



# AM26LS31

## Quad Line Driver with NAND Enabled Three-State Outputs

The Motorola AM26LS31 is a quad differential line driver intended for digital data transmission over balanced lines. It meets all the requirements of EIA-422 Standard and Federal Standard 1020.

The AM26LS31 provides an enable/disable function common to all four drivers as opposed to the split enables on the MC3487 EIA-422 driver.

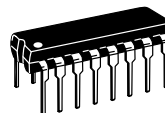
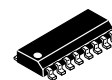
The high impedance output state is assured during power down.

- Full EIA-422 Standard Compliance
- Single +5.0 V Supply
- Meets Full  $V_O = 6.0\text{ V}$ ,  $V_{CC} = 0\text{ V}$ ,  $I_O < 100\text{ }\mu\text{A}$  Requirement
- Output Short Circuit Protection
- Complementary Outputs for Balanced Line Operation
- High Output Drive Capability
- Advanced LS Processing
- PNP Inputs for MOS Compatibility

### QUAD EIA-422 LINE DRIVER WITH THREE-STATE OUTPUTS

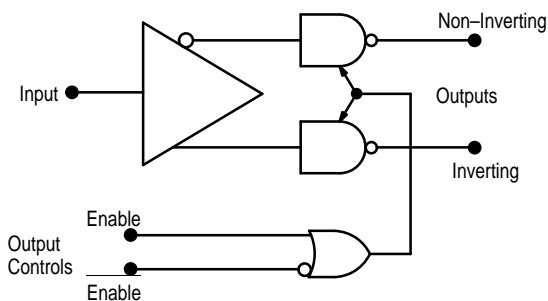
#### SEMICONDUCTOR TECHNICAL DATA

**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751B  
(SO-16)

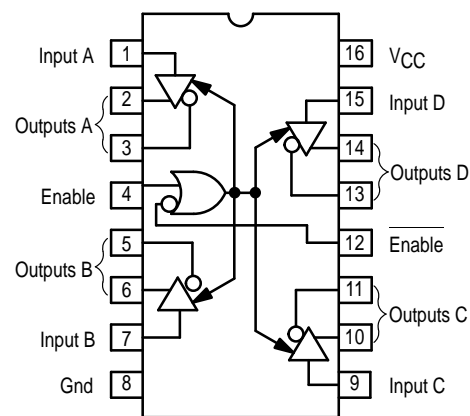


**PC SUFFIX**  
PLASTIC PACKAGE  
CASE 648

### Representative Block Diagrams



### PIN CONNECTIONS



### TRUTH TABLE

Input	Control Inputs (E/E)	Non-Inverting Output	Inverting Output
H	H/L	H	L
L	H/L	L	H
X	L/H	Z	Z

L = Low Logic State      X = Irrelevant  
H = High Logic State      Z = Third-State (High Impedance)

### ORDERING INFORMATION

Device	Operating Temperature Range	Package
AM26LS31PC	$T_A = 0\text{ to }+70^\circ\text{C}$	Plastic DIP
MC26LS31D*		SO-16

\* Note that the surface mount MC26LS31D device uses the same die as in the plastic DIP AM26LS31DC device, but with an MC prefix to prevent confusion with the package suffix.

# AM26LS31

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}$	8.0	Vdc
Input Voltage	$V_I$	5.5	Vdc
Operating Ambient Temperature Range	$T_A$	0 to + 70	°C
Operating Junction Temperature Range	$T_J$	150	°C
Storage Temperature Range	$T_{stg}$	- 65 to + 150	°C

**ELECTRICAL CHARACTERISTICS** (Unless otherwise noted, specifications apply  $4.75\text{ V} \leq V_{CC} \leq 5.25\text{ V}$  and  $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ . Typical values measured at  $V_{CC} = 5.0\text{ V}$ , and  $T_A = 25^\circ\text{C}$ .)

