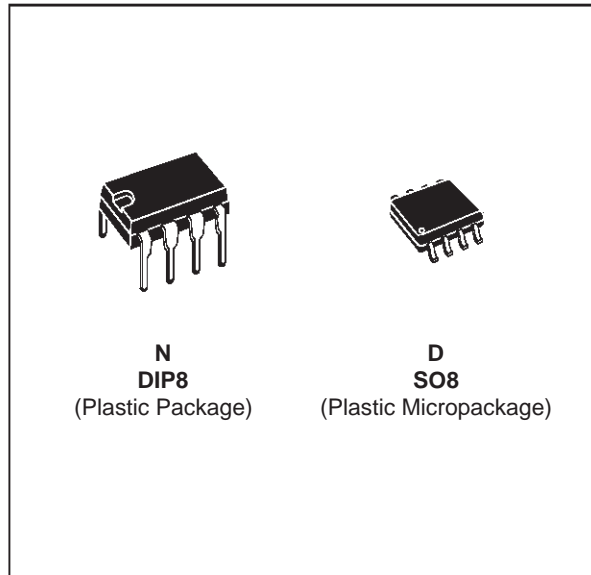


## LOW POWER DUAL BIPOLAR OPERATIONAL AMPLIFIERS

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



### DESCRIPTION

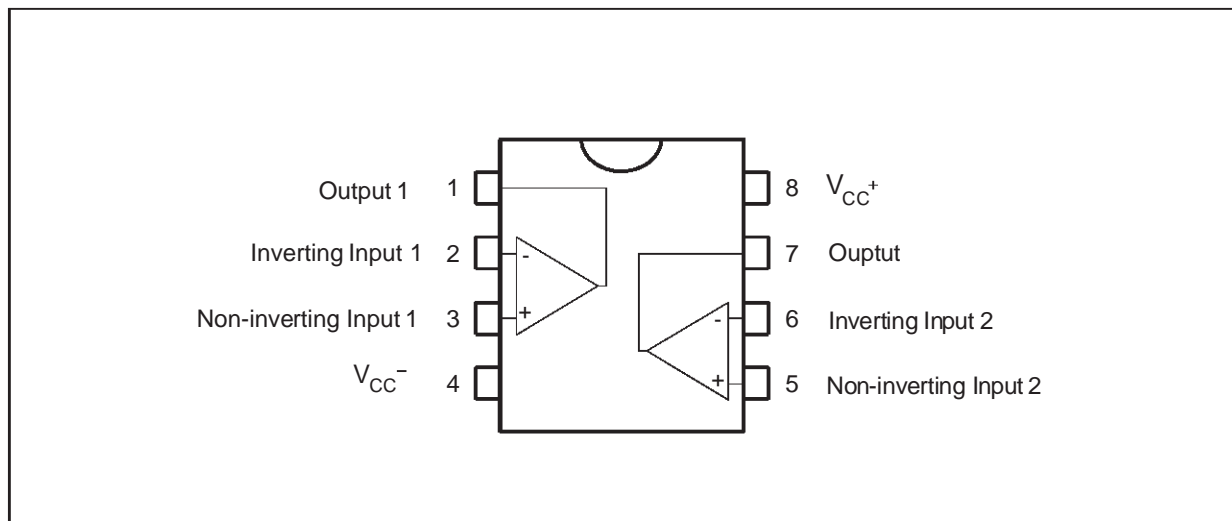
The MC33172 series are dual bipolar operational amplifiers offering both low consumption (200 $\mu$ A/Amp) and good speed (2.1MHz, 2V/ $\mu$ s). Moreover the Input Common Mode Range extends down to the lower supply rail, allowing single supply operation from +4V to +44V.

