

## DUAL OPERATIONAL AMPLIFIERS

- LOW POWER CONSUMPTION
- LARGE INPUT VOLTAGE RANGE
- NO LATCH-UP
- HIGH GAIN
- SHORT-CIRCUIT PROTECTION
- NO FREQUENCY COMPENSATION REQUIRED

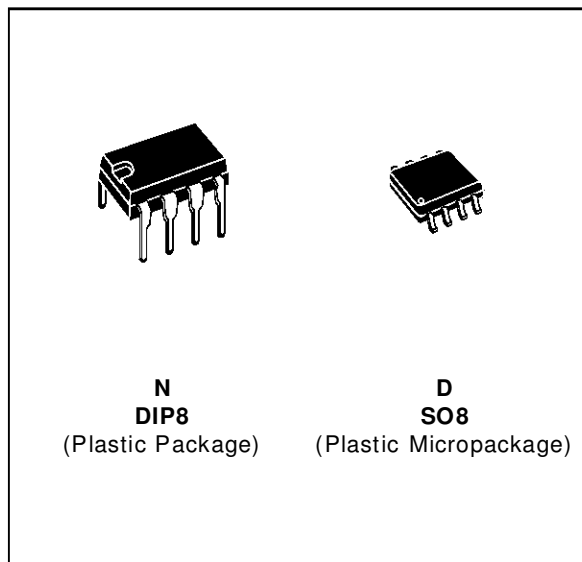
### DESCRIPTION

The MC1458 is a high performance monolithic dual operational amplifier intended for a wide range of analog

applications :

- Summing amplifier
- Voltage follower
- Integrator
- Active filter
- Function generator

The high gain and wide range of operating voltages provide superior performance in integrator, summing amplifier, and general feed back applications.

