

#### FEATURES

- Wide Bandwidth ..... 100MHz
- Voltage Gain ..... 0.99
- High Continuous Output Current .....  $\pm 100\text{mA}$
- High Input Impedance ..... 2M $\Omega$ m
- Short Circuit Protection
- Compatible with LH0002, HA-5002 and EL2003

#### APPLICATIONS

- Video Amplifiers
- High-Speed Current (Buffer) Amplifiers
- Signal Separators
- High-Power Drivers for
  - Coaxial cables
  - Transmission lines
  - Data Acquisition Circuits
  - A/D Converters

#### ORDERING INFORMATION

| PACKAGE                    |                             |                         | OPERATING<br>TEMPERATURE<br>RANGE |
|----------------------------|-----------------------------|-------------------------|-----------------------------------|
| HERMETIC<br>TO-99<br>8-PIN | HERMETIC<br>CERDIP<br>8-PIN | PLASTIC<br>DIP<br>8-PIN |                                   |
| CA2003J                    | CA2003Z                     |                         | MIL                               |
|                            | CA2033Z                     |                         | MIL                               |
| CA2003CJ                   | CA2003CZ                    | CA2003CP                | IND                               |
|                            | CA2033CZ                    | CA2033CP                | IND                               |

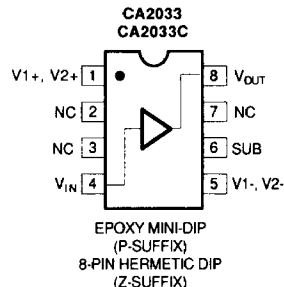
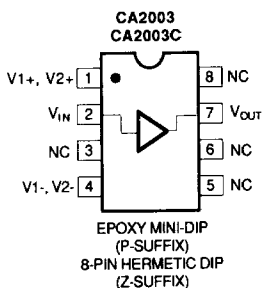
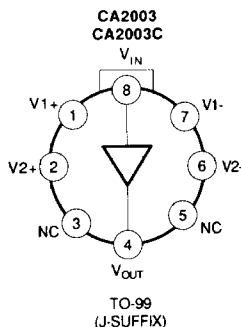
#### DESCRIPTION

The CA2003/CA2033 are high speed monolithic buffer amplifiers designed for high-performance video circuits and for driving Coaxial and twisted pair cables. The CA2003/CA2033's fast slew rate of 1200 V/ $\mu$ s make them extremely useful in applications where the output current of fast op-amps have to be boosted, or where the op-amp has to be isolated from a capacitive load. These buffers are capable of sustaining a 100mA current continuously. An internal output short circuit current limiting feature has been designed in the device such that when the junction temperature reaches 175°C the current is limited to 100mA. Therefore heatsinking will improve the power performance of these devices. If more than 100mA output current is required or if the heatsinking is insufficient for the application, then several buffers can be paralleled together.

The CA2003/CA2033 are manufactured with the di-electric isolation process method in such a way that the NPN and PNP transistors have identical characteristics.

The CA2003 and CA2033 are designed for military temperature ranges, -55°C to 125°C, and are available in TO-99 and 8-pin HERMETIC-DIP. The CA2003C and CA2033C are for operation in the industrial temperature ranges, -25°C to 85°C, and are available in TO-99, 8-pin HERMETIC-DIP and 8-pin PLASTIC MINI-DIP.

#### Pin Connections (Top View)



**ABSOLUTE MAXIMUM RATINGS**

|                                                           |                                   |
|-----------------------------------------------------------|-----------------------------------|
| Supply Voltage ( $V_S$ )                                  | $\pm 18V$                         |
| Input Voltage                                             | $\pm 15V$                         |
| Input Current                                             | $\pm 50mA$                        |
| Output Short Circuit Duration with Heatsink is continuous |                                   |
| Storage Temperature Range                                 |                                   |
| J and Z Packages                                          | $65^{\circ}C$ to $+150^{\circ}C$  |
| P Package                                                 | $-65^{\circ}C$ to $+125^{\circ}C$ |

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| Operating Temperature Range           |                                   |
| CA2003/2033                           | $-55^{\circ}C$ to $+125^{\circ}C$ |
| CA2003C/2033C                         | $-25^{\circ}C$ to $85^{\circ}C$   |
| Lead Temperature (soldering, 60 sec.) | $300^{\circ}C$                    |
| DICE Junction Temperature ( $T_j$ )   |                                   |
| J and Z Packages                      | $175^{\circ}C$                    |
| P Package                             | $150^{\circ}C$                    |

