



# MC33174 - MC35174

## LOW POWER QUAD BIPOLAR OPERATIONAL AMPLIFIERS

- GOOD CONSUMPTION/SPEED RATIO :  
ONLY 200µA FOR 2.1MHz, 2Vµs
- SINGLE (OR DUAL) SUPPLY OPERATION  
FROM +4V TO +44V ( $\pm 2V$  TO  $\pm 22V$ )
- WIDE INPUT COMMON MODE MODE  
VOLTAGE RANGE INCLUDING  $V_{CC}^-$
- LOW LEVEL OUTPUT VOLTAGE CLOSE TO  
 $V_{CC}^-$  : 100mV TYPICAL
- PIN TO PIN COMPATIBLE WITH  
STANDARD QUAD OP-AMPS

### DESCRIPTION

The MC3x174 series are quad bipolar operational amplifier offering both low consumption (200µA) and good speed (2.1MHz, 2V/µs).

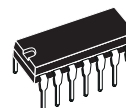
Moreover the Input Common Mode Range extends down to the lower supply rail, allowing single supply operation from +4V to +44V.

### ORDER CODE

| Part Number               | Temperature Range | Package |   |
|---------------------------|-------------------|---------|---|
|                           |                   | N       | D |
| MC33174                   | -40°C, +105°C     | •       | • |
| MC35174                   | -55°C, +125°C     | •       | • |
| <b>Example : MC33174N</b> |                   |         |   |