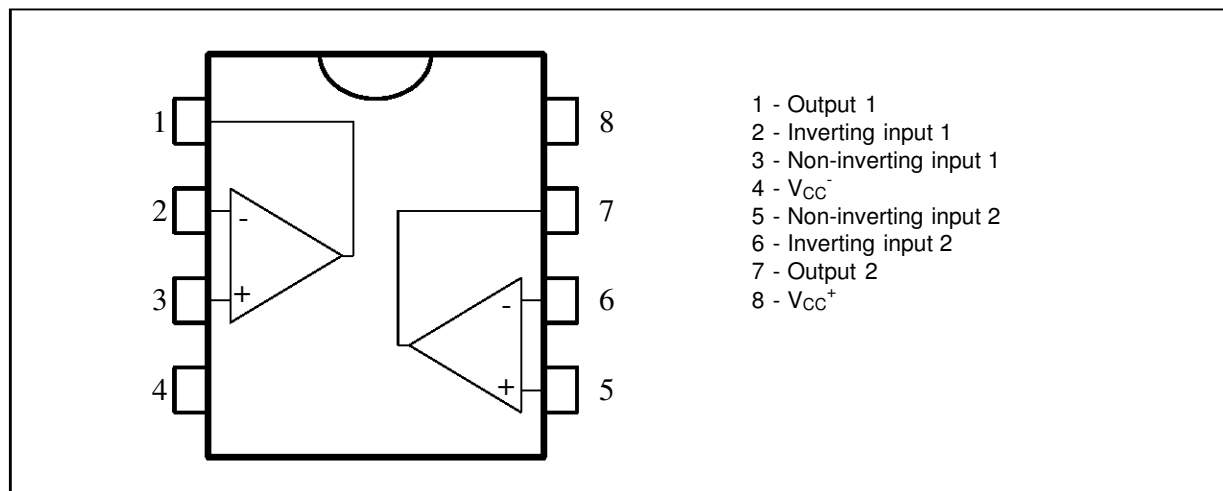


### ORDER CODES

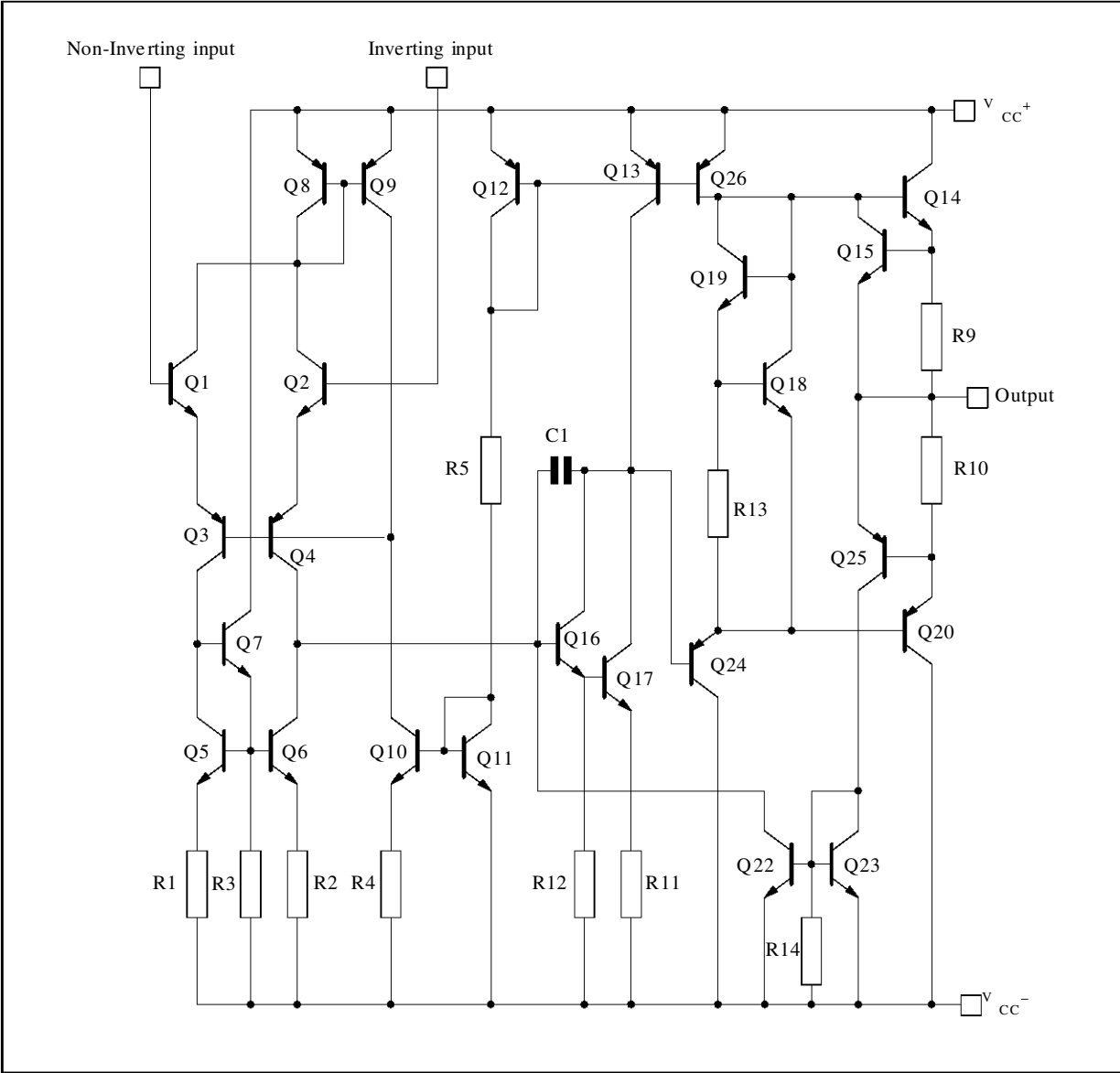
| Part Number | Temperature Range | Package |   |
|-------------|-------------------|---------|---|
|             |                   | N       | D |
| MC1458      | 0, +70°C          | •       | • |
| MC1458I     | -40, +105°C       | •       | • |
| MC1558      | -55, +125°C       | •       | • |

**Example :** MC1458N

### PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol     | Parameter                            | MC1458      | MC1458I     | MC1558      | Unit |
|------------|--------------------------------------|-------------|-------------|-------------|------|
| $V_{CC}$   | Supply Voltage                       | $\pm 22$    | $\pm 22$    | $\pm 22$    | V    |
| $V_i$      | Input Voltage                        | $\pm 15$    | $\pm 15$    | $\pm 15$    | V    |
| $V_{id}$   | Differential Input Voltage           | $\pm 30$    | $\pm 30$    | $\pm 30$    | V    |
| $P_{tot}$  | Power Dissipation                    | 300<br>500  |             |             | mW   |
|            | Output Short-circuit Duration        | Infinite    |             |             |      |
| $T_{oper}$ | Operating Free-air Temperature Range | 0 to +70    | -40 to +105 | -55 to +125 | °C   |
| $T_{stg}$  | Storage Temperature Range            | -65 to +150 | -65 to +150 | -65 to +150 | °C   |

