



MC33171 - MC35171

LOW POWER SINGLE BIPOLAR OPERATIONAL AMPLIFIERS

- GOOD CONSUMPTION/SPEED RATIO :
ONLY 200 μ A FOR 2.1MHz, 2V μ s
- 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 SINGLE OP-AMPS

DESCRIPTION

The MC3x171 series are single bipolar operational amplifiers offering both low consumption (200 μ A) and good speed (2.1MHz, 2V/ μ s).

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

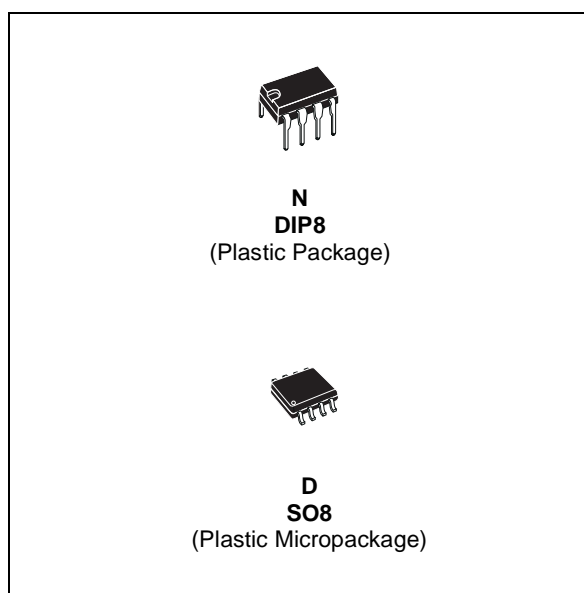
ORDER CODE

| Part Number | Temperature Range | Package | |
|-------------|-------------------|---------|---|
| | | N | D |
| MC33171 | -40°C, +105°C | • | • |
| MC35171 | -55°C, +125°C | • | • |

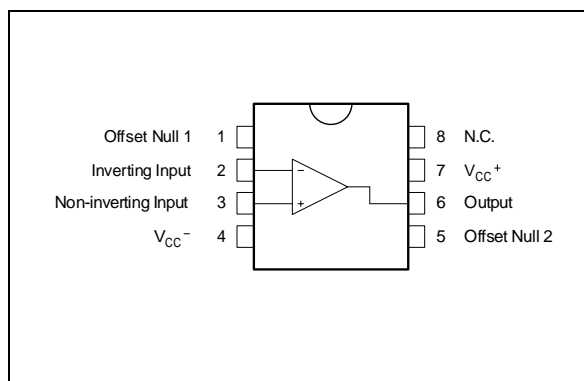
Example : MC33171N

N = Dual in Line Package (DIP)

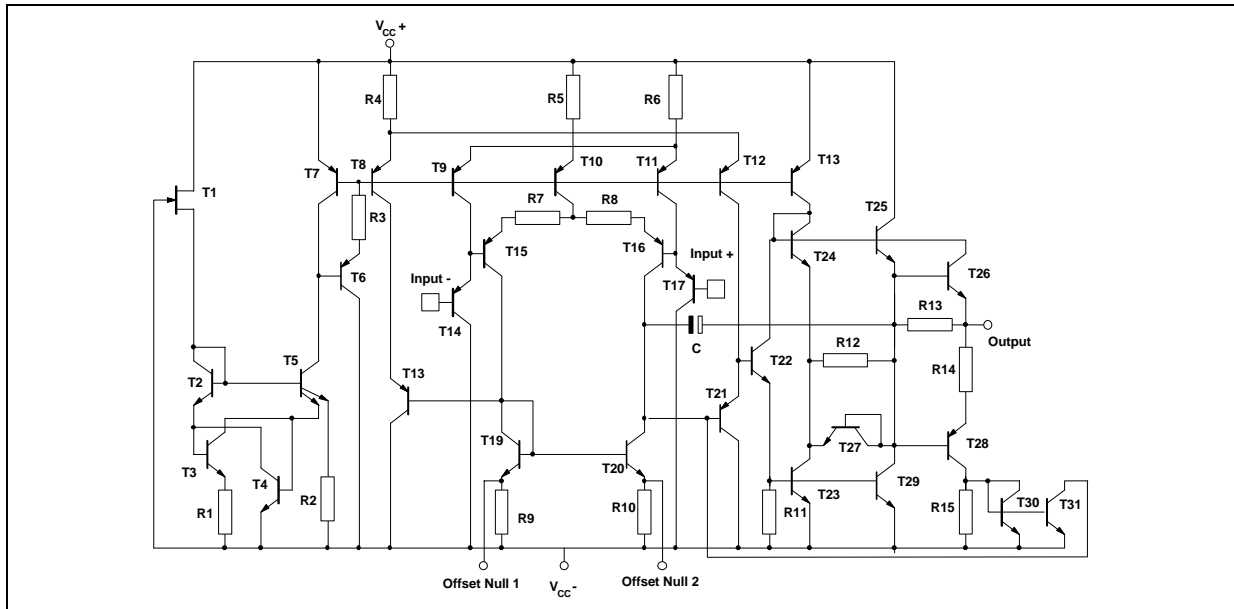
D = Small Outline Package (SO) - also available in Tape & Reel (DT)



