

**MC34C86**

*Product Preview*  
**Quad EIA-422-A Line Receiver**  
**CMOS**

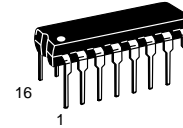
The MC34C86 is a quad differential line receiver designed for digital data transmission over balanced lines. The MC34C86 meets all the requirements of standard EIA-422-A while retaining the low-power characteristics of CMOS.

The MC34C86 has an input sensitivity of 200 mV over the common mode input voltage range of  $\pm 7$  V. In addition, each receiver chain has internal hysteresis circuitry to improve noise margin and discourage output instability for slowly changing input waveforms.

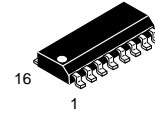
The MC34C86 is pin compatible with the MC3486.

All pins are protected against damage due to electrostatic discharges.

- Typical Power Supply Current: 6 mA
- 2000 V ESD Protection on the Inputs and Outputs
- Typical Propagation Delay: 18 ns
- Typical Input Hysteresis: 75 mV
- Meets the Requirements of Standard EIA-422-A
- Operation from Single 5 V Supply
- High Impedance Mode for Outputs Connected to System Buses
- TTL/CMOS Compatible Outputs



**P SUFFIX**  
PLASTIC DIP  
CASE 648

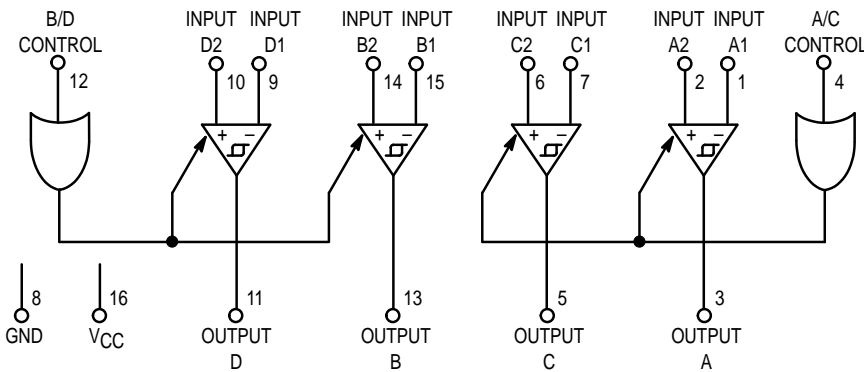


**D SUFFIX**  
SOG PACKAGE  
CASE 751B

**ORDERING INFORMATION**

|          |             |
|----------|-------------|
| MC34C86P | Plastic DIP |
| MC34C86D | 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 4  
10/95

## TRUTH TABLE

| Control Input | Input                      | Output |
|---------------|----------------------------|--------|
| L             | X                          | Z      |
| H             | $V_{ID} \geq V_{TH}$ (Max) | 1      |
| H             | $V_{ID} \leq V_{TH}$ (Min) | 0      |
| H             | Open                       | 1      |

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    |
| Input Voltage                | $V_I$     | $\pm 10$       | V    |
| Input Differential Voltage   | $V_{ID}$  | $\pm 14$       | V    |
| Enable Control Input Voltage | $V_{in}$  | $V_{CC} + 0.5$ | V    |
| Storage Temperature          | $T_{stg}$ | - 65 to + 150  | °C   |
| Maximum Current per Output   | $I_O$     | $\pm 25$       | mA   |
| ESD (Human Body Model)       |           | 2000           | V    |