Characteristic	Symbol	Min	Typ	Max	Unit
Input Voltage – Low Logic State	$V_{IL}$	–	–	0.8	Vdc
Input Voltage – High Logic State	$V_{IH}$	2.0	–	–	Vdc
Input Current – Low Logic State ( $V_{IL} = 0.4\text{ V}$ )	$I_{IL}$	–	–	– 360	$\mu\text{A}$
Input Current – High Logic State ( $V_{IH} = 2.7\text{ V}$ ) ( $V_{IH} = 7.0\text{ V}$ )	$I_{IH}$	– –	– –	+ 20 + 100	$\mu\text{A}$
Input Clamp Voltage ( $I_{IK} = - 18\text{ mA}$ )	$V_{IK}$	–	–	– 1.5	V
Output Voltage – Low Logic State ( $I_{OL} = 20\text{ mA}$ )	$V_{OL}$	–	–	0.5	V
Output Voltage – High Logic State ( $I_{OH} = -20\text{ mA}$ )	$V_{OH}$	2.5	–	–	V
Output Short Circuit Current ( $V_{IH} = 2.0\text{ V}$ ) Note 1	$I_{OS}$	– 30	–	– 150	mA
Output Leakage Current – Hi-Z State ( $V_{OL} = 0.5\text{ V}$ , $V_{IL(E)} = 0.8\text{ V}$ , $V_{IH(E)} = 2.0\text{ V}$ ) ( $V_{OH} = 2.5\text{ V}$ , $V_{IL(E)} = 0.8\text{ V}$ , $V_{IH(E)} = 2.0\text{ V}$ )	$I_{O(Z)}$	– –	– –	– 20 + 20	$\mu\text{A}$
Output Leakage Current – Power OFF ( $V_{OH} = 6.0\text{ V}$ , $V_{CC} = 0\text{ V}$ ) ( $V_{OL} = - 0.25\text{ V}$ , $V_{CC} = 0\text{ V}$ )	$I_{O(off)}$	– –	– –	+ 100 – 100	$\mu\text{A}$
Output Offset Voltage Difference, Note 2	$V_{OS} - V_{OS}$	–	–	$\pm 0.4$	V
Output Differential Voltage, Note 2	$V_{OD}$	2.0	–	–	V
Output Differential Voltage Difference, Note 2	$ \Delta V_{OD} $	–	–	$\pm 0.4$	V
Power Supply Current (Output Disabled) Note 3	$I_{CCX}$	–	60	80	mA

**NOTES:** 1. Only one output may be shorted at a time.  
2. See EIA Specification EIA-422 for exact test conditions.  
3. Circuit in three-state condition.

**SWITCHING CHARACTERISTICS** ( $V_{CC} = 5.0\text{ V}$ ,  $T_A = 25^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Propagation Delay Times High to Low Output Low to High Output	$t_{PHL}$ $t_{PLH}$	– –	– –	20 20	ns
Output Skew		–	–	6.0	ns
Propagation Delay – Control to Output ( $C_L = 10\text{ pF}$ , $R_L = 75\ \Omega$ to Gnd) ( $C_L = 10\text{ pF}$ , $R_L = 180\ \Omega$ to $V_{CC}$ ) ( $C_L = 30\text{ pF}$ , $R_L = 75\ \Omega$ to Gnd) ( $C_L = 30\text{ pF}$ , $R_L = 180\ \Omega$ to $V_{CC}$ )	$t_{PHZ(E)}$ $t_{PLZ(E)}$ $t_{PZH(E)}$ $t_{PZL(E)}$	– – – –	– – – –	30 35 40 45	ns

