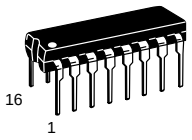
MC34C87

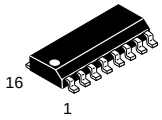
Product Preview

Quad EIA-422-A Line Driver

CMOS



P SUFFIX
PLASTIC DIP
CASE 648



D SUFFIX
SOG PACKAGE
CASE 751B

ORDERING INFORMATION

MC34C87P	Plastic DIP
MC34C87D	SOG Package

The MC34C87 is a quad differential line driver designed for digital data transmission over balanced lines. The MC34C87 meets all the requirements of standard EIA–422–A while retaining the low–power characteristics of CMOS.

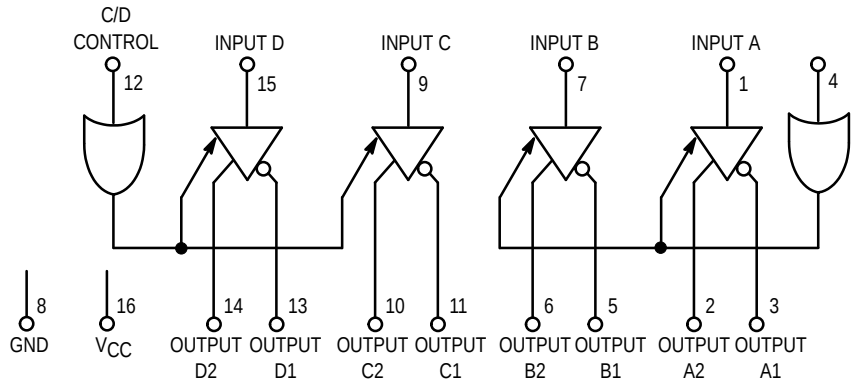
The MC34C87 accepts TTL or CMOS input levels and translates these to EIA–422–A output level. This part uses special output circuitry that enables the individual drivers to power down without loading down the bus. The MC34C87 also includes special circuitry which will set the outputs to a high impedance mode during power up or down, preventing spurious glitches. Each enable pin controls two drivers.

The MC34C87 is pin compatible with the MC3487.

All pins are protected against damage due to electrostatic discharges.

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

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

TRUTH TABLE

Control Input	Input	Non–Inverting Output	Inverting Output
L	X	Z	Z
H	H	H	L
H	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 $V_{SS} \le (V_{in}$ or $V_{out}) \le V_{DD}$. 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 Ω (Note 1)	V_{OD}	2.0	—	—	V
Output Differential Voltage Difference R_L = 100 Ω (Note 1)	$D(V_{OD})$	—	—	± 0.4	V
Output Offset Voltage R_L = 100 Ω (Note 1)	V_{OS}	—	—	3.0	V
Output Offset Voltage Difference R_L = 100 Ω (Note 1)	$D(V_{OS})$	—	—	± 0.4	V
Input Current V_{in} = V_{CC}, GND, V_{IH} or V_{IL}	I_{in}	—	—	± 1.0	μA
Quiescent Supply Current I_{out} = 0 μA	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
Output Leakage Current (Power Off) V_{out} = 6 V V_{out} = – 0.25 V	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°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

