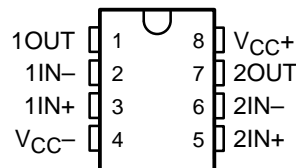


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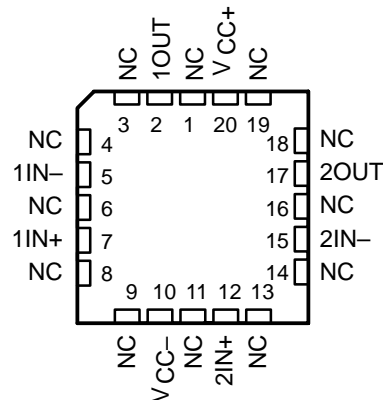
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- Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- No Frequency Compensation Required
- Low Power Consumption
- No Latch-Up
- Designed to Be Interchangeable With Motorola MC1558/MC1458 and Signetics S5558/N5558

MC1458 . . . D, P, OR PS PACKAGE
MC1558 . . . JG PACKAGE
(TOP VIEW)



MC1558 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

The MC1458 and MC1558 are dual general-purpose operational amplifiers, with each half electrically similar to the μ A741, except that offset null capability is not provided.

The high-common-mode input voltage range and the absence of latch-up make these amplifiers ideal for voltage-follower applications. The devices are short-circuit protected and the internal frequency compensation ensures stability without external components.

ORDERING INFORMATION

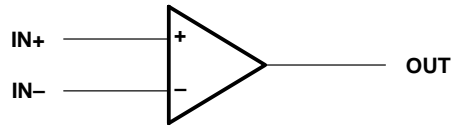
| T_A | V_{IOmax} AT 25°C | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|------------------------|------------|---------------|--------------------------|---------------------|
| 0°C to 70°C | 6 mV | PDIP (P) | Tube | MC1458P | MC1458P |
| | | SOIC (D) | Tube | MC1458D | MC1458 |
| | | | Tape and reel | MC1458DR | |
| | | SOP (PS) | Tape and reel | MC1458PSR | M1458 |
| –55°C to 125°C | 5 mV | CDIP (JG) | Tube | MC1558JG | MC1558JG |
| | | CDIP (JGB) | Tube | MC1558JGB | MC1558JGB |
| | | LCCC (FK) | Tube | MC1558FK | MC1558FK |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

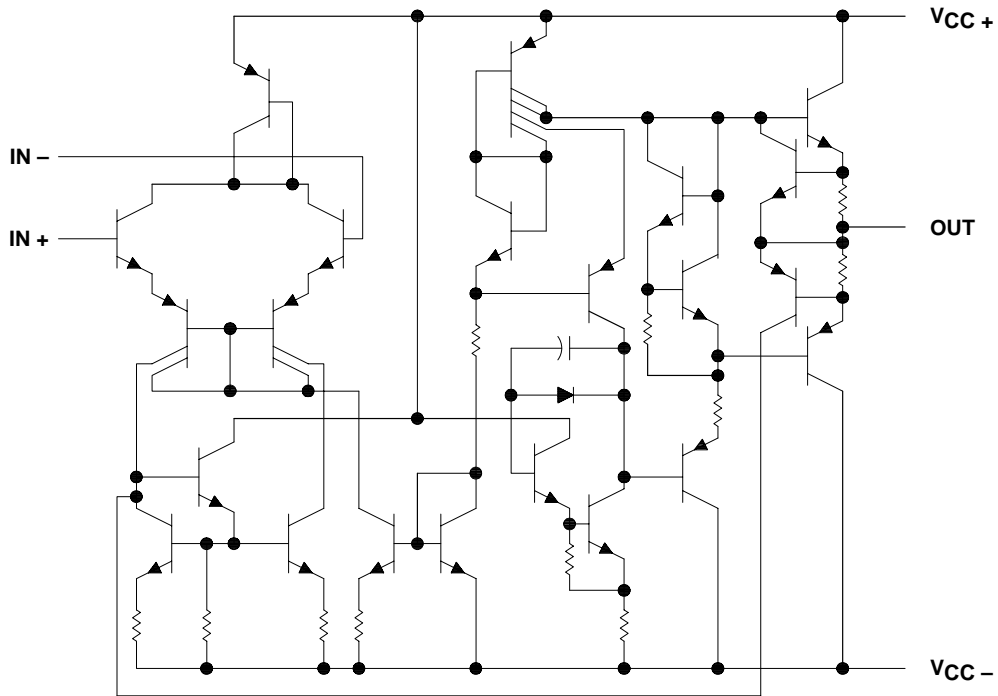
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symbol (each amplifier)



schematic (each amplifier)



