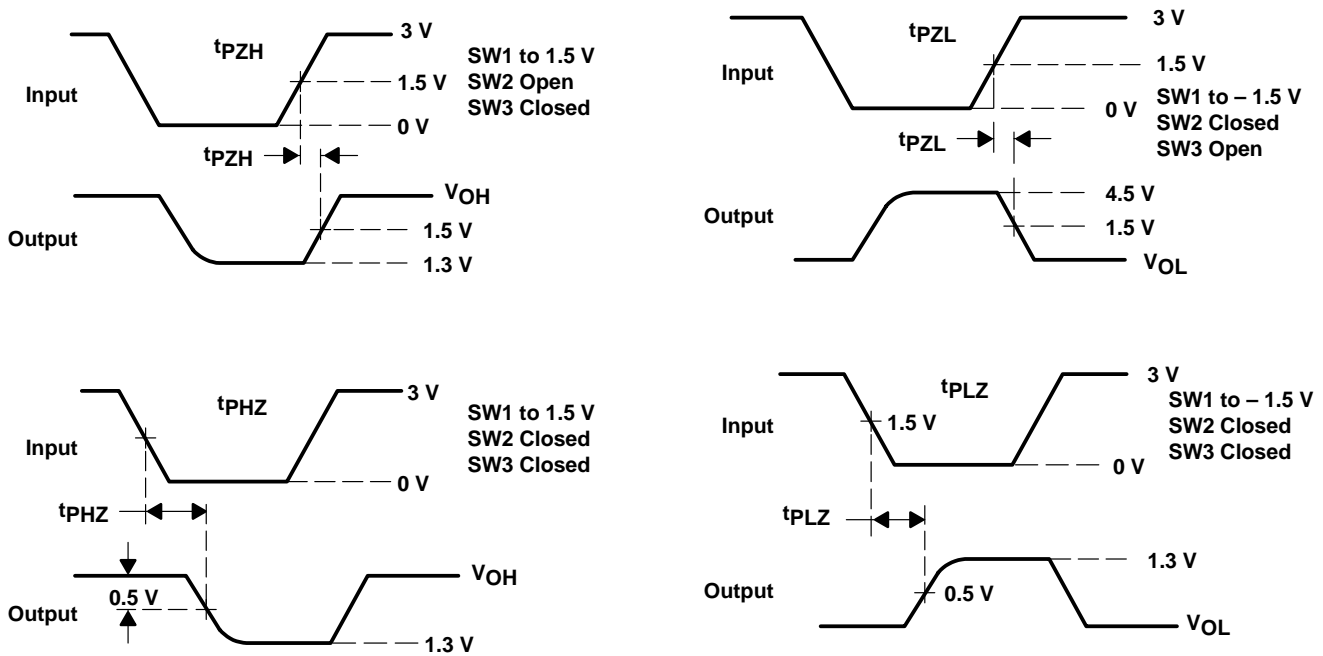
MC3486 QUADRUPLE DIFFERENTIAL LINE RECEIVER WITH 3-STATE OUTPUTS

SLLS097C – JUNE 1980 – REVISED FEBRUARY 2002

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

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
MC3486D	ACTIVE	SOIC	D	16	40	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
MC3486DR	ACTIVE	SOIC	D	16	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
MC3486J	OBSOLETE	CDIP	J	16		None	Call TI	Call TI
MC3486N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
MC3486NSR	ACTIVE	SO	NS	16	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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