

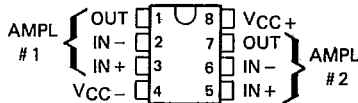
**RM4558, RV4558, RC4558
DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS**

T-79-05-20

D2141, MARCH 1976—REVISED DECEMBER 1988

- Continuous-Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- No Frequency Compensation Required
- Low Power Consumption
- No Latch-up
- Unity Gain Bandwidth 3 MHz Typical
- Gain and Phase Match Between Amplifiers
- Low Noise . . . 8 nV/√Hz Typ at 1 kHz
- Designed to be Interchangeable with Raytheon RM4558, RV4558, and RC4558

D, JG, OR P PACKAGE
(TOP VIEW)



2

Operational Amplifiers

description

The RM4558, RV4558, and RC4558 are dual general-purpose operational amplifiers with each half electrically similar to uA741 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.

The RM4558 is characterized for operation over the full military temperature range of -55°C to 125°C, the RV4558 is characterized for operation from -40°C to 85°C, and the RC4558 is characterized for operation from 0°C to 70°C.

AVAILABLE OPTIONS

| T _A | V _{IO} MAX at 25°C | PACKAGES | | |
|----------------------|--------------------------------|----------------------|---------------------|--------------------|
| | | SMALL OUTLINE (D) | CERAMIC DIP (JG) | PLASTIC DIP (P) |
| 0°C to 70°C | 6 mV | RC4558D | RC4558JG | RC4558P |
| -40°C to 85°C | 6 mV | RV4558D | RV4558JG | RV4558P |
| -55°C to 125°C | 5 mV | — | RM4558JG | — |

The D packages are available taped and reeled. Add the suffix "R" to the device type (e.g., RC4558DR).

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



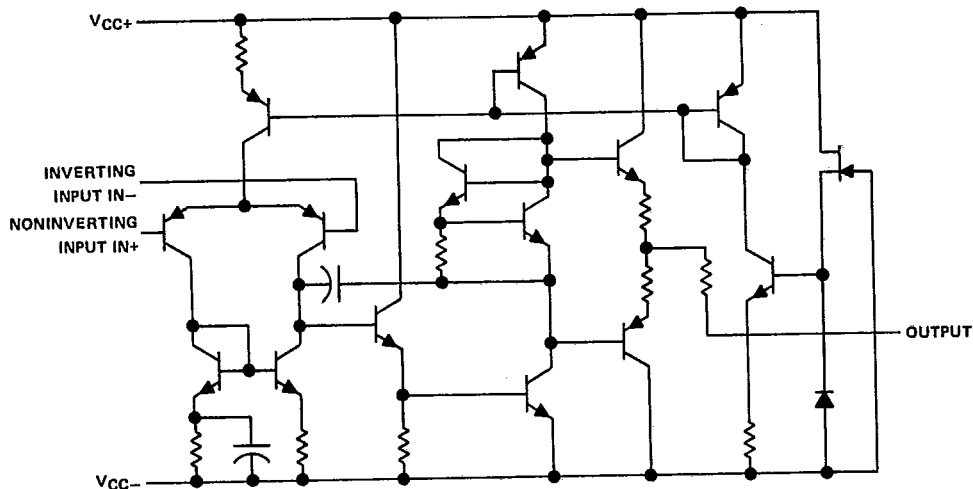
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**RM4558, RV4558, RC4558
DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS**

T-79-05-20

schematic (each amplifier)