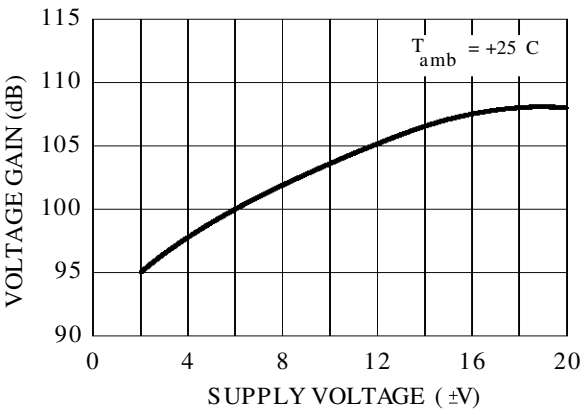
**ELECTRICAL CHARACTERISTICS** $V_{CC} = \pm 15V$ ,  $T_{amb} = 25^{\circ}C$ , (unless otherwise specified)

| Symbol        | Parameter                                                                                                                                                                  | MC1458 - 1458I - 1558 |          |            | Unit       |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|------------|------------|
|               |                                                                                                                                                                            | Min.                  | Typ.     | Max.       |            |
| $V_{io}$      | Input Offset Voltage ( $R_S \leq 10k\Omega$ )<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                          |                       | 1        | 5<br>6     | mV         |
| $I_{io}$      | Input Offset Current<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                                   |                       | 2        | 200<br>300 | nA         |
| $I_{ib}$      | Input Bias Current<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                                     |                       | 30       | 500<br>800 | nA         |
| $A_{vd}$      | Large Signal Voltage Gain ( $V_O = \pm 10V$ , $R_L = 2k\Omega$ )<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                       | 50<br>25              | 200      |            | V/mV       |
| SVR           | Supply Voltage Rejection Ratio ( $R_S \leq 10k\Omega$ )<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                | 77<br>77              | 90       |            | dB         |
| $I_{CC}$      | Supply Current, all Amp, no Load<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                       |                       | 2.3      | 5<br>6     | mA         |
| $V_{icm}$     | Input Common Mode Voltage Range<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                                        | $\pm 12$<br>$\pm 12$  |          |            | V          |
| CMR           | Common-mode Rejection Ratio ( $R_S \leq 10k\Omega$ )<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                                                   | 70<br>70              | 90       |            | dB         |
| $I_{OS}$      | Output Short-circuit Current<br>$T_{amb} = 25^{\circ}C$                                                                                                                    | 10                    | 20       | 35         | mA         |
| $\pm V_{OPP}$ | Output Voltage Swing<br>$T_{amb} = 25^{\circ}C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$<br>$R_L = 10k\Omega$<br>$R_L = 2k\Omega$<br>$R_L = 10k\Omega$<br>$R_L = 2k\Omega$ | 12<br>10<br>12<br>10  | 14<br>13 |            | V          |
| SR            | Slew Rate ( $V_I = \pm 10V$ , $R_L = 2k\Omega$ , $C_L = 100pF$ ,<br>$T_{amb} = 25^{\circ}C$ , unity gain)                                                                  | 0.2                   | 0.8      |            | V/ $\mu s$ |
| $t_r$         | Rise Time ( $V_I = 20mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ ,<br>$T_{amb} = 25^{\circ}C$ , unity gain)                                                                     |                       | 0.3      |            | $\mu s$    |
| $K_{OV}$      | Overshoot ( $V_I = 20mV$ , $R_L = 2k\Omega$ ,<br>$C_L = 100pF$ , $T_{amb} = 25^{\circ}C$ , unity gain)                                                                     |                       | 5        |            | %          |
| $R_I$         | Input Resistance                                                                                                                                                           | 0.3                   | 2        |            | M $\Omega$ |
| $Z_{ic}$      | Common-mode Input Impedance                                                                                                                                                |                       | 200      |            | M $\Omega$ |
| $C_I$         | Input Capacitance                                                                                                                                                          |                       | 1.4      |            | pF         |
| $R_O$         | Output Resistance                                                                                                                                                          |                       | 75       |            | $\Omega$   |
| FPB           | Full Power Bandwidth<br>( $R_L = 2k\Omega$ , $V_O \geq \pm 10V$ , $A_{VD} = 1$ , THD $\leq 5\%$ )                                                                          |                       | 14       |            | KHz        |
| B             | Unity Gain Bandwidth<br>( $V_I = 10mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^{\circ}C$ )                                                                      |                       | 1        |            | MHz        |