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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

| | | |
|---|------------------|----------------|
| Supply voltage, V_{CC+} (see Note 1): | MC1458 | 18 V |
| | MC1558 | 22 V |
| Supply voltage, V_{CC-} (see Note 1): | MC1458 | -18 V |
| | MC1558 | -22 V |
| Differential input voltage, V_{ID} (see Note 2) | | ± 30 V |
| Input voltage, V_I (either input, see Notes 1 and 3) | | ± 15 V |
| Duration of output short circuit (see Note 4) | | Unlimited |
| Operating virtual junction temperature, T_J | | 150°C |
| Package thermal impedance, θ_{JA} (see Notes 5 and 6): | D package | 97°C/W |
| | P package | 85°C/W |
| | PS package | 95°C/W |
| Package thermal impedance, θ_{JC} (see Notes 7 and 8): | FK package | 5.61°C/W |
| | JG package | 14.5°C/W |
| Case temperature for 60 seconds: FK package | | 260°C |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: JG package | | 300°C |
| Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: D, P, or PS package | | 260°C |
| Storage temperature range, T_{stg} | | -65°C to 150°C |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-} .
 2. Differential voltages are at $IN+$ with respect to $IN-$.
 3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
 4. The output can be shorted to ground or either power supply. For the MC1558 only, the unlimited duration of the short circuit applies at (or below) 125°C case temperature or 70°C free-air temperature.
 5. Maximum power dissipation is a function of $T_J(max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 6. The package thermal impedance is calculated in accordance with JESD 51-7.
 7. Maximum power dissipation is a function of $T_J(max)$, θ_{JC} , and T_C . The maximum allowable power dissipation at any allowable case temperature is $P_D = (T_J(max) - T_C)/\theta_{JC}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 8. The package thermal impedance is calculated in accordance with MIL-STD-883.

recommended operating conditions

| | | MIN | MAX | UNIT |
|-------------|--------------------------------------|---------|----------|------|
| $V_{CC\pm}$ | Supply voltage | ± 5 | ± 15 | V |
| T_A | Operating free-air temperature range | MC1458 | 0 70 | °C |
| | | MC1558 | -55 125 | |



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electrical characteristics at specified free-air temperature, $V_{CC\pm} = \pm 15\text{ V}$

| PARAMETER | TEST CONDITIONS† | MC1458 | | | MC1558 | | | UNIT |
|--|---|-------------|------|-----|--------|------|--------|------|
| | | MIN | TYP | MAX | MIN | TYP | MAX | |
| V_{IO} Input offset voltage | $V_O = 0$ | 25°C | 1 | 6 | 1 | 5 | mV | |
| | | Full range | | 7.5 | | 6 | | |
| I_{IO} Input offset current | $V_O = 0$ | 25°C | 20 | 200 | 20 | 200 | nA | |
| | | Full range | | 300 | | 500 | | |
| I_{IB} Input bias current | $V_O = 0$ | 25°C | 80 | 500 | 80 | 500 | nA | |
| | | Full range | | 800 | | 1500 | | |
| V_{ICR} Common-mode input voltage range | | 25°C | ±12 | ±13 | ±12 | ±13 | V | |
| | | Full range | ±12 | | ±12 | | | |
| V_{OM} Maximum peak output voltage swing | $R_L = 10\text{ k}\Omega$ | 25°C | ±12 | ±14 | ±12 | ±14 | V | |
| | $R_L \geq 10\text{ k}\Omega$ | Full range | ±12 | | ±12 | | | |
| | $R_L = 2\text{ k}\Omega$ | 25°C | ±10 | ±13 | ±10 | ±13 | | |
| | $R_L \geq 2\text{ k}\Omega$ | Full range | ±10 | | ±10 | | | |
| A_{VD} Large-signal differential voltage amplification | $R_L \geq 2\text{ k}\Omega, V_O = \pm 10\text{ V}$ | 25°C | 20 | 200 | 50 | 200 | V/mV | |
| | | Full range | 15 | | 25 | | | |
| B_{OM} Maximum-output-swing bandwidth (closed loop) | $R_L = 2\text{ k}\Omega, A_{VD} = 1, THD \geq 5\%$ | 25°C | | 14 | | 14 | kHz | |
| B_1 Unity-gain bandwidth | | 25°C | | 1 | | 1 | MHz | |
| ϕ_m Phase margin | $A_{VD} = 1$ | 25°C | | 65 | | 65 | deg | |
| | | Gain margin | 25°C | | 11 | | | 11 |
| r_i Input resistance | | 25°C | 0.3 | 2 | 0.3* | 2 | MΩ | |
| r_o Output resistance | $V_O = 0, \text{ See Note 9}$ | 25°C | | 75 | | 75 | Ω | |
| C_i Input capacitance | | 25°C | | 1.4 | | 1.4 | pF | |
| z_{ic} Common-mode input impedance | $f = 20\text{ Hz}$ | 25°C | | 200 | | 200 | MΩ | |
| CMRR Common-mode rejection ratio | $V_{IC} = V_{ICR}\text{ min}, V_O = 0$ | 25°C | 70 | 90 | 70 | 90 | dB | |
| | | Full range | 70 | | 70 | | | |
| k_{SVS} Supply-voltage sensitivity ($\Delta V_{IO}/\Delta V_{CC}$) | $V_{CC} = \pm 9\text{ V to } \pm 15\text{ V}, V_O = 0$ | 25°C | 30 | 150 | 30 | 150 | μV/V | |
| | | Full range | | 150 | | 150 | | |
| V_n Equivalent input noise voltage (closed loop) | $A_{VD} = 100, f = 1\text{ kHz}, R_S = 0, BW = 1\text{ Hz}$ | 25°C | | 45 | | 45 | nV/√Hz | |
| I_{OS} Short-circuit output current | | 25°C | ±25 | ±40 | ±25 | ±40 | mA | |
| I_{CC} Supply current (both amplifiers) | $V_O = 0, \text{ No load}$ | 25°C | 3.4 | 5.6 | 3.4 | 5 | mA | |
| | | Full range | | 6.6 | | 6.6 | | |
| P_D Total power dissipation (both amplifiers) | $V_O = 0, \text{ No load}$ | 25°C | 100 | 170 | 100 | 150 | mW | |
| | | Full range | | 200 | | 200 | | |
| V_{O1}/V_{O2} Crosstalk attenuation | | 25°C | | 120 | | 120 | dB | |