**N** = Dual in Line Package (DIP)

**D** = Small Outline Package (SO) - also available in Tape & Reel (DT)

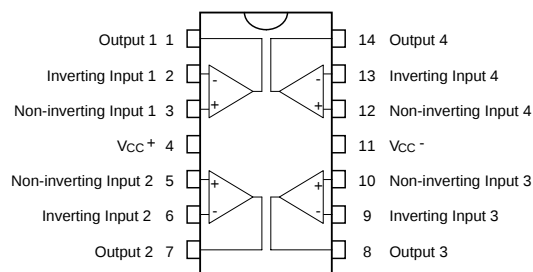


**N**  
**DIP14**  
(Plastic Package)

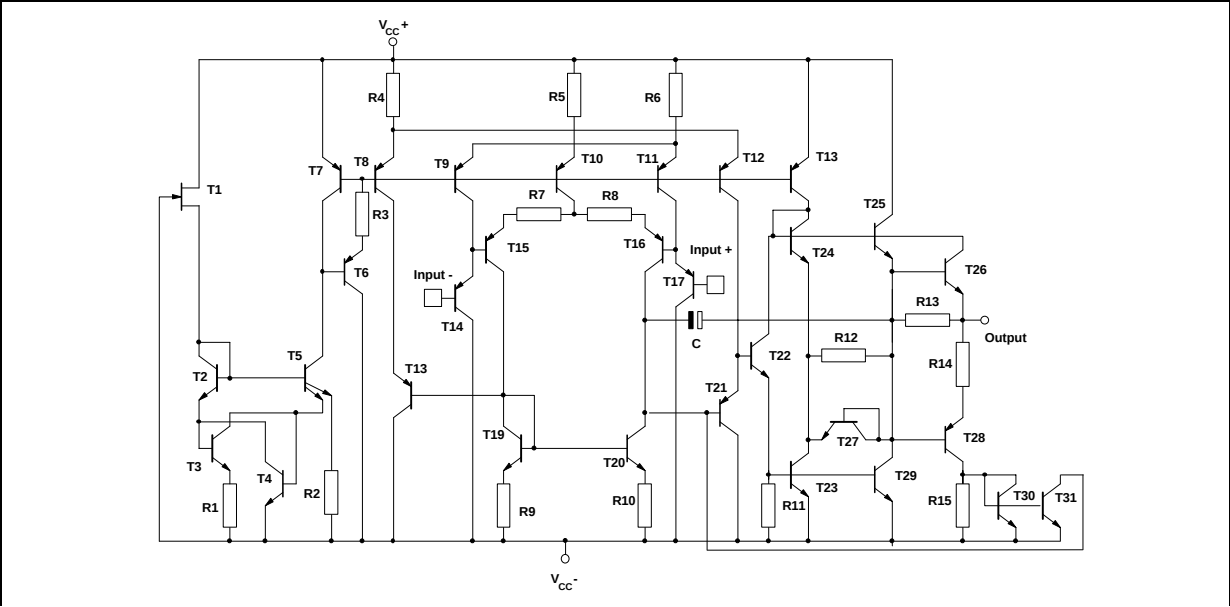


**D**  
**SO14**  
(Plastic Micropackage)

### PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM (for 1/4 MC33174)



MAXIMUM RATINGS

| Symbol     | Parameter                                                  | Value                    | Unit |
|------------|------------------------------------------------------------|--------------------------|------|
| $V_{CC}$   | Supply Voltage                                             | $\pm 22$                 | V    |
| $V_{id}$   | Differential Input Voltage                                 | see note 1)              | V    |
| $V_i$      | Input Voltage                                              | see note 1               | V    |
|            | Output Short Circuit Duration                              | Indefinite               | s    |
| $T_{oper}$ | Operating Free-Air Temperature range<br>MC33174<br>MC35174 | -40 to 105<br>-55 to 125 | °C   |
| $T_j$      | Junction Temperature                                       | 150                      | °C   |
| $T_{stg}$  | Storage Temperature                                        | -65 to 150               | °C   |

1. Either or both input voltages must not exceed the magnitude of  $V_{cc}$ .

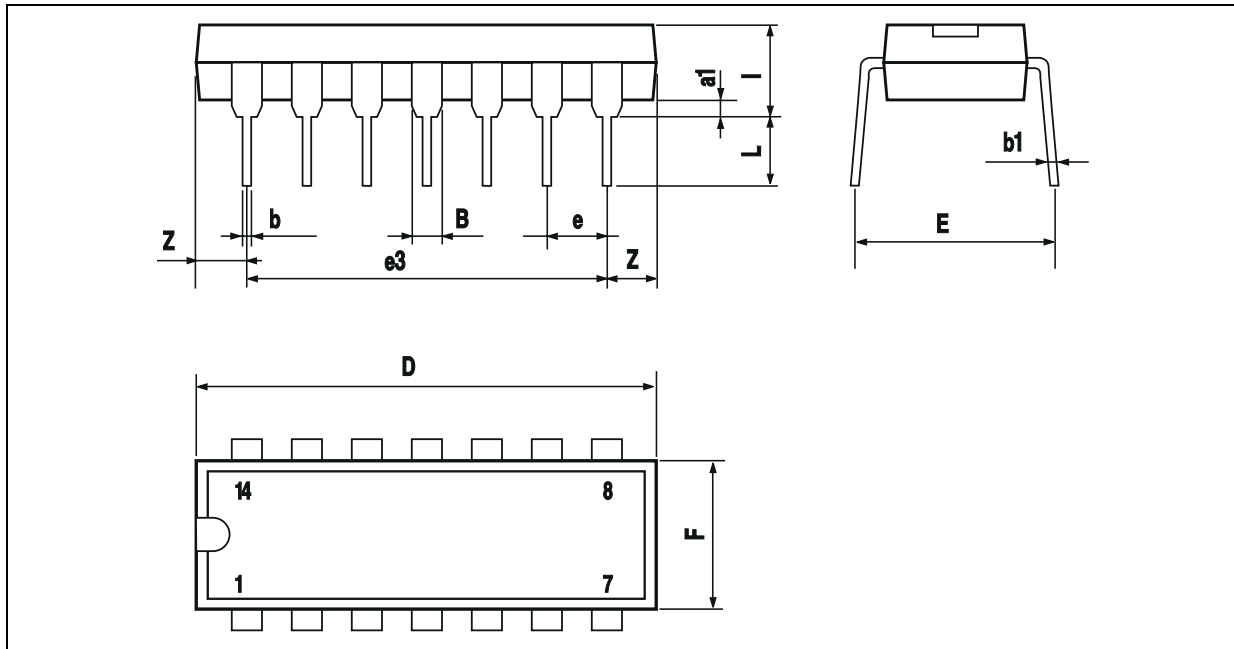
OPERATING CONDITIONS

| Symbol   | Parameter      | Value               | Unit |
|----------|----------------|---------------------|------|
| $V_{CC}$ | Supply Voltage | $\pm 2$ to $\pm 22$ | V    |

