

MC26C31

Product Preview

**Quad EIA-422-A Line Driver
CMOS**

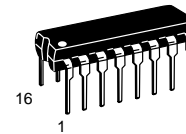
The MC26C31 is a quad differential line driver designed for digital data transmission over balanced lines. The MC26C31 meets all the requirements of standard EIA-422-A while retaining the low-power characteristics of CMOS.

The MC26C31 accepts TTL or CMOS input levels and translates these to EIA-422-A output level. This part uses special output circuitry that enables the individual drivers to power down without loading down the bus. The MC26C31 also includes special circuitry which will set the outputs to a high impedance mode during power up or down, preventing spurious glitches. This device has enable and disable circuitry common for all four drivers.

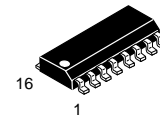
The MC26C31 is pin compatible with the AM26LS31.

All pins are protected against damage due to electrostatic discharges.

- Maximum Supply Current: 3 mA
- 2000 V ESD Protection on the Inputs and Outputs
- TTL/CMOS Input Compatible
- Typical Propagation Delay: 6 ns
- Typical Output Skew: 1 ns
- Meets $V_O = 6.0\text{ V}$ (and $V_O = 0.25\text{ V}$), $V_{CC} = 0\text{ V}$, $I_O < 100\text{ }\mu\text{A}$ Requirement
- Meets the Requirements of Standard EIA-422-A
- Operation from Single 5 V Supply
- High Impedance Mode for Outputs Connected to System Buses



P SUFFIX
PLASTIC DIP
CASE 648

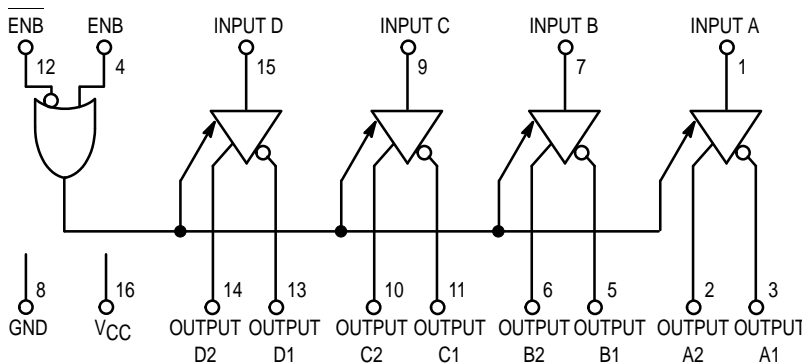


D SUFFIX
SOG PACKAGE
CASE 751B

ORDERING INFORMATION

MC26C31P	Plastic DIP
MC26C31D	SOG Package

BLOCK DIAGRAM



This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

REV 3
1993

© Motorola, Inc. 1995



TRUTH TABLE

Control Inputs $\overline{E/E}$	Input	Non-Inverting Output	Inverting Output
L/H	X	Z	Z
All other combinations of enable inputs	H	H	L
	L	L	H

X = Don't Care

H = High Logic State

Z = High Impedance

L = Low Logic State

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	7	V
DC Input Voltage	V_{in}	- 1.5 to $V_{CC} + 1.5$	V
DC Output Voltage*	V_{out}	- 0.5 to $V_{CC} + 0.5$	V
DC Output Current, per Pin	I_{out}	150	mA
DC V_{CC} or GND Current, per Pin	I_{DD}	150	mA
Storage Temperature	T_{stg}	- 65 to + 150	°C
Power Dissipation	P_D	500	mW
ESD (Human Body Model)		2000	V

* Power-on conditions.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid applications of any voltage higher than the maximum rated voltages to this high impedance circuit.

For proper operation it is recommended that V_{in} and V_{out} be constrained to the range $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$. Reliability of operation is enhanced if unused inputs are tied to and appropriate logic voltage level (e.g., either V_{SS} or V_{DD}).