Figure 1. Three-State Enable Test Circuit and Waveforms

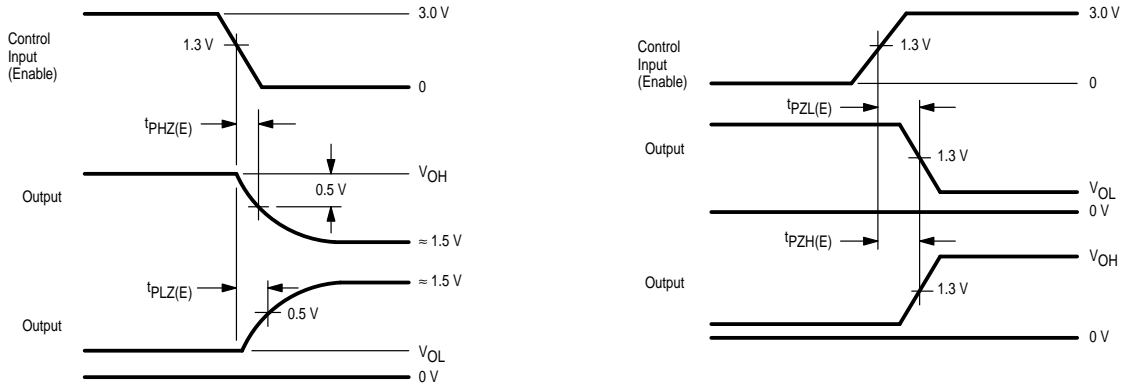
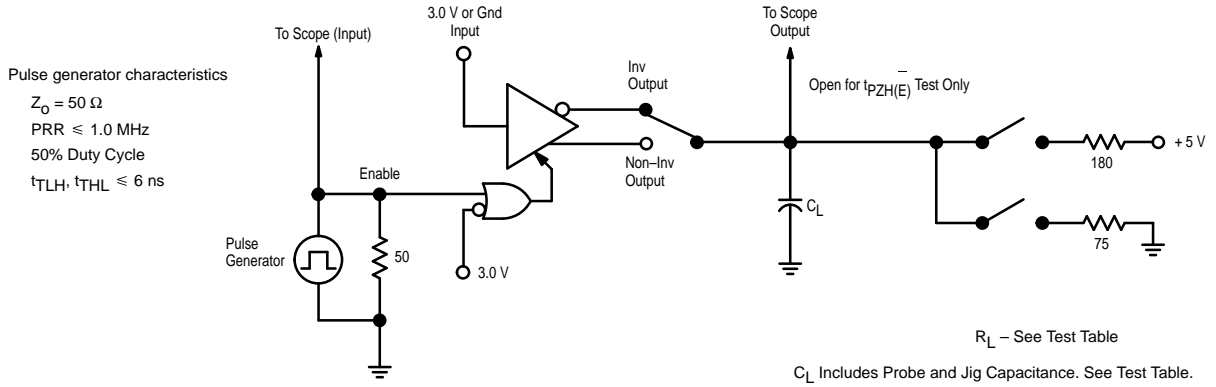
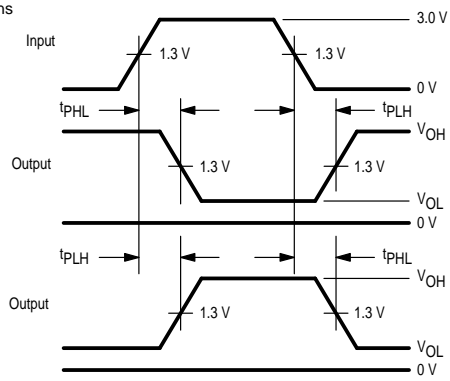
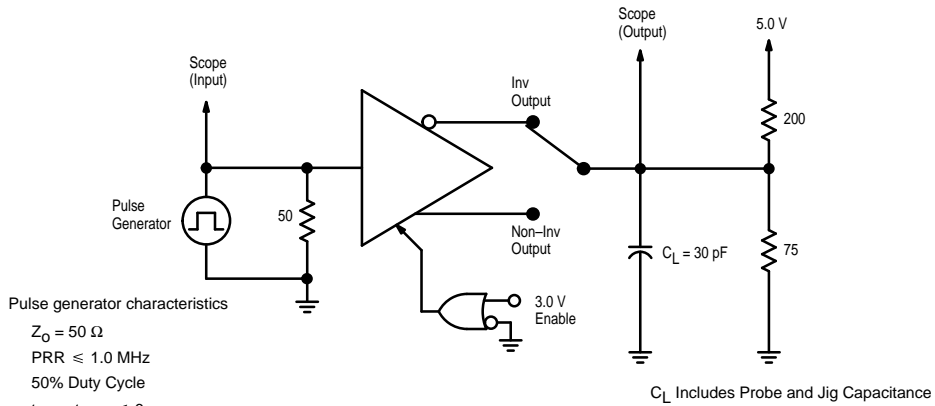