*On products compliant to MIL-PRF-38535, this parameter is not production tested.

† All characteristics are specified under open-loop operating conditions with zero common-mode input voltage, unless otherwise specified. Full range for MC1458 is 0°C to 70°C and for MC1558 is -55°C to 125°C.

NOTE 9: This typical value applies only at frequencies above a few hundred hertz because of the effect of drift and thermal feedback.



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operating characteristics, $V_{CC\pm} = \pm 15\text{ V}$, $C_L = 100\text{ pF}$, $T_A = 25^\circ\text{C}$ (see Figure 1)

| PARAMETER | | TEST CONDITIONS | | MC1458 | | | MC1558 | | | UNIT |
|-----------|-------------------------|------------------------|----------------------------|--------|-----|-----|--------|-----|-----|------------------------|
| | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| t_r | Rise time | $V_I = 20\text{ mV}$, | $R_L = 2\text{ k}\Omega$, | 0.3 | | | 0.3 | | | μs |
| | Overshoot factor | $V_I = 20\text{ mV}$, | $R_L = 2\text{ k}\Omega$ | 5 | | | 5 | | | % |
| SR | Slew rate at unity gain | $V_I = 10\text{ V}$, | $R_L = 2\text{ k}\Omega$ | 0.5 | | | 0.5 | | | $\text{V}/\mu\text{s}$ |

PARAMETER MEASUREMENT INFORMATION

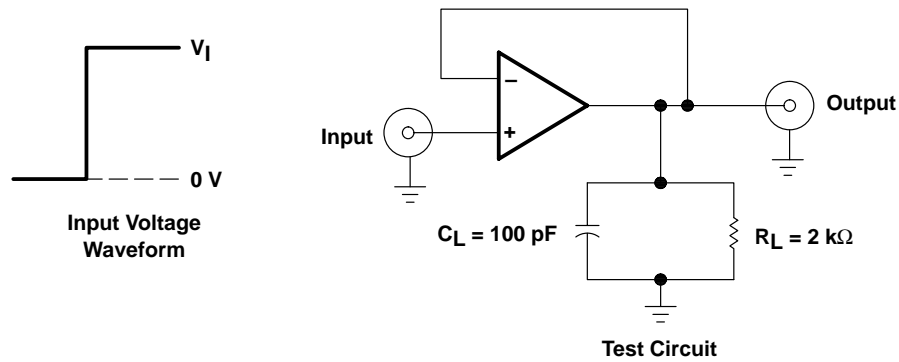


Figure 1. Rise-Time, Overshoot, and Slew-Rate Waveform and Test Circuit

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