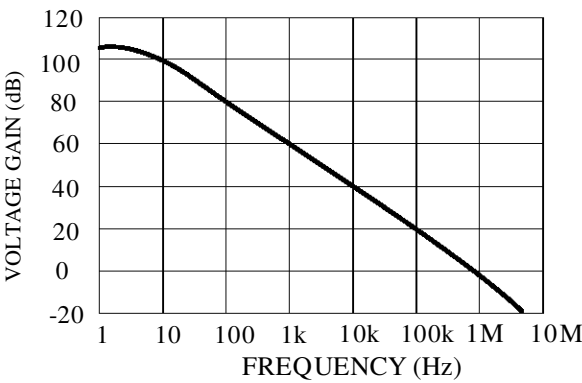
ELECTRICAL CHARACTERISTICS (continued)

| Symbol          | Parameter                                                                                                                                                                                | MC1458 - 1458I<br>MC1558 |      |      | Unit                                 |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|------|--------------------------------------|
|                 |                                                                                                                                                                                          | Min.                     | Typ. | Max. |                                      |
| GBP             | Gain Bandwidth Product<br>( $V_I = 10\text{mV}$ , $R_L = 2\text{k}\Omega$ , $C_L = 100\text{pF}$ , $f = 100\text{kHz}$ , $T_{\text{amb}} = 25^\circ\text{C}$ )                           | 0.4                      | 1    |      | MHz                                  |
| THD             | Total Harmonic Distortion<br>( $f = 1\text{kHz}$ , $A_V = 20\text{dB}$ , $R_L = 2\text{k}\Omega$ , $V_O = 2V_{\text{PP}}$ , $C_L = 100\text{pF}$ , $T_{\text{amb}} = 25^\circ\text{C}$ ) |                          | 0.02 |      | %                                    |
| $e_n$           | Equivalent Input Noise Voltage<br>( $f = \text{kHz}$ , $R_s = 100\Omega$ )                                                                                                               |                          | 45   |      | $\frac{\text{nV}}{\sqrt{\text{Hz}}}$ |
| $\phi_m$        | Phase Margin                                                                                                                                                                             |                          | 65   |      | Degrees                              |
| Am              | Gain Margin                                                                                                                                                                              |                          | 11   |      | dB                                   |
| $V_{O1}/V_{O2}$ | Channel Separation                                                                                                                                                                       |                          | 120  |      | dB                                   |