### ORDER CODES

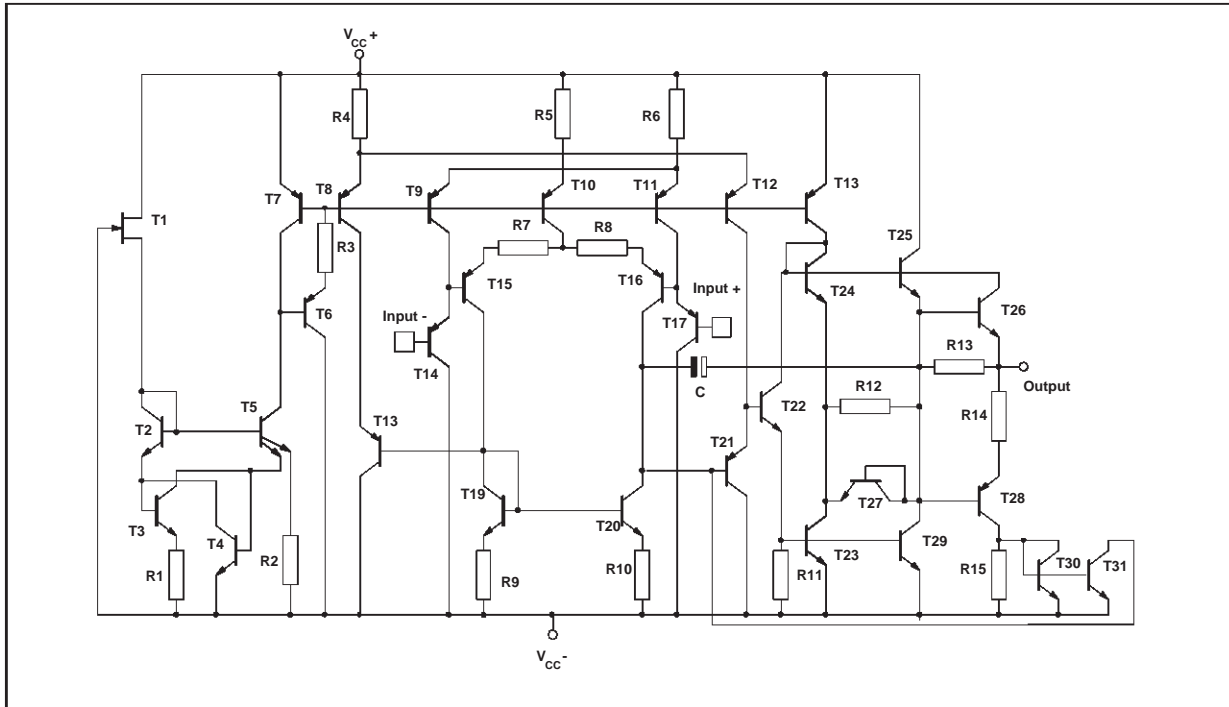
Part Number	Temperature Range	Package	
		N	D
MC33172	-40°C, +105°C	•	•
MC35172	-55°C, +125°C	•	•

**Example:** MC33172N

### PIN CONNECTIONS (top view)



**SCHEMATIC DIAGRAM** (for 1/2 MC33172)



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit	
$V_{CC}$	Supply Voltage	$\pm 22$	V	
$V_{id}$	Differential Input Voltage	(Note 1)	V	
$V_i$	Input Voltage	(Note 1)	V	
	Output Short Circuit Duration	Indefinite	s	
$T_{oper}$	Operating Temperature Range	MC33172 MC35172	-40 to 105 -55 to 125	$^{\circ}C$
$T_j$	Junction Temperature	150	$^{\circ}C$	
$T_{stg}$	Storage Temperature	-65 to 150	$^{\circ}C$	

**Note 1:** Either or both input voltages must not exceed the magnitude of  $V_{CC}$ .

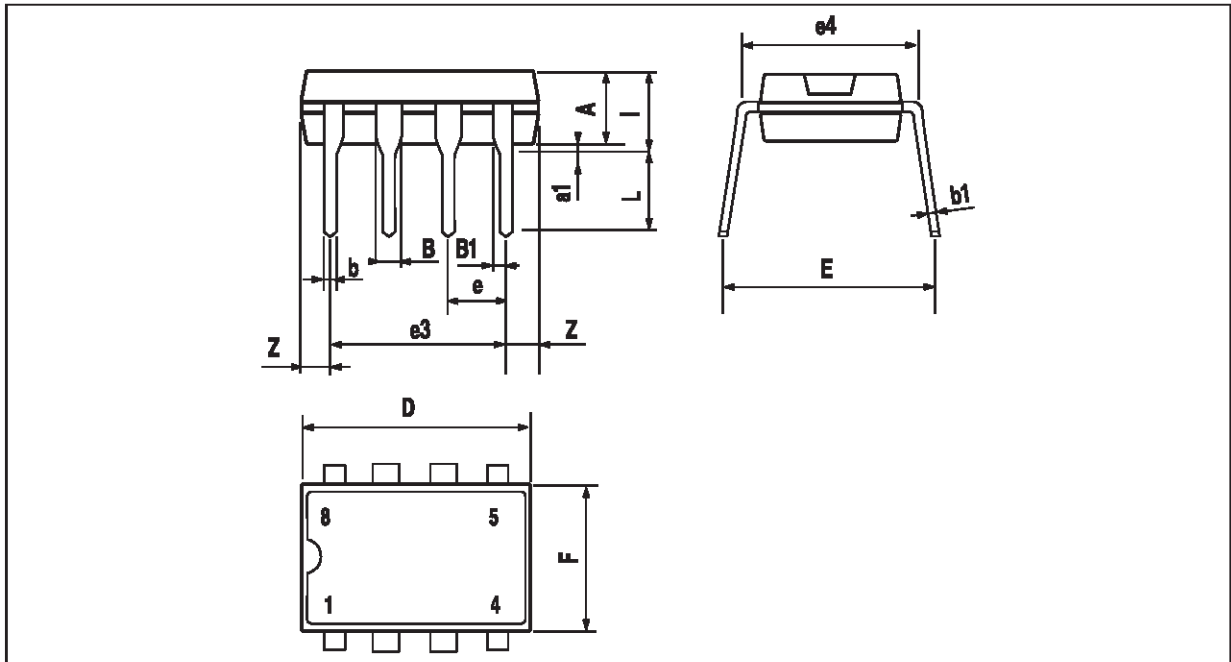
**OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage Range	$\pm 2$ 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 $V_{CC}^+ = +15V, V_{CC}^- = -15V, V_{ic} = 0V$ $V_{CC}^+ = 5V, V_{CC}^- = 0V, V_{ic} = 0V, V_o = 1.4V$ $V_{CC}^+ = +15V, V_{CC}^- = -15V, V_{ic} = 0V, T_{min.} \leq T_{amb} \leq T_{max.}$		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
CMR	Common Mode Rejection Ratio ( $V_i = V_{icm \text{ min.}}$ )	80	100		dB
SVR	Supply Voltage Rejection Ratio ( $V_{CC} = \pm 5$ to $\pm 15V$ )	80	100		dB
$I_{CC}$	Supply Current (per amplifier) $V_{CC}^+ = 5V, V_{CC}^- = 0V, \text{no load}$ $V_{CC}^+ = +15V, V_{CC}^- = -15V, \text{no load}$ $V_{CC}^+ = +15V, V_{CC}^- = -15V, \text{no load}, T_{min.} \leq T_{amb} \leq T_{max.}$		200 220	250 250 300	$\mu A$
SR	Slew Rate ( $V_i = \pm 10V, R_L = 10k\Omega, C_L = 100pF$ )	1.6	2		V/ $\mu s$
GBP	Gain Bandwidth Product ( $R_L = 10k\Omega, C_L = 100pF, f = 100kHz$ )	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**  
8 PINS - PLASTIC DIP