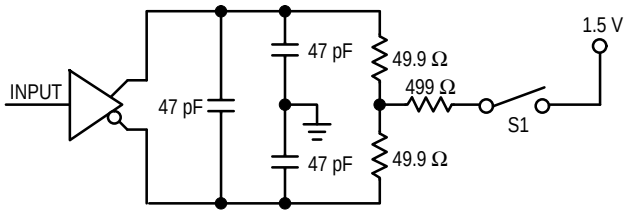


Figure 1. AC Test Circuit

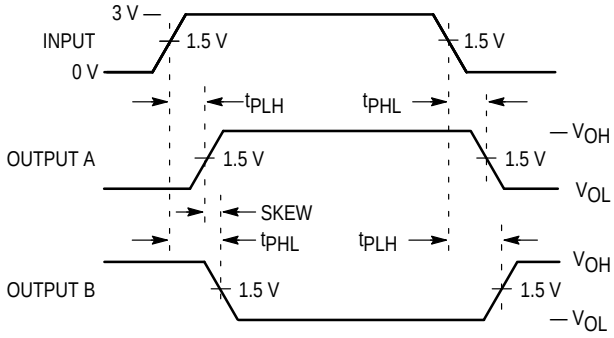


Figure 2. Propagation Delays and Skew Waveforms

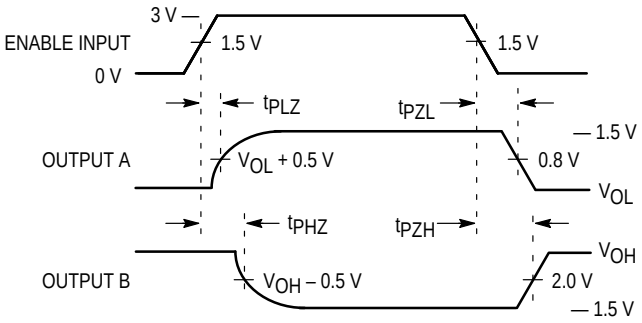


Figure 3. Enable and Disable Times

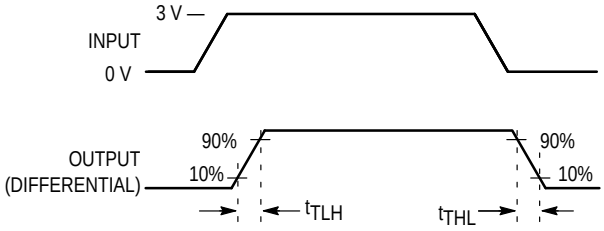


Figure 4. Differential Rise and Fall Times

TYPICAL APPLICATIONS

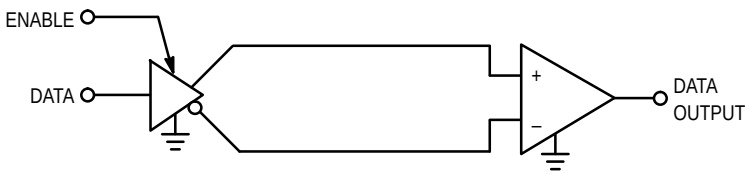
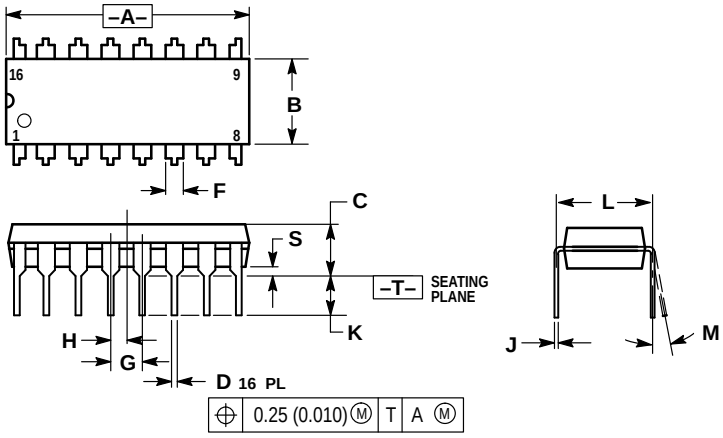


Figure 5. Two–Wire Balanced Systems (EIA–422–A)

PACKAGE DIMENSIONS

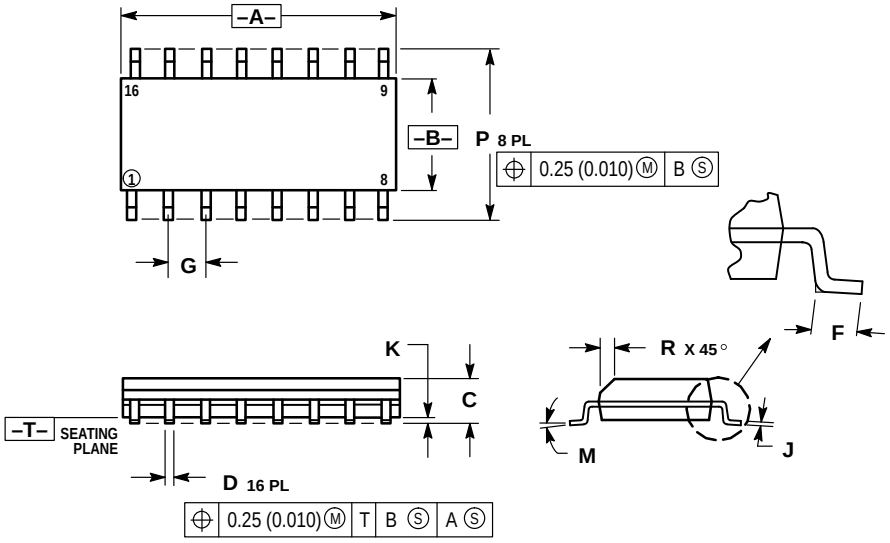
P SUFFIX
PLASTIC DIP
CASE 648–08



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.

	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

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.

	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

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