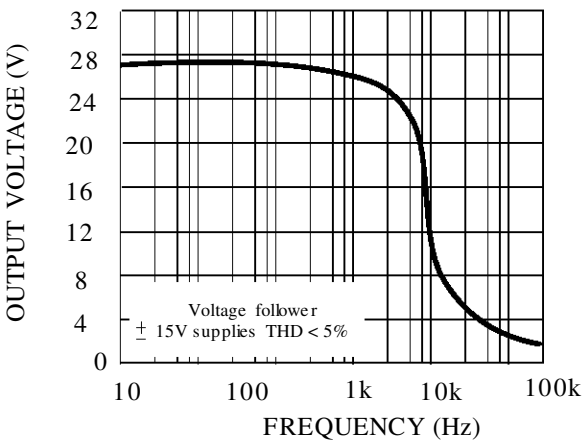
OPEN LOOP VOLTAGE GAIN



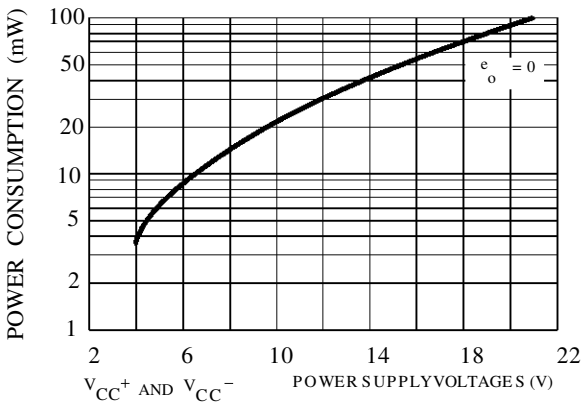
OPEN LOOP FREQUENCY RESPONSE

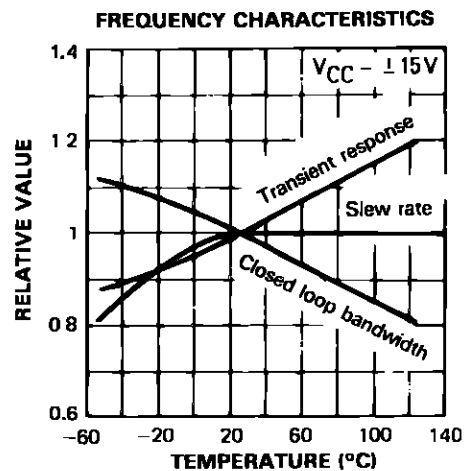
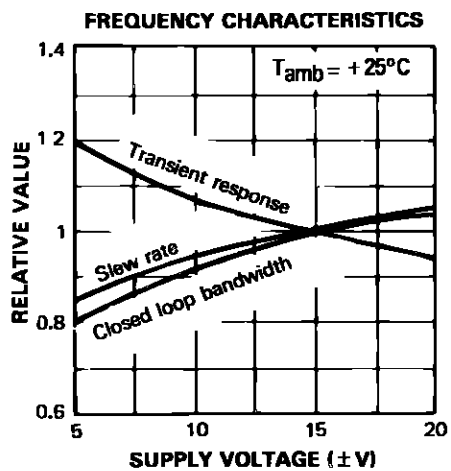
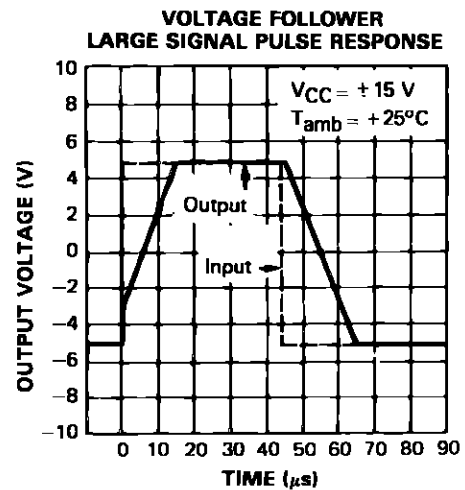
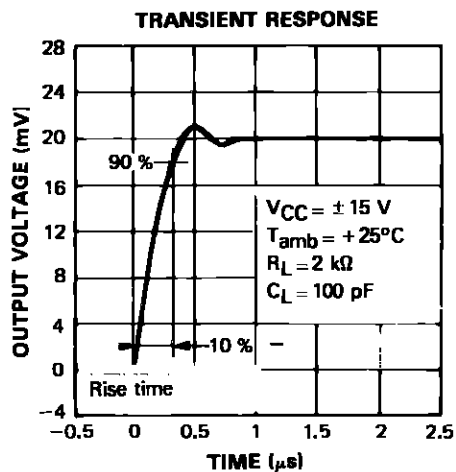
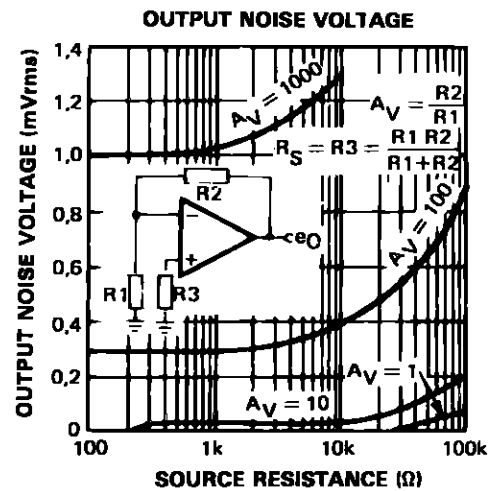
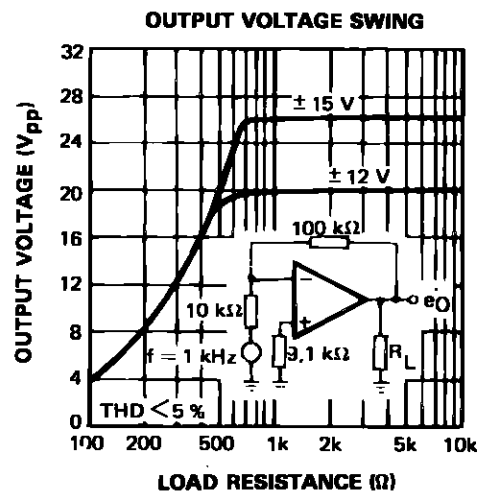