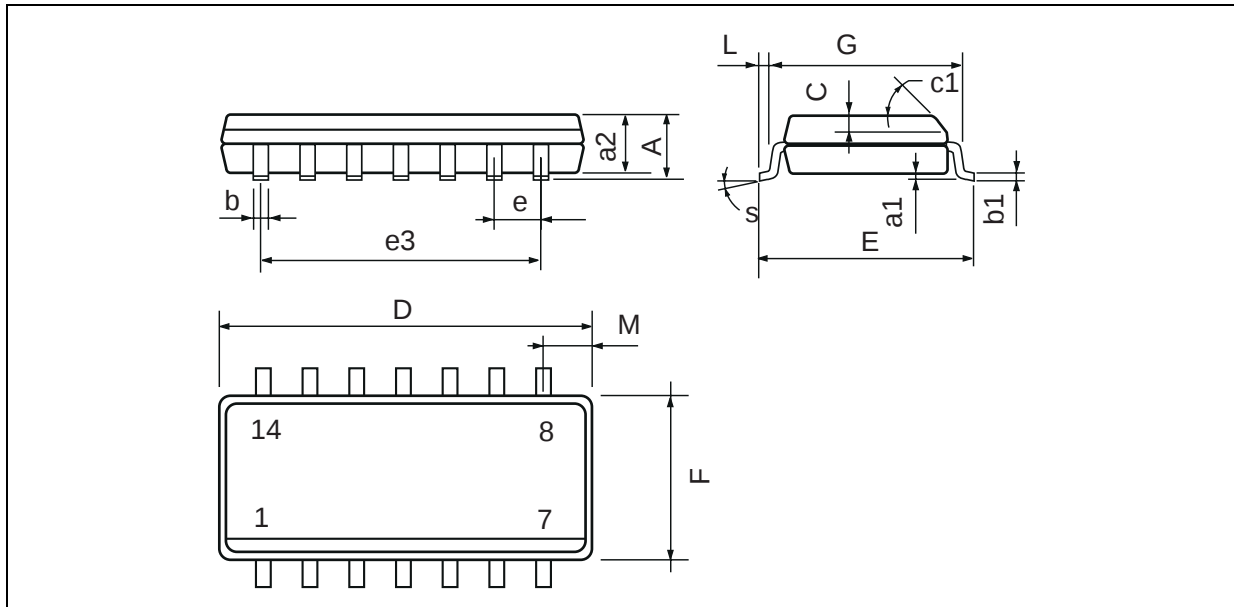
**ELECTRICAL CHARACTERISTICS**
 $V_{CC}^{+} = +15V$ ,  $V_{CC}^{-} = -15V$ ,  $R_L$  connected to Ground,  $T_{amb} = 25^{\circ}C$  (unless otherwise specified)

| Symbol          | Parameter                                                                                                                                                                                                                                                        | Min.                                                                         | Typ.        | Max.                   | Unit                   |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------|------------------------|------------------------|
| $V_{io}$        | Input Offset Voltage<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , $V_{ic} = 0V$<br>$V_{CC}^{+} = 5V$ , $V_{CC}^{-} = 0V$ , $V_{ic} = 0V$ , $V_o = 1.4V$<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , $V_{ic} = 0V$ , $T_{min.} \leq T_{amb} \leq T_{max.}$   |                                                                              | 1<br>1      | 4.5<br>5<br>6.5        | mV                     |
| $DV_{io}$       | Input Offset Voltage Drift                                                                                                                                                                                                                                       |                                                                              | 10          |                        | $\mu V/^{\circ}C$      |
| $I_{io}$        | Input Offset Current ( $V_{ic} = 0V$ )<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                                                                                                                                  |                                                                              | 5           | 20<br>40               | nA                     |
| $I_{ib}$        | Input Bias Current ( $V_{ic} = 0V$ )<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                                                                                                                                    |                                                                              | 20          | 100<br>200             | nA                     |
| $A_{vd}$        | Large Signal Voltage Gain ( $R_L = 10k\Omega$ , $V_o = \pm 10V$ )<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                                                                                                       | 50<br>25                                                                     | 100         |                        | V/mV                   |
| $V_{OH}$        | High Level Output Voltage<br>$V_{CC}^{+} = 5V$ , $V_{CC}^{-} = 0V$ , $R_L = 10k\Omega$<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , $R_L = 10k\Omega$<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , $R_L = 10k\Omega$ , $T_{min.} \leq T_{amb} \leq T_{max.}$ | 3.5<br>13.6<br>13.3                                                          | 4.2<br>14.2 |                        | V                      |
| $V_{OL}$        | Low Level Output Voltage<br>$V_{CC}^{+} = 5V$ , $V_{CC}^{-} = 0V$ , $R_L = 10k\Omega$<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , $R_L = 10k\Omega$<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , $R_L = 10k\Omega$ , $T_{min.} \leq T_{amb} \leq T_{max.}$  |                                                                              | 0.1<br>-14  | 0.15<br>-13.6<br>-13.3 | V                      |
| $I_{sc}$        | Output Short Circuit Current ( $V_{id} = \pm 1V$ , $V_o = 0V$ )<br>Source<br>Sink                                                                                                                                                                                | 3<br>15                                                                      | 6<br>27     |                        | mA                     |
| $V_{icm}$       | Input Common Mode Voltage Range<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                                                                                                                                         | $V_{CC}^{-}$ to $(V_{CC}^{+} - 1.8)$<br>$V_{CC}^{-}$ to $(V_{CC}^{+} - 2.2)$ |             |                        | V                      |
| CMR             | Common-mode Rejection Ratio ( $V_{ic} = V_{icm \text{ min.}}$ )                                                                                                                                                                                                  | 80                                                                           | 100         |                        | dB                     |
| SVR             | Supply Voltage Rejection Ratio ( $V_{CC} = \pm 5$ to $\pm 15V$ )                                                                                                                                                                                                 | 80                                                                           | 100         |                        | dB                     |
| $I_{CC}$        | Supply Current<br>$V_{CC}^{+} = 5V$ , $V_{CC}^{-} = 0V$ , no load<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , no load<br>$V_{CC}^{+} = +15V$ , $V_{CC}^{-} = -15V$ , no load, $T_{min.} \leq T_{amb} \leq T_{max.}$                                           |                                                                              | 200<br>220  | 250<br>250<br>300      | $\mu A$                |
| SR              | Slew Rate ( $V_i = \pm 10V$ , $R_L = 10k\Omega$ , $C_L = 100pF$ )                                                                                                                                                                                                | 1.6                                                                          | 2           |                        | V/ $\mu s$             |
| GBP             | Gain Bandwidth Product<br>$R_L = 10k\Omega$ , $C_L = 100pF$ , $f = 100kHz$                                                                                                                                                                                       | 1.4                                                                          | 2.1         |                        | MHz                    |
| $\phi_m$        | Phase Margin ( $R_L = 10k\Omega$ , $C_L = 100pF$ )                                                                                                                                                                                                               |                                                                              | 45          |                        | Degrees                |
| $e_n$           | Equivalent Input Noise Voltage ( $f = 1kHz$ )                                                                                                                                                                                                                    |                                                                              | 29          |                        | $\frac{nV}{\sqrt{Hz}}$ |
| THD             | Total Harmonic Distortion                                                                                                                                                                                                                                        |                                                                              | 0.05        |                        | %                      |
| $V_{O1}/V_{O2}$ | Channel Separation                                                                                                                                                                                                                                               |                                                                              | 120         |                        | dB                     |

