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MOTOROLA

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.

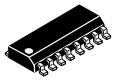
The high impedance output state is assured during power down.

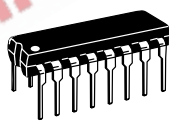
- Full EIA–422 Standard Compliance
- Single +5.0 V Supply
- Meets Full V_O = 6.0 V, V_{CC} = 0 V, I_O < 100 µA Requirement
- Output Short Circuit Protection
- Complementary Outputs for Balanced Line Operation
- High Output Drive Capability
- Advanced LS Processing
- PNP Inputs for MOS Compatibility

QUAD EIA–422 LINE DRIVER WITH THREE–STATE OUTPUTS

SEMICONDUCTOR TECHNICAL DATA

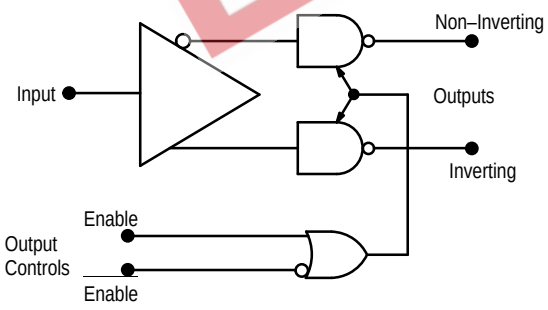
D SUFFIX
PLASTIC PACKAGE
CASE 751B
(SO–16)



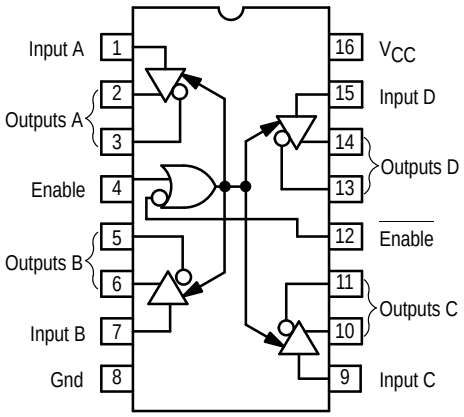


PC SUFFIX
PLASTIC PACKAGE
CASE 648

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
H = High Logic State
X = Irrelevant
Z = Third–State (High Impedance)

ORDERING INFORMATION

Device	Operating Temperature Range	Package
AM26LS31PC	T_A = 0 to +70°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.

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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 V ≤ V_{CC} ≤ 5.25 V and 0°C ≤ T_A ≤ 70°C. Typical values measured at V_{CC} = 5.0 V, and T_A = 25°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 V)	I_{IL}	–	–	– 360	µA
Input Current – High Logic State (V_{IH} = 2.7 V) (V_{IH} = 7.0 V)	I_{IH}	– –	– –	+ 20 + 100	µA
Input Clamp Voltage (I_{IK} = – 18 mA)	V_{IK}	–	–	– 1.5	V
Output Voltage – Low Logic State (I_{OL} = 20 mA)	V_{OL}	–	–	0.5	V
Output Voltage – High Logic State (I_{OH} = –20 mA)	V_{OH}	2.5	–	–	V
Output Short Circuit Current (V_{IH} = 2.0 V) Note 1	I_{OS}	– 30	–	– 150	mA
Output Leakage Current – Hi–Z State (V_{OL} = 0.5 V, $V_{IL(E)}$ = 0.8 V, $V_{IH(E)}$ = 2.0 V) (V_{OH} = 2.5 V, $V_{IL(E)}$ = 0.8 V, $V_{IH(E)}$ = 2.0 V)	$I_{O(Z)}$	– –	– –	– 20 + 20	µA
Output Leakage Current – Power OFF (V_{OH} = 6.0 V, V_{CC} = 0 V) (V_{OL} = – 0.25 V, V_{CC} = 0 V)	$I_{O(off)}$	– –	– –	+ 100 – 100	µA
Output Offset Voltage Difference, Note 2	$V_{OS} - \overline{V_{OS}}$	–	–	± 0.4	V
Output Differential Voltage, Note 2	V_{OD}	2.0	–	–	V
Output Differential Voltage Difference, Note 2	$\lvert\Delta V_{OD}\rvert$	–	–	± 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 V, T_A = 25°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 pF, R_L = 75 Ω to Gnd) (C_L = 10 pF, R_L = 180 Ω to V_{CC}) (C_L = 30 pF, R_L = 75 Ω to Gnd) (C_L = 30 pF, R_L = 180 Ω 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