POWER BANDWIDTH  
(LARGE SIGNAL SWING)



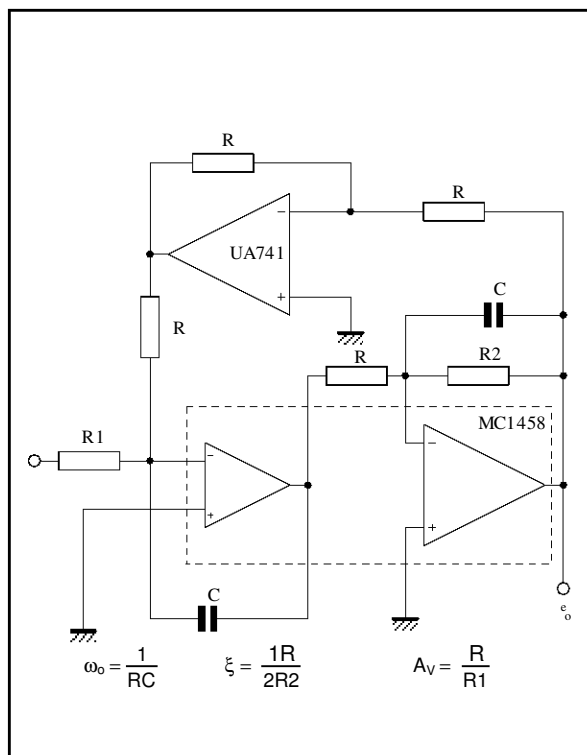
POWER CONSUMPTION



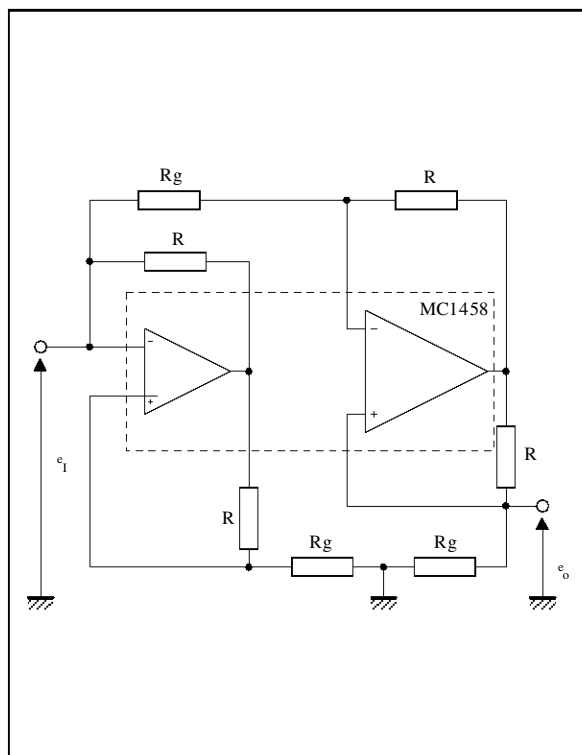


## TYPICAL APPLICATIONS

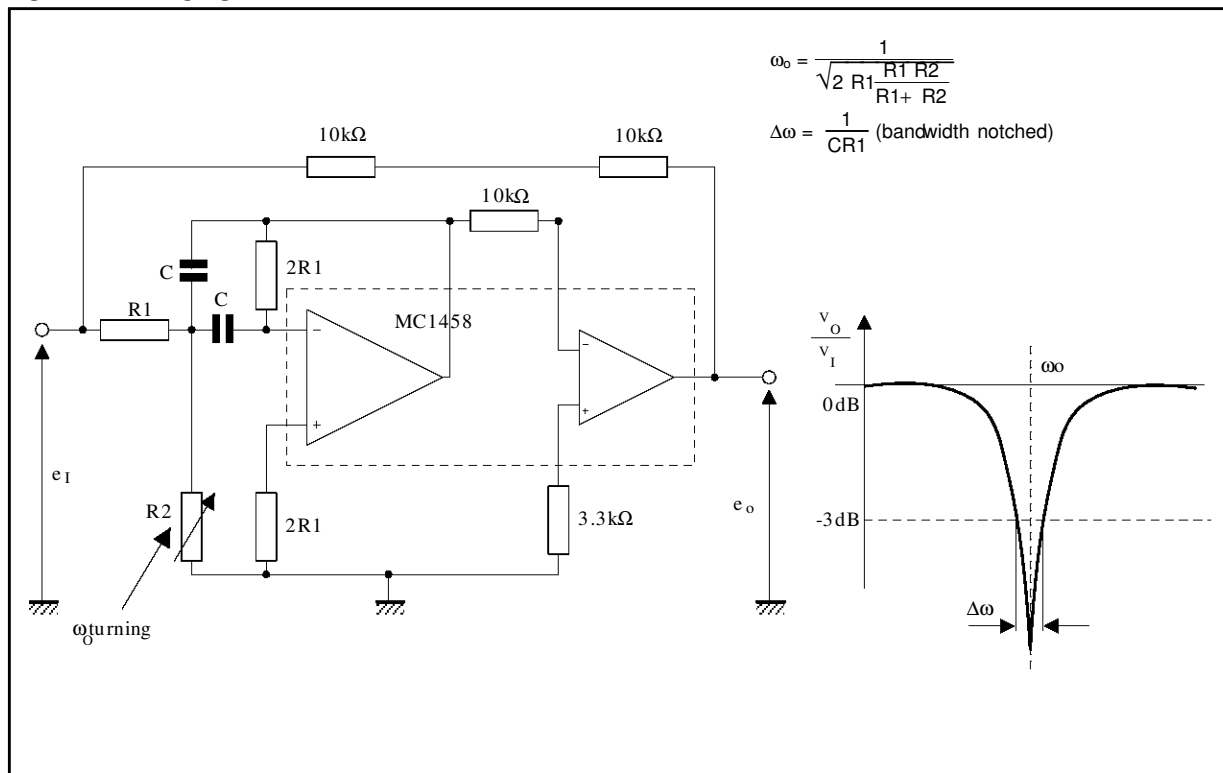