**PACKAGE MECHANICAL DATA**  
14 PINS - PLASTIC DIP



| Dimensions | Millimeters |       |      | Inches |       |       |
|------------|-------------|-------|------|--------|-------|-------|
|            | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| a1         | 0.51        |       |      | 0.020  |       |       |
| B          | 1.39        |       | 1.65 | 0.055  |       | 0.065 |
| b          |             | 0.5   |      |        | 0.020 |       |
| b1         |             | 0.25  |      |        | 0.010 |       |
| D          |             |       | 20   |        |       | 0.787 |
| E          |             | 8.5   |      |        | 0.335 |       |
| e          |             | 2.54  |      |        | 0.100 |       |
| e3         |             | 15.24 |      |        | 0.600 |       |
| F          |             |       | 7.1  |        |       | 0.280 |
| i          |             |       | 5.1  |        |       | 0.201 |
| L          |             | 3.3   |      |        | 0.130 |       |
| Z          | 1.27        |       | 2.54 | 0.050  |       | 0.100 |

**PACKAGE MECHANICAL DATA****14 PINS - PLASTIC MICROPACKAGE (SO)**

| Dimensions | Millimeters |      |      | Inches |       |       |
|------------|-------------|------|------|--------|-------|-------|
|            | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A          |             |      | 1.75 |        |       | 0.069 |
| a1         | 0.1         |      | 0.2  | 0.004  |       | 0.008 |
| a2         |             |      | 1.6  |        |       | 0.063 |
| b          | 0.35        |      | 0.46 | 0.014  |       | 0.018 |
| b1         | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C          |             | 0.5  |      |        | 0.020 |       |
| c1         | 45° (typ.)  |      |      |        |       |       |
| D (1)      | 8.55        |      | 8.75 | 0.336  |       | 0.344 |
| E          | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e          |             | 1.27 |      |        | 0.050 |       |
| e3         |             | 7.62 |      |        | 0.300 |       |
| F (1)      | 3.8         |      | 4.0  | 0.150  |       | 0.157 |
| G          | 4.6         |      | 5.3  | 0.181  |       | 0.208 |
| L          | 0.5         |      | 1.27 | 0.020  |       | 0.050 |
| M          |             |      | 0.68 |        |       | 0.027 |
| S          | 8° (max.)   |      |      |        |       |       |

Note : (1) D and F do not include mold flash or protrusions - Mold flash or protrusions shall not exceed 0.15mm (.066 inc) ONLY FOR DATA BOOK.

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