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    |
| 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) (See Note 1)

| Parameter  | Symbol    | Min      | Typ          | Max        | Unit          |
|--|-----------|----------|--------------|------------|---------------|
| Power Supply Current, $V_{CC} = \text{Max}$  | $I_{CC}$  | —        | 6            | 12         | mA            |
| Enable Input Current, $V_{in} = V_{CC}$ or GND   | $I_L$     | —        | —            | $\pm 1.0$  | $\mu\text{A}$ |
| Input Voltage — Low Logic State (Enable Control)   | $V_{IL}$  | —        | —            | 0.8        | V             |
| Input Voltage — High Logic State (Enable Control)  | $V_{IH}$  | 2        | —            | —          | V             |
| Differential Input Voltage, $-7 \text{ V} < V_{LCM} < 7 \text{ V}$                             | $V_{TH}$  | 0.2<br>— | —<br>—       | —<br>- 0.2 | V             |
| Input Hysteresis, $V_{LCM} = 0 \text{ V}$  | $V_{hys}$ | —        | 75           | —          | mV            |
| Comparator Input Current   | $I_{in}$  | —<br>—   | 1.4<br>- 2.5 | —<br>—     | mA            |
| Comparator Input Resistance, $-10 \text{ V} < V_{LCM} < +10 \text{ V}$                         | $R_{in}$  | 4        | 4.8          | —          | k $\Omega$    |
| Output Voltage (Low Logic State) $V_{ID} = -1 \text{ V}$ , $I_{out} = 6 \text{ mA}$ (Note 2)   | $V_{OL}$  | —        | 0.13         | 0.33       | V             |
| Output Voltage (High Logic State) $V_{ID} = +1 \text{ V}$ , $I_{out} = -6 \text{ mA}$ (Note 2) | $V_{OH}$  | 3.8      | 4.8          | —          | V             |
| Output Leakage Current (High Logic State) $V_{out} = V_{CC}$ or GND                            | $I_{OZ}$  | - 5      | —            | 5          | $\mu\text{A}$ |

### NOTES:

- All currents into device pins are shown as positive, out of device pins are negative. All voltages referenced to ground unless otherwise noted.
- See EIA specifications EIA-422-A for exact test conditions.

**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, $C_L = 50$ pF, $V_{DIFF} = 2.5$ V                          | $t_{PLH}$<br>$t_{PHL}$ | —   | 18  | 30  | ns   |
| Skew = $ t_{PHL} - t_{PLH} $  | Skew                   | —   | 1   | —   | ns   |
| Propagation Delay Enable to Output<br>$C_L = 50$ pF, $R_L = 1000 \Omega$ , $V_{DIFF} = 2.5$ V | $t_{PLZ}$<br>$t_{PHZ}$ | —   | 12  | —   | ns   |
| Propagation Delay Enable to Output<br>$C_L = 50$ pF, $R_L = 1000 \Omega$ , $V_{DIFF} = 2.5$ V | $t_{PZL}$<br>$t_{PZH}$ | —   | 14  | —   | ns   |