### LOW PASS FILTER



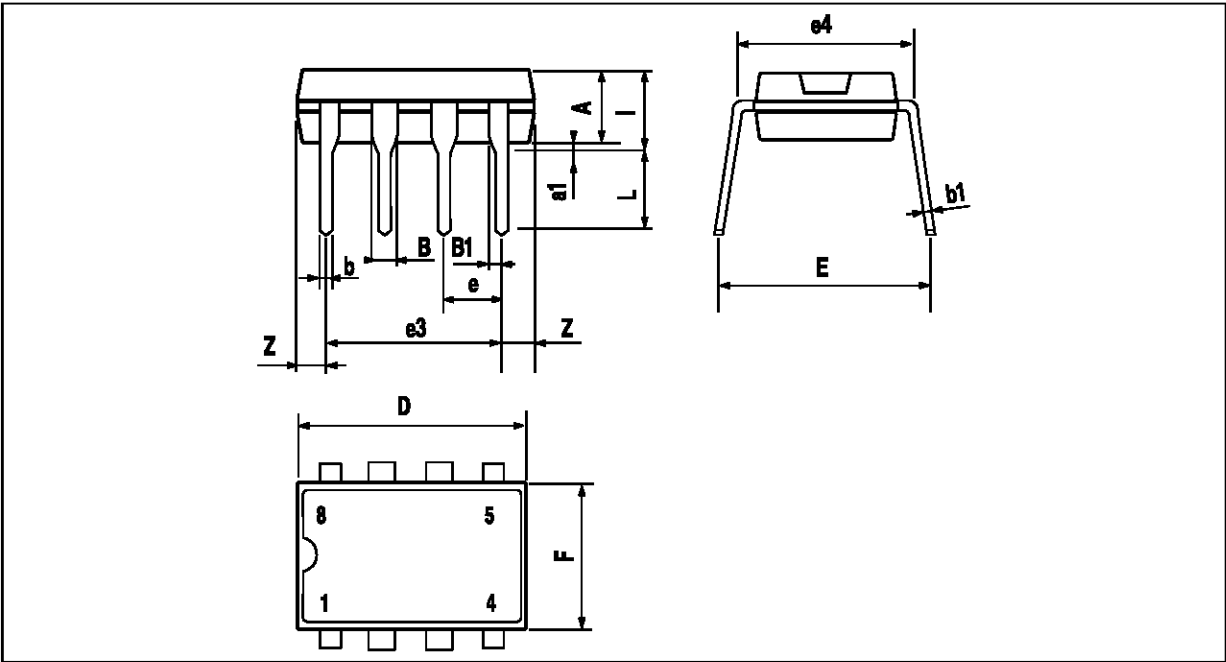
### GIRATOR



### TURNABLE NOTCH FILTER



PACKAGE MECHANICAL DATA  
8 PINS - PLASTIC DIP

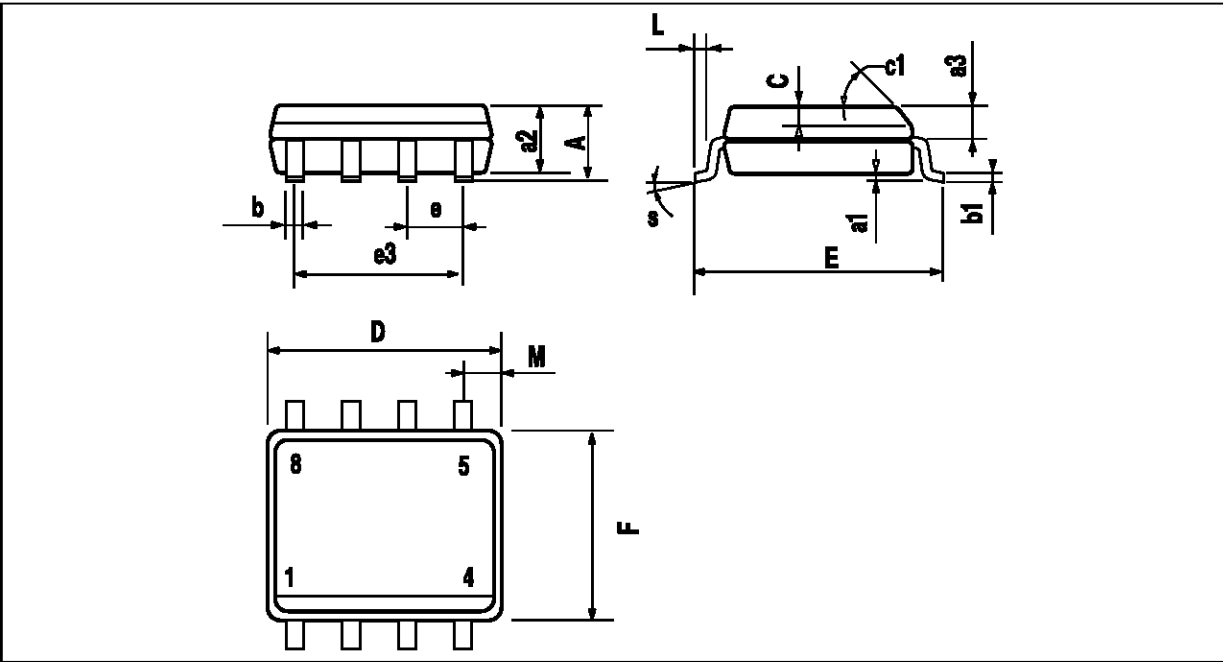


PM-DIP8.EPS

| 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)



| 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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