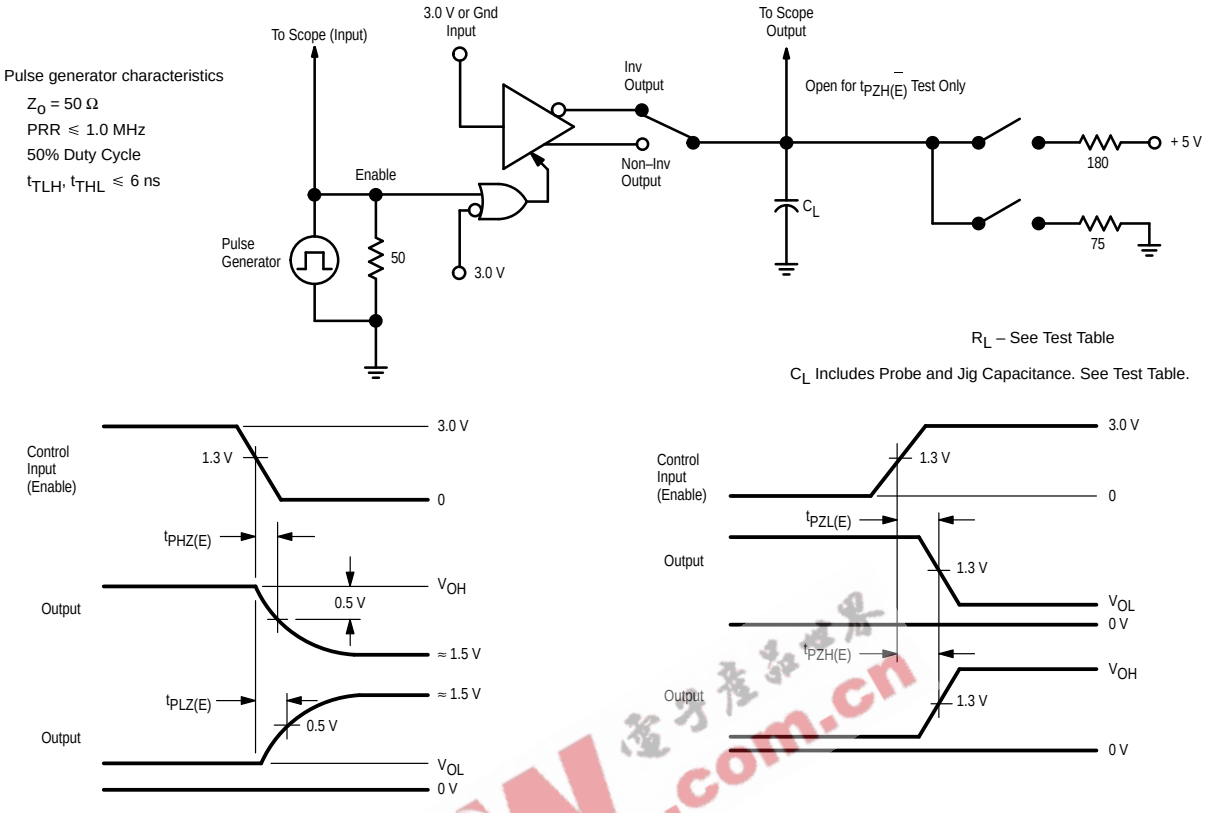
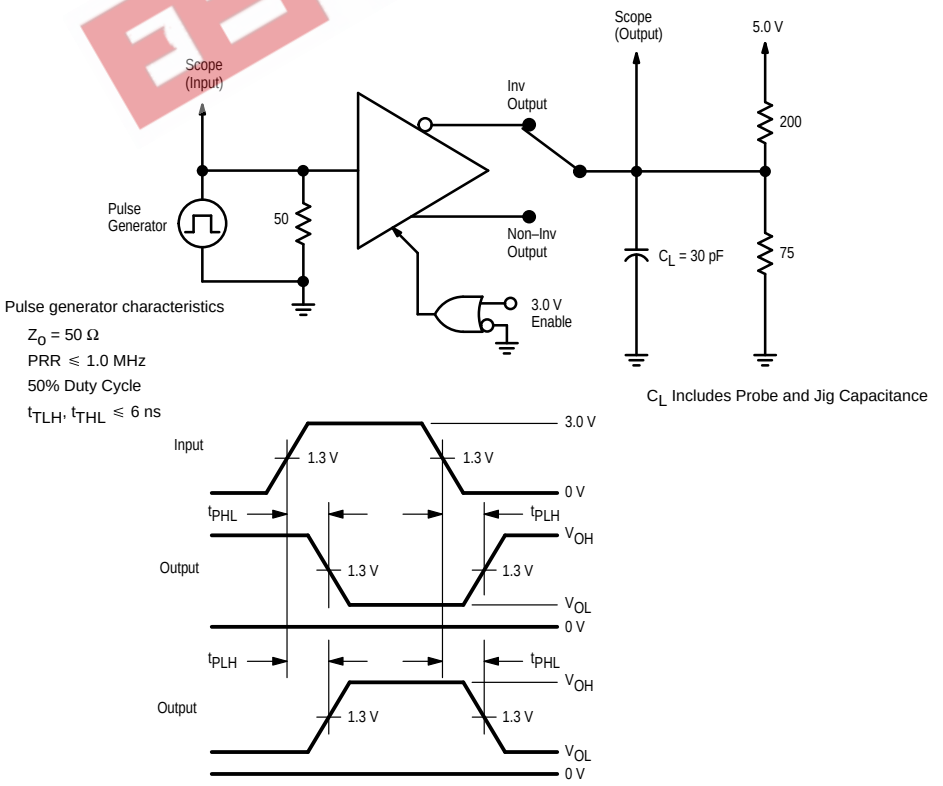