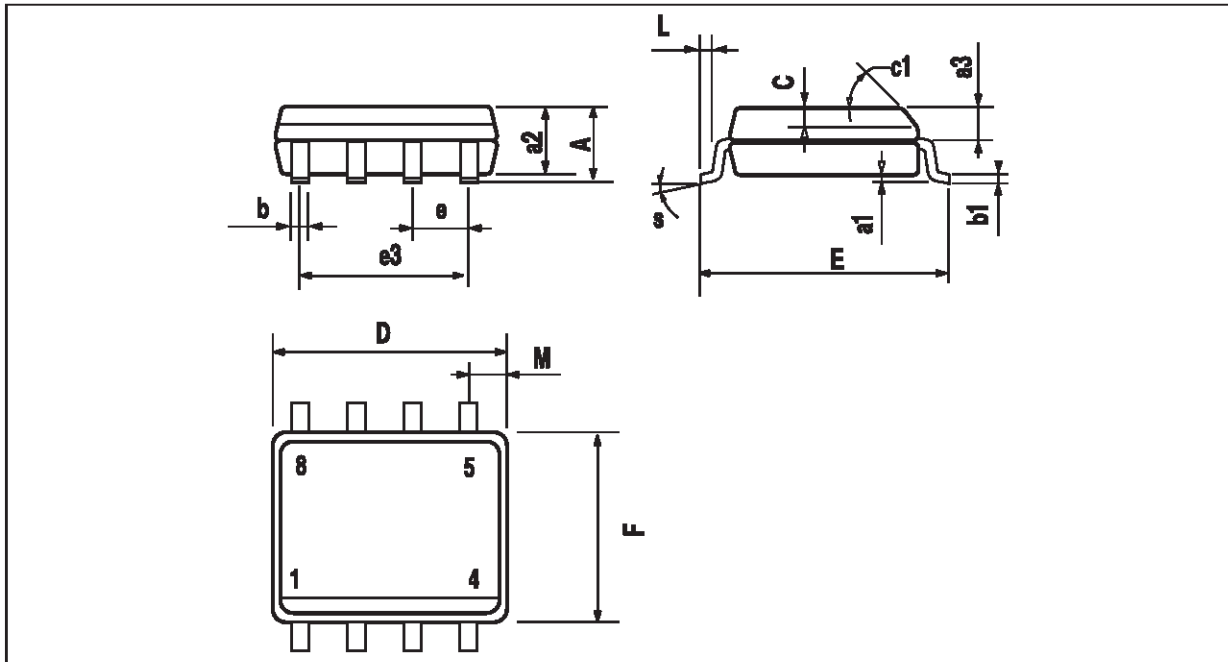


PM-DIP8.EPS

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

DIP8.TBL

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



PM-S08.EPS

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.)					

S08.TBL

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