**AC TEST CIRCUIT AND SWITCHING TIME WAVEFORMS**

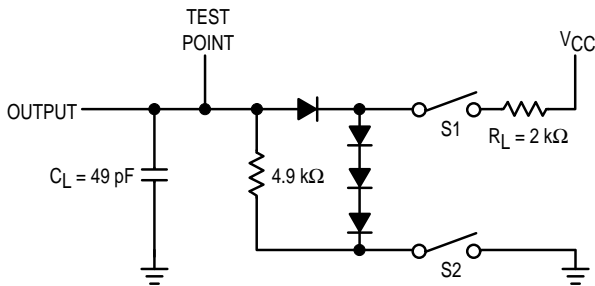


Figure 1. Test Circuit

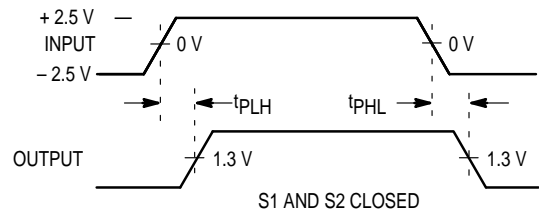


Figure 2. Propagation Delays

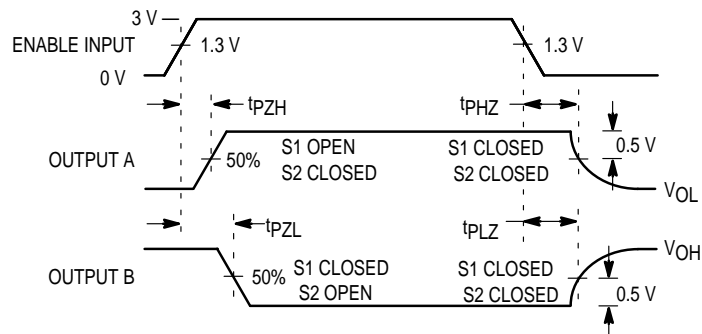


Figure 3. Enable and Disable Times

**TYPICAL APPLICATIONS**

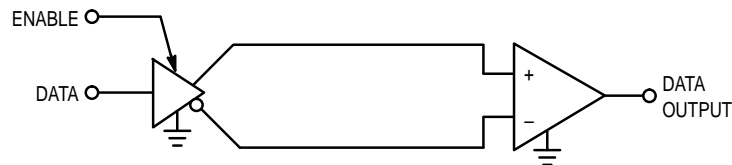
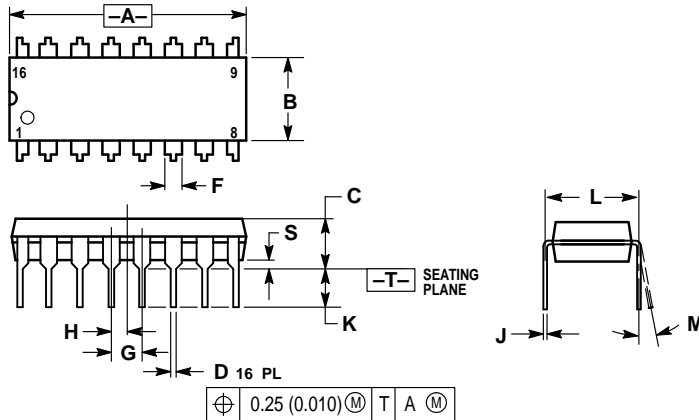


Figure 4. Two-Wire Balanced Systems (EIA-422-A)

## PACKAGE DIMENSIONS

### P SUFFIX PLASTIC DIP CASE 648-08

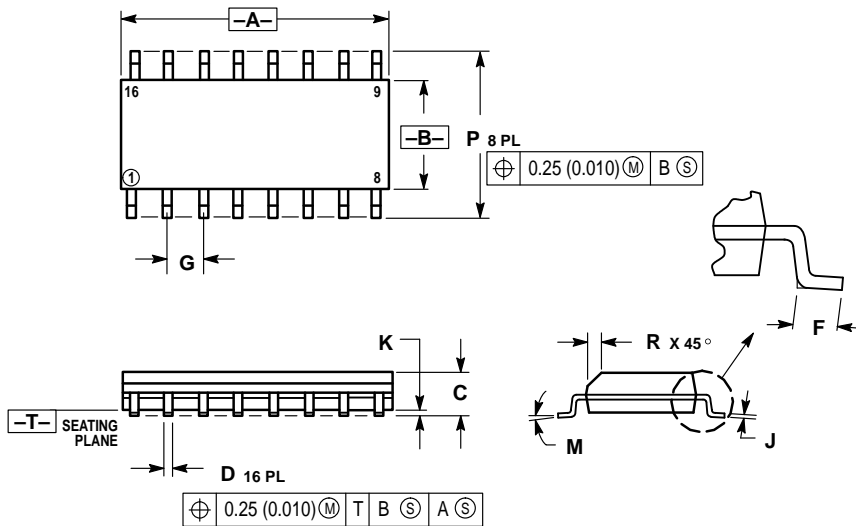


#### NOTES:

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 |

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