OPERATING CONDITIONS

Rating	Symbol	Min	Max	Unit
Power Supply Voltage	V_{CC}	4.5	5.5	V
DC Input Voltage	V_{in}	0	V_{CC}	V
Operating Temperature Range	T_A	- 40	+ 85	°C
Input Rise and Fall Time	t_r, t_f	—	500	ns

DC CHARACTERISTICS ($V_{CC} = 4.5$ to 5.5 V, $T_A = - 40$ to $+ 85$ °C, unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Unit
Input Voltage (Low Logic State)	V_{IL}	—	—	0.8	V
Input Voltage (High Logic State)	V_{IH}	2.0	—	—	V
Output Voltage (Low Logic State) $I_{sink} = 20$ mA	V_{OL}	—	0.3	0.5	V
Output Voltage (High Logic State) $I_{source} = 20$ mA	V_{OH}	2.5	2.8	—	V
Output Differential Voltage $R_L = 100 \Omega$ (Note 1)	V_{OD}	2.0	—	—	V
Output Differential Voltage Difference $R_L = 100 \Omega$ (Note 1)	$D(V_{OD})$	—	—	± 0.4	V
Output Offset Voltage $R_L = 100 \Omega$ (Note 1)	V_{OS}	—	—	3.0	V
Output Offset Voltage Difference $R_L = 100 \Omega$ (Note 1)	$D(V_{OS})$	—	—	± 0.4	V
Input Current $V_{IH} = V_{CC}$, GND, V_{IH} or V_{IL}	I_{in}	—	—	± 1.0	μA
Quiescent Supply Current $I_{out} = 0 \mu A$	I_{CC}	—	—	3.0	mA
Output Short Circuit Current (Note 2)	I_{OS}	- 30	- 100	- 150	mA
Output Leakage Current (High-Z State) $V_{out} = V_{CC}$ or GND	$I_{O(Z)}$	—	—	± 1.0	μA
Input Leakage Current (Power Off)	I_{oxh} I_{oxl}	— —	— —	100 - 100	μA

NOTES:

1. See EIA specifications EIA-422-A for exact test conditions.
2. Only one output may be shorted at a time.

AC CHARACTERISTICS ($V_{CC} = 4.5$ to 5.5 V, $T_A = -40$ to $+85^\circ\text{C}$, unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Unit
Propagation Delay Input to Output (S1 Open)	t_{PLH} t_{PHL}	—	6	12	ns
Output Skew (S1 Open)*	Skew	—	1.0	4	ns
Differential Output Rise Time Fall Time (S1 Open)	$t^{(TLH)}$ $t^{(THL)}$	—	4	8	ns
Output Enable Time (S1 Closed)	t_{PZH} t_{PZL}	—	16 15	—	ns
Output Disable Time (S1 Closed)	t_{PHZ} t_{PLZ}	—	6 9	—	ns

* Skew: difference in propagation delays between complementary outputs.