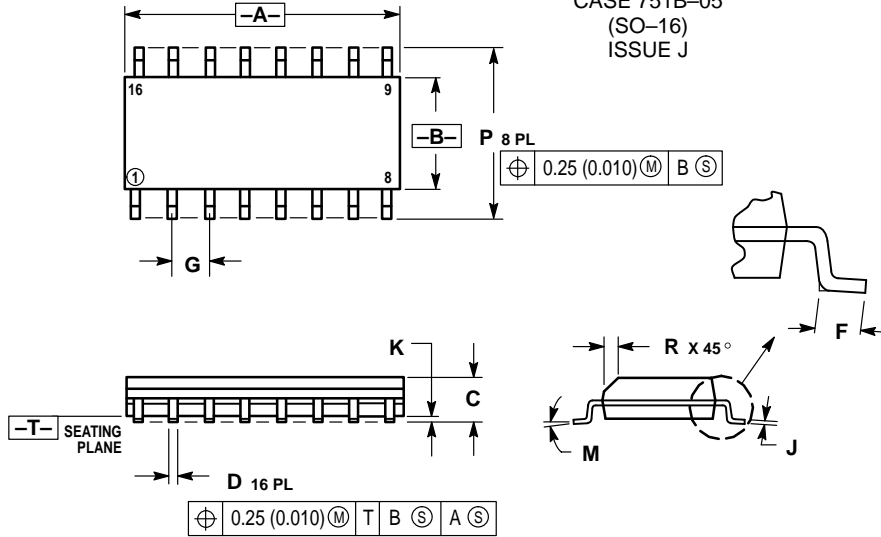
Figure 2. Propagation Delay Times Input to Output Waveforms and Test Circuit



# AM26LS31

## OUTLINE DIMENSIONS

### D SUFFIX PLASTIC PACKAGE CASE 751B-05 (SO-16) ISSUE J

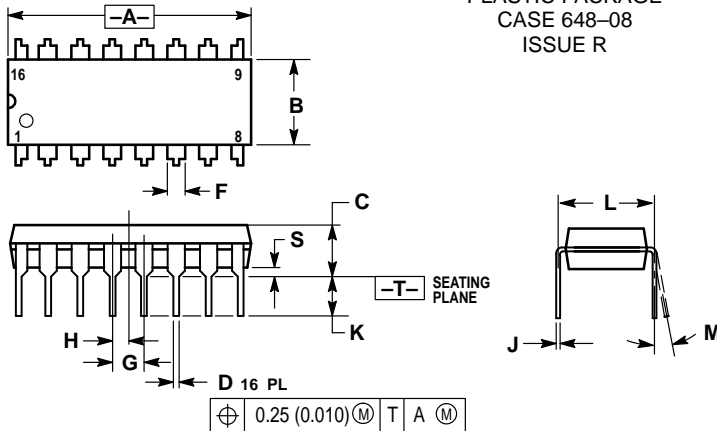


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

### PC SUFFIX PLASTIC PACKAGE CASE 648-08 ISSUE R



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

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AM26LS30/D

