



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.

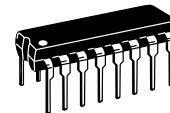
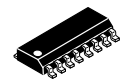
The high impedance output state is assured during power down.

- Full EIA-422 Standard Compliance
- Single +5.0 V Supply
- Meets Full $V_O = 6.0\text{ V}$, $V_{CC} = 0\text{ V}$, $I_O < 100\ \mu\text{A}$ 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

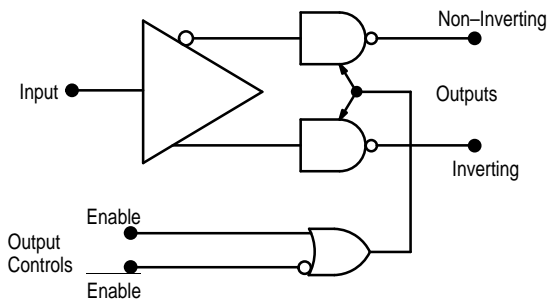
SEMICONDUCTOR TECHNICAL DATA

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

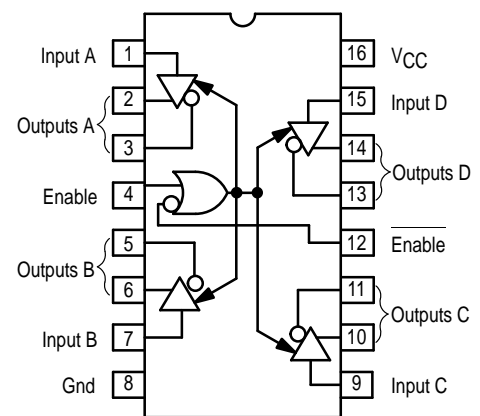


PC SUFFIX
PLASTIC PACKAGE
CASE 648

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	μA
Input Current – High Logic State ($V_{IH} = 2.7\text{ V}$) ($V_{IH} = 7.0\text{ V}$)	I_{IH}	– –	– –	+ 20 + 100	μA
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	μA
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	μA
Output Offset Voltage Difference, Note 2	$V_{OS} - V_{OS}$	–	–	± 0.4	V
Output Differential Voltage, Note 2	V_{OD}	2.0	–	–	V
Output Differential Voltage Difference, Note 2	$ \Delta V_{OD} $	–	–	± 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

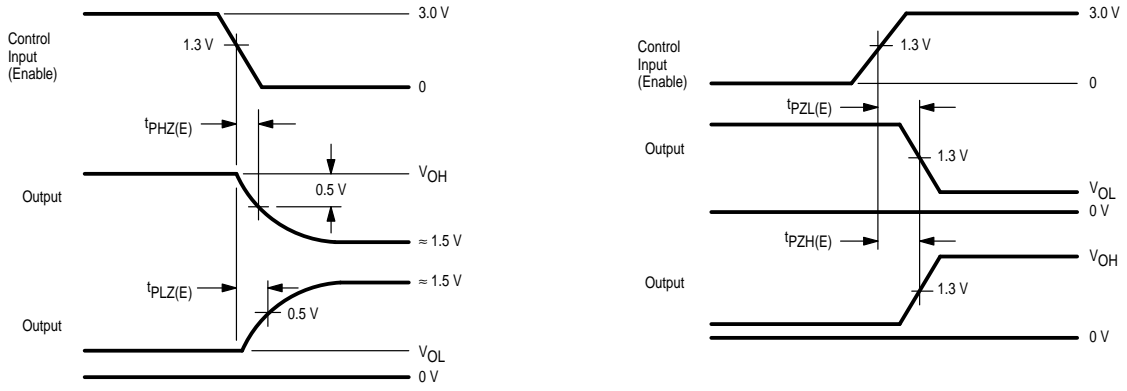
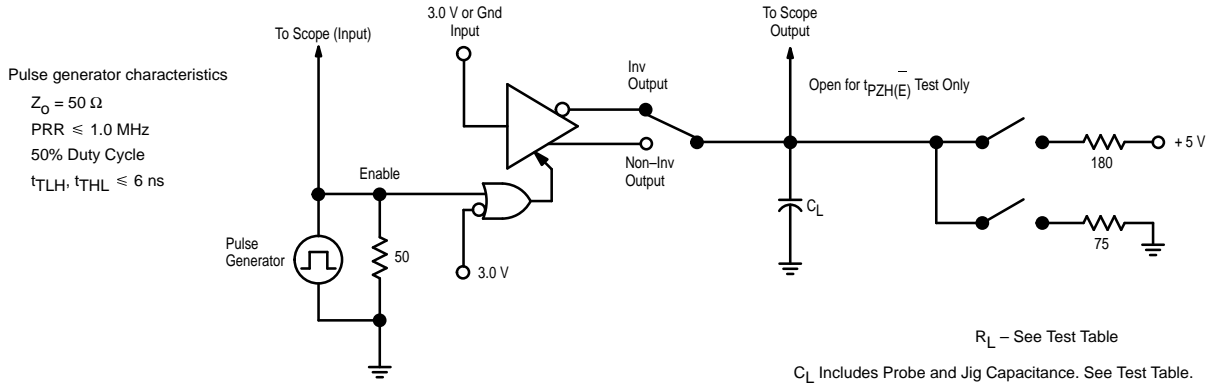
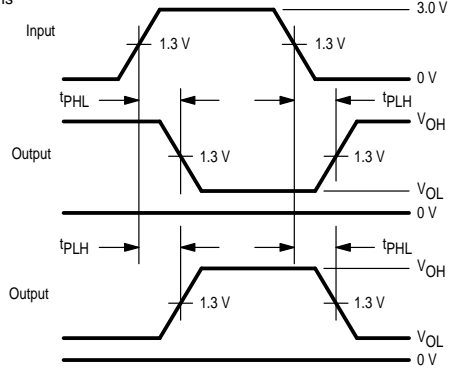
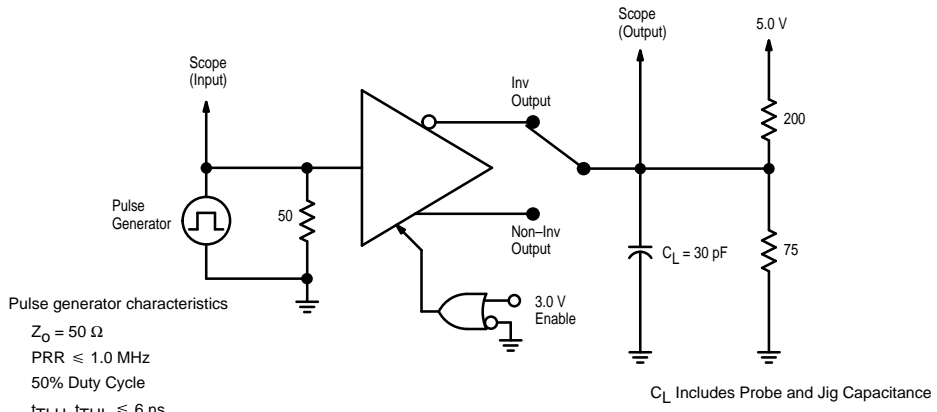