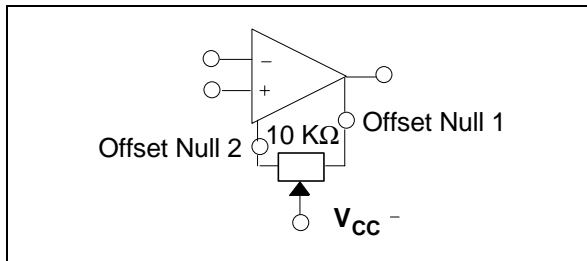
PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM



INPUT OFFSET VOLTAGE NULL CIRCUIT



MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit | |
|------------|--------------------------------------|--------------------|--------------------------|-------------|
| V_{CC} | Supply Voltage | ± 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 | MC33171 MC35171 | -40 to 105 -55 to 125 | $^{\circ}C$ |
| T_j | Junction Temperature | 150 | $^{\circ}C$ | |
| T_{stg} | Storage Temperature | -65 to 150 | $^{\circ}C$ | |

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

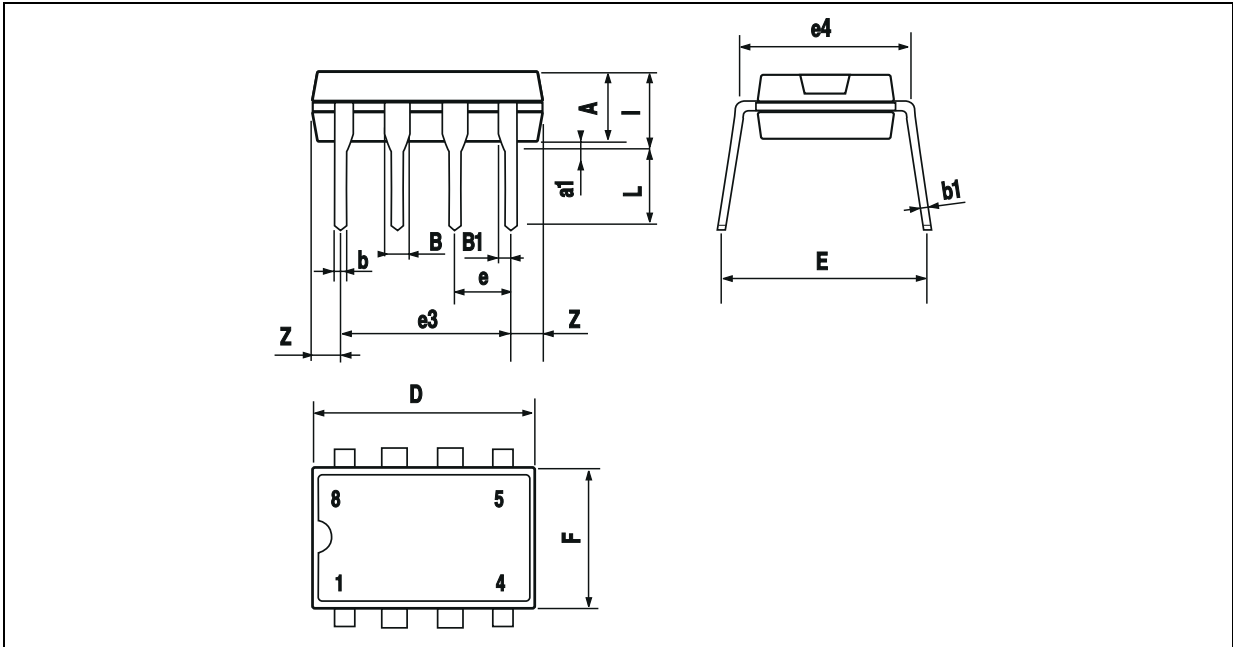
OPERATING CONDITIONS

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

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

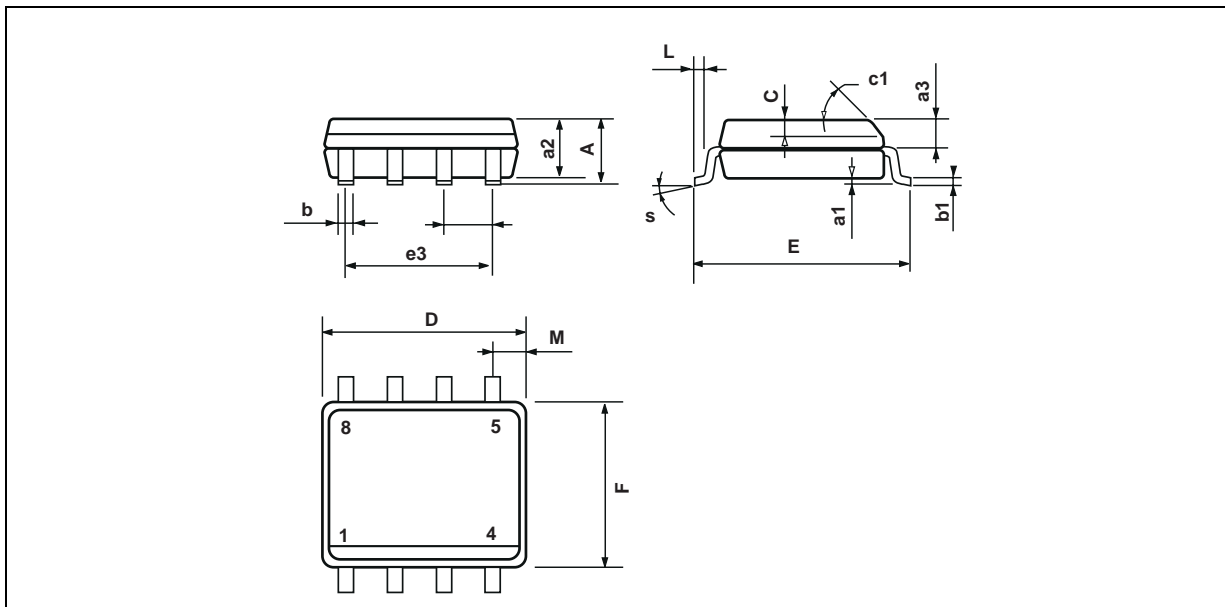
| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|-----------|--|--|-------------|------------------------|------------------------|
| V_{io} | Input Offset Voltage $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $V_{ic} = 0V$ $V_{CC}^+ = 5V$, $V_{CC}^- = 0V$, $V_{ic} = 0V$, $V_o = 1.4V$ $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $V_{ic} = 0V$, $T_{min.} \leq T_{amb} \leq T_{max.}$ | | 1 1 | 4.5 5 6.5 | mV |
| DV_{io} | Input Offset Voltage Drift | | 10 | | $\mu V/^\circ C$ |
| I_{io} | Input Offset Current ($V_{ic} = 0V$) $T_{min.} \leq T_{amb} \leq T_{max.}$ | | 5 | 20 40 | nA |
| I_{ib} | Input Bias Current ($V_{ic} = 0V$) $T_{min.} \leq T_{amb} \leq T_{max.}$ | | 20 | 100 200 | nA |