**ELECTRICAL CHARACTERISTICS**  $V_S = \pm 15V$ ,  $V_S = 50\Omega$ ,  $T_A = 25^{\circ}C$  for CA2003/CA2033 and CA2003C/CA2033C

| PARAMETER                    | SYMBOL   | CONDITIONS                                     | MIN.       | TYP.       | MAX. | UNITS      |
|------------------------------|----------|------------------------------------------------|------------|------------|------|------------|
| Offset Voltage               | $V_{OS}$ | $V_{IN} = 0V$ , $R_L = \text{inf.}$            | -30        | 5          | 30   | mV         |
| Input Current                | $I_{IN}$ | $V_{IN} = 0V$ , $R_L = \text{inf.}$            | -25        | 5          | 25   | $\mu A$    |
| Input Resistance             | $R_{IN}$ | $V_{IN} = \pm 12V$ , $R_L = 100\Omega$         | 1          | 2          |      | M $\Omega$ |
| Voltage Gain                 | $A_{V1}$ | $V_{IN} = \pm 12V$ , $R_L = 1k\Omega$          | 0.98       | 0.99       |      | V/V        |
| Voltage Gain                 | $A_{V2}$ | $V_{IN} = \pm 12V$ , $R_L = 100\Omega$         | 0.83       | 0.90       |      | V/V        |
| Voltage Gain                 | $A_{V3}$ | $V_{IN} = \pm 6V$ , $R_L = 50\Omega$           | 0.82       | 0.89       |      | V/V        |
| Output Voltage Swing         | $V_O$    | $V_{IN} = \pm 14V$ , $R_L = 1k\Omega$          | $\pm 13$   | $\pm 13.5$ |      | V          |
| Output Voltage Swing         | $V_O$    | $V_{IN} = \pm 12V$ , $R_L = 100\Omega$         | $\pm 10.5$ | $\pm 11.3$ |      | V          |
| Slew Rate                    | SR       | $V_{IN} = \pm 10V$ , $R_L = 1k\Omega$ (Note 1) | 600        | 1200       |      | V/ $\mu s$ |
| Slew Rate                    | SR       | $V_{IN} = \pm 5V$ , $R_L = 50\Omega$ (Note 2)  | 200        | 400        |      | V/ $\mu s$ |
| Output Current               | $I_O$    | $V_{IN} = \pm 12V$ (Note 3)                    | $\pm 105$  | $\pm 230$  |      | mA         |
| Output Resistance            | $R_O$    | $V_{IN} = \pm 2V$ , $R_L = 50\Omega$           |            | 5          | 10   | $\Omega$   |
| Distortion @ 1kHz            | THD      | $V_{IN} = 4V_{rms}$ , $R_L = \text{inf.}$      |            | 0.2        | 1    | %          |
| Supply Current               | $I_S$    | $V_{IN} = 0V$ , $R_L = \text{inf.}$            |            | 10         | 15   | mA         |
| Power Supply Rejection Ratio | PSSR     | $V_{IN} = 0V$ , $R_L = \text{inf.}$ (Note 4)   | 60         | 80         |      | dB         |

**ELECTRICAL CHARACTERISTICS**  $V_S = \pm 15V$ ,  $V_S = 50\Omega$ ,  $T_A = -55^{\circ}C$  to  $+125^{\circ}C$  for CA2003/CA2033,  $T_A = -25^{\circ}C$  to  $85^{\circ}C$  for CA2003C/CA2033C