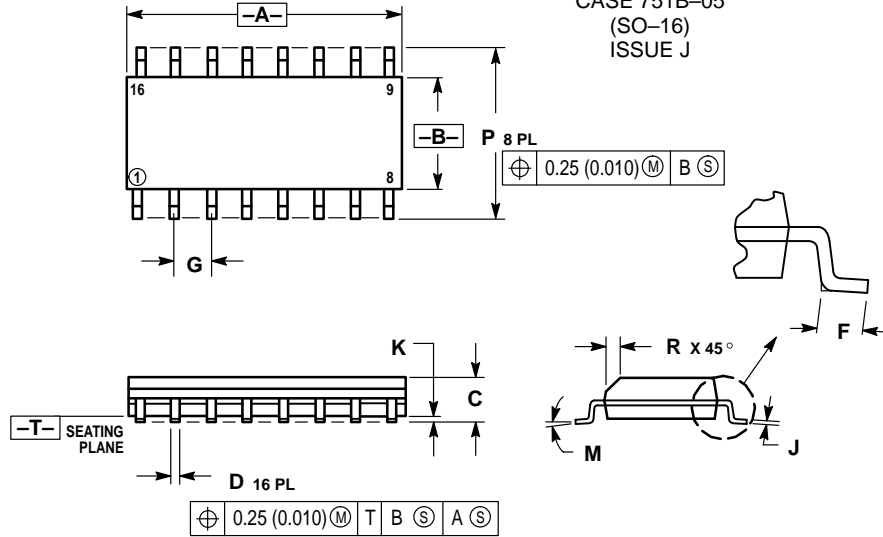
Figure 2. Propagation Delay Times Input to Output Waveforms and Test Circuit



AM26LS31

OUTLINE DIMENSIONS

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

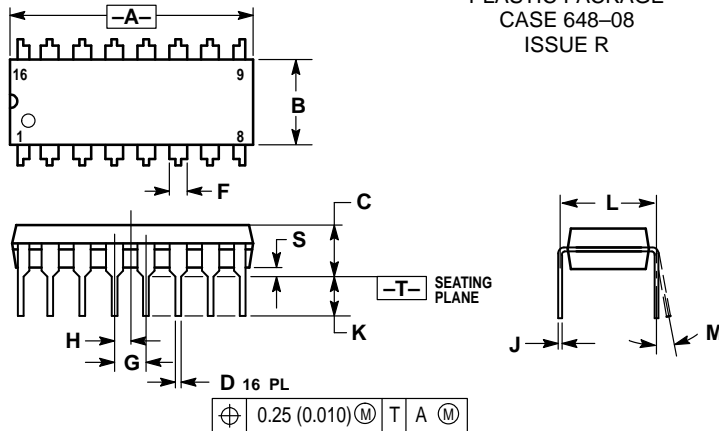


NOTES:

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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and μ are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:

USA/EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609
INTERNET: http://Design-NET.com

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