| A_{vd} | Large Signal Voltage Gain ($R_L = 10k\Omega$, $V_o = \pm 10V$) $T_{min.} \leq T_{amb} \leq T_{max.}$ | 50 25 | 100 | | V/mV |
| V_{OH} | High Level Output Voltage $V_{CC}^+ = 5V$, $V_{CC}^- = 0V$, $R_L = 10k\Omega$ $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $R_L = 10k\Omega$ $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $R_L = 10k\Omega$, $T_{min.} \leq T_{amb} \leq T_{max.}$ | 3.5 13.6 13.3 | 4.2 14.2 | | V |
| V_{OL} | Low Level Output Voltage $V_{CC}^+ = 5V$, $V_{CC}^- = 0V$, $R_L = 10k\Omega$ $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $R_L = 10k\Omega$ $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, $R_L = 10k\Omega$, $T_{min.} \leq T_{amb} \leq T_{max.}$ | | 0.1 -14 | 0.15 -13.6 -13.3 | V |
| I_{sc} | Output Short Circuit Current ($V_{id} = \pm 1V$, $V_o = 0V$) Source Sink | 3 15 | 6 27 | | mA |
| V_{icm} | Input Common Mode Voltage Range $T_{min.} \leq T_{amb} \leq T_{max.}$ | V_{CC}^- to $V_{CC}^+ - 1.8$ 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 $V_{CC}^+ = 5V$, $V_{CC}^- = 0V$, no load $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$, no load $V_{CC}^+ = +15V$, $V_{CC}^- = -15V$ no load, $T_{min.} \leq T_{amb} \leq T_{max.}$ | | 200 220 | 250 250 300 | μA |
| SR | Slew Rate ($V_i = \pm 10V$, $R_L = 10k\Omega$, $C_L = 100pF$) | 1.6 | 2 | | V/ μs |
| GBP | Gain Bandwidth Product $R_L = 10k\Omega$, $C_L = 100pF$, $f = 100kHz$ | 1.4 | 2.1 | | MHz |
| ϕ_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 | | % |