AC TEST CIRCUIT AND SWITCHING TIME WAVEFORMS

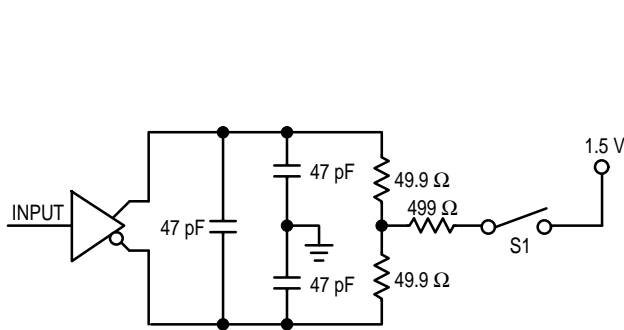


Figure 1. AC Test Circuit

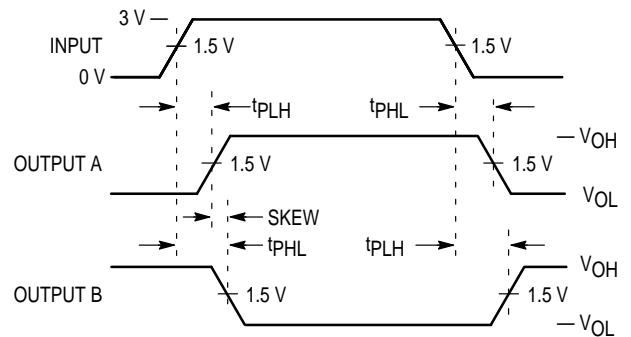


Figure 2. Propagation Delays and Skew Waveforms

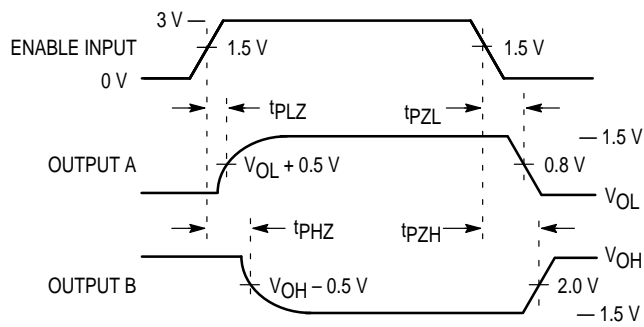


Figure 3. Enable and Disable Times

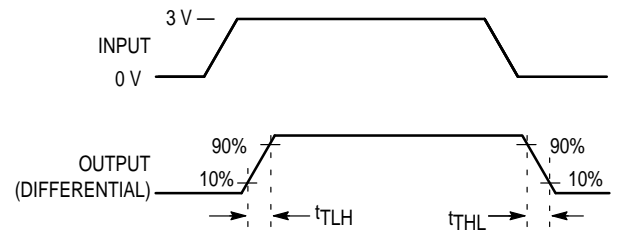


Figure 4. Differential Rise and Fall Times

TYPICAL APPLICATIONS

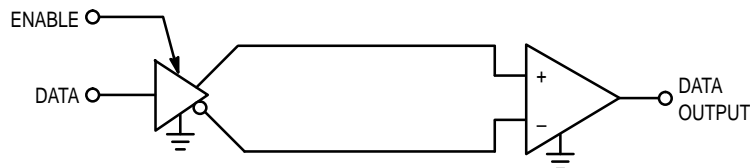
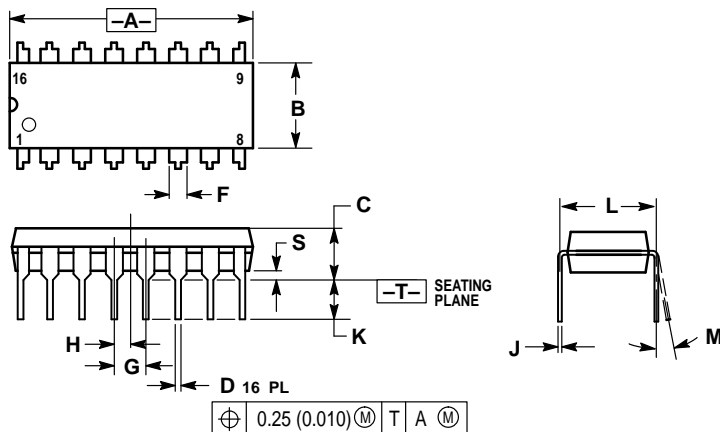


Figure 5. Two-Wire Balanced Systems (EIA-422-A)

PACKAGE DIMENSIONS

P SUFFIX PLASTIC DIP CASE 648-08

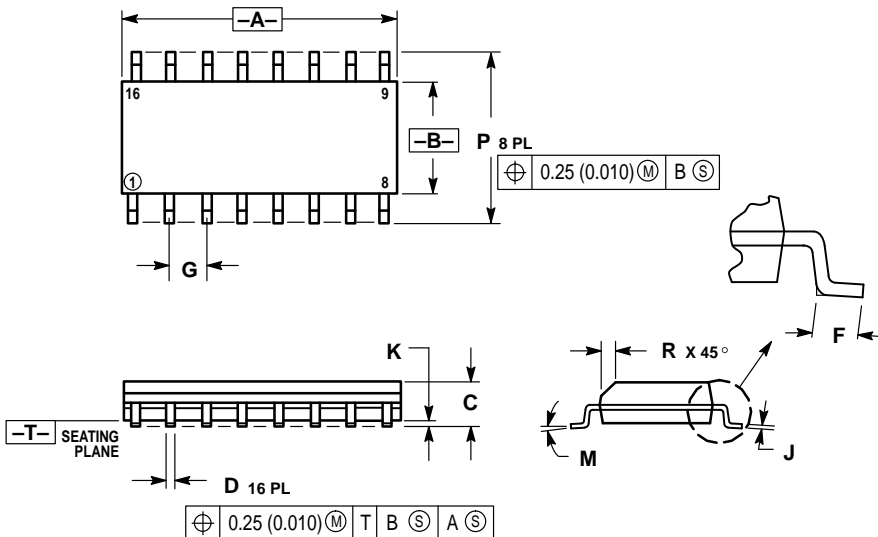


NOTES:

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

D SUFFIX SOG PACKAGE CASE 751B-05



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

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 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



MC26C31/D