Figure 2. Propagation Delay Times Input to Output Waveforms and Test Circuit



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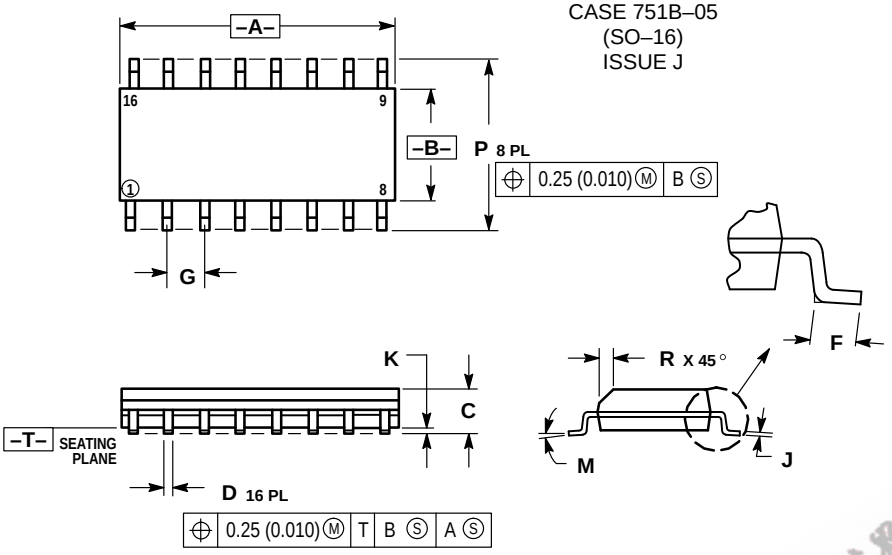
OUTLINE DIMENSIONS

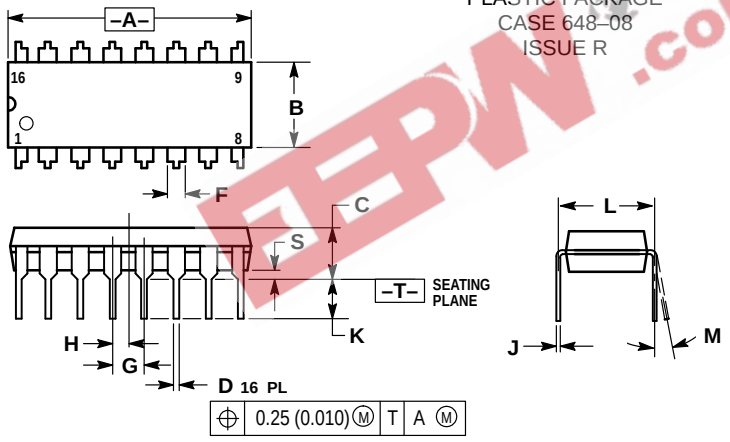
D SUFFIX
PLASTIC PACKAGE
CASE 751B–05
(SO–16)
ISSUE J



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.

	MILLIMETERS		INCHES	
DIM	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.

	INCHES		MILLIMETERS	
DIM	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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