PACKAGE MECHANICAL DATA
8 PINS - PLASTIC DIP



| Dimensions | Millimeters | | | Inches | | |
|------------|-------------|------|-------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | 3.32 | | | 0.131 | |
| a1 | 0.51 | | | 0.020 | | |
| B | 1.15 | | 1.65 | 0.045 | | 0.065 |
| b | 0.356 | | 0.55 | 0.014 | | 0.022 |
| b1 | 0.204 | | 0.304 | 0.008 | | 0.012 |
| D | | | 10.92 | | | 0.430 |
| E | 7.95 | | 9.75 | 0.313 | | 0.384 |
| e | | 2.54 | | | 0.100 | |
| e3 | | 7.62 | | | 0.300 | |
| e4 | | 7.62 | | | 0.300 | |
| F | | | 6.6 | | | 0.260 |
| i | | | 5.08 | | | 0.200 |
| L | 3.18 | | 3.81 | 0.125 | | 0.150 |
| Z | | | 1.52 | | | 0.060 |

PACKAGE MECHANICAL DATA
8 PINS - PLASTIC MICROPACKAGE (SO)



| Dimensions | Millimeters | | | Inches | | |
|------------|-------------|------|------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.75 | | | 0.069 |
| a1 | 0.1 | | 0.25 | 0.004 | | 0.010 |
| a2 | | | 1.65 | | | 0.065 |
| a3 | 0.65 | | 0.85 | 0.026 | | 0.033 |
| b | 0.35 | | 0.48 | 0.014 | | 0.019 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | 0.25 | | 0.5 | 0.010 | | 0.020 |
| c1 | 45° (typ.) | | | | | |
| D | 4.8 | | 5.0 | 0.189 | | 0.197 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 3.81 | | | 0.150 | |
| F | 3.8 | | 4.0 | 0.150 | | 0.157 |
| L | 0.4 | | 1.27 | 0.016 | | 0.050 |
| M | | | 0.6 | | | 0.024 |
| S | 8° (max.) | | | | | |

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