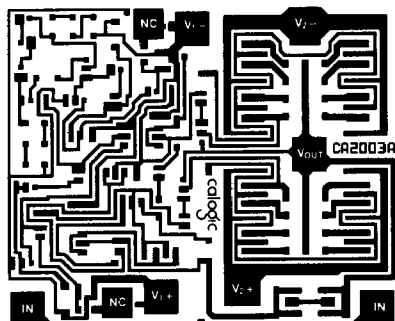
| PARAMETER                    | SYMBOL   | CONDITIONS                                    | MIN.       | CA2003<br>TYP. | MAX. | UNITS      |
|------------------------------|----------|-----------------------------------------------|------------|----------------|------|------------|
| Offset Voltage               | $V_{OS}$ | $V_{IN} = 0V$ , $R_L = \text{inf.}$           | -40        |                | 40   | mV         |
| Input Current                | $I_{IN}$ | $V_{IN} = 0V$ , $R_L = \text{inf.}$           | -50        |                | 50   | $\mu A$    |
| Input Resistance             | $R_{IN}$ | $V_{IN} = \pm 12V$ , $R_L = 100\Omega$        | 0.1        |                |      | M $\Omega$ |
| Voltage Gain                 | $A_{V1}$ | $V_{IN} = \pm 12V$ , $R_L = 1k\Omega$         |            | 0.97           |      | V/V        |
| Voltage Gain                 | $A_{V2}$ | $V_{IN} = \pm 12V$ , $R_L = 100\Omega$        |            | 0.80           |      | V/V        |
| Voltage Gain                 | $A_{V3}$ | $V_{IN} = \pm 6V$ , $R_L = 50\Omega$          |            | 0.79           |      | V/V        |
| Output Voltage Swing         | $V_O$    | $V_{IN} = \pm 14V$ , $R_L = 1k\Omega$         | $\pm 12.5$ |                |      | V          |
| Output Voltage Swing         | $V_O$    | $V_{IN} = \pm 12V$ , $R_L = 100\Omega$        | $\pm 10$   |                |      | V          |
| Slew Rate                    | SR       | $V_{IN} = \pm 5V$ , $R_L = 50\Omega$ (Note 2) | 200        | 400            |      | V/ $\mu s$ |
| Output Current               | $I_O$    | $V_{IN} = \pm 12V$ (Note 3)                   | $\pm 100$  |                |      | mA         |
| Output Resistance            | $R_O$    |                                               |            |                | 12   | $\Omega$   |
| Supply Current               | $I_S$    | $V_{IN} = 0V$ , $R_L = \text{inf.}$           |            |                | 20   | mA         |
| Power Supply Rejection Ratio | PSSR     | $V_{IN} = 0V$ , $R_L = \text{inf.}$ (Note 4)  | 50         |                |      | dB         |

**NOTES:**

1. Slew rate is measured between  $V_{OUT} = +5V$  and  $-5V$ .
2. Slew rate is measured between  $V_{OUT} = +2.5V$  and  $-2.5V$ .

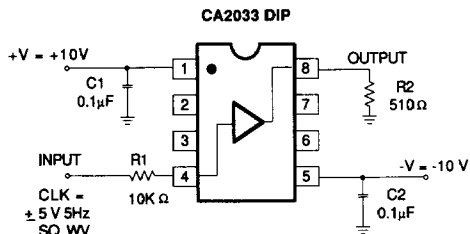
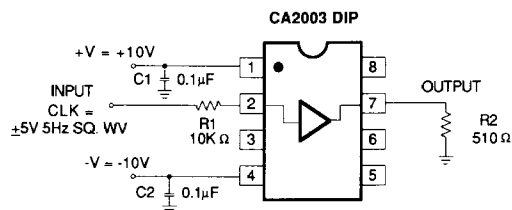
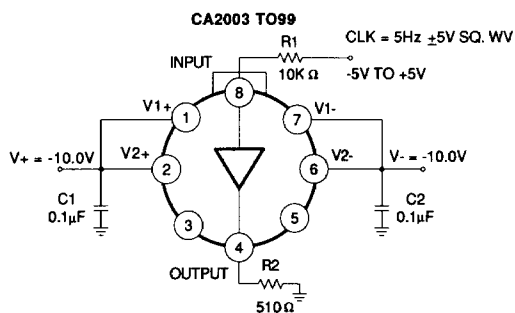
3. Force input to  $+12V$  output  $+10V$  for  $+I_{OUT}$  and  $V_{IN} = -12V$ ,  $V_{OUT} = -10V$  for  $-I_{OUT}$ .
4.  $V_S = \pm 4.5V$  to  $\pm 10V$ .

# Die Layout



**DIE SIZE:**  
0.057×0.048 inch, 2736 sq. mils  
(1.448×1.219mm, 1.765 sq. mm)

# Burn-In Circuits



**Simplified Schematic**