2 Operational Amplifiers

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

| | RM4558 | RV4558 | RC4558 | UNIT |
|--|------------------------------|------------|------------|--------------------|
| Supply voltage V_{CC+} (see Note 1) | 22 | 18 | 18 | V |
| Supply voltage V_{CC-} (see Note 1) | -22 | -18 | -18 | V |
| Differential input voltage (see Note 2) | ± 30 | ± 30 | ± 30 | V |
| Input voltage (any input, see Notes 1 and 3) | ± 15 | ± 15 | ± 15 | V |
| Duration of output short-circuit to ground, one amplifier at a time (see Note 4) | unlimited | unlimited | unlimited | |
| Continuous total dissipation | See Dissipation Rating Table | | | |
| Operating free-air temperature range | -55 to 125 | -40 to 85 | 0 to 70 | $^{\circ}\text{C}$ |
| Storage temperature range | -65 to 150 | -65 to 150 | -65 to 150 | $^{\circ}\text{C}$ |
| Lead temperature 1,8 mm (1/16 inch) from case for 60 seconds: JG package | 300 | 300 | 300 | $^{\circ}\text{C}$ |
| Lead temperature 1,8 mm (1/16 inch) from case for 10 seconds: D or P package | | 260 | 260 | $^{\circ}\text{C}$ |

- 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 the noninverting input terminal with respect to the inverting input terminal.
 3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
 4. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^{\circ}\text{C}$ POWER RATING | DERATING FACTOR ABOVE $T_A = 25^{\circ}\text{C}$ | DERATE ABOVE T_A | $T_A = 70^{\circ}\text{C}$ POWER RATING | $T_A = 85^{\circ}\text{C}$ POWER RATING | $T_A = 85^{\circ}\text{C}$ POWER RATING |
|-------------|---|---|-----------------------|--|--|--|
| D | 680 mW | 5.8 mW/ $^{\circ}\text{C}$ | 33 $^{\circ}\text{C}$ | 464 mW | 377 mW | N/A |
| JG (RM4558) | 680 mW | 8.4 mW/ $^{\circ}\text{C}$ | 69 $^{\circ}\text{C}$ | 672 mW | 546 mW | 210 mW |
| JG (RV4558) | 680 mW | 6.6 mW/ $^{\circ}\text{C}$ | 47 $^{\circ}\text{C}$ | 528 mW | 429 mW | N/A |
| (RC4558) | 680 mW | 8.0 mW/ $^{\circ}\text{C}$ | 65 $^{\circ}\text{C}$ | 640 mW | 520 mW | N/A |
| P | 680 mW | 8.0 mW/ $^{\circ}\text{C}$ | 65 $^{\circ}\text{C}$ | 640 mW | 520 mW | N/A |

RM4558, RV4558, RC4558
DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS

T-79-05-20

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

| PARAMETER | TEST CONDITIONS† | RM4558 | | | RV4558 | | | RC4558 | | | UNIT | | |
|--|--|--|------|-----|--------|------|-----|--------|-----|-----|-----------------|------------------------|----|
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | | | |
| V_{IO} Input offset voltage | $V_O = 0$ | 25°C | 0.5 | 5 | 0.5 | 6 | 0.5 | 6 | | | mV | | |
| | | Full range | 6 | | | 7.5 | | | 7.5 | | | | |
| I_{IO} Input offset current | $V_O = 0$ | 25°C | 5 | 200 | 5 | 200 | 5 | 200 | | | nA | | |
| | | Full range | 600 | | | 500 | | | 300 | | | | |
| I_{IB} Input bias current | $V_O = 0$ | 25°C | 140 | 500 | 140 | 500 | 150 | 500 | | | nA | | |
| | | Full range | 1600 | | | 1600 | | | 800 | | | | |
| V_{ICR} Common-mode input voltage range | | 25°C | ±12 | ±14 | ±12 | ±14 | ±12 | ±14 | | | V | | |
| V_{OM} Maximum output voltage swing | $R_L = 10\text{ k}\Omega$ | 25°C | ±12 | ±14 | ±12 | ±14 | ±12 | ±14 | | | V | | |
| | $R_L = 2\text{ k}\Omega$ | 25°C | ±10 | ±13 | ±10 | ±13 | ±10 | ±13 | | | | | |
| | $R_L \geq 2\text{ k}\Omega$ | Full range | ±10 | | | ±10 | | | ±10 | | | | |
| A_{VD} Large-signal differential voltage amplification | $R_L \geq 2\text{ k}\Omega$, $V_O = \pm 10\text{ V}$ | 25°C | 50 | 350 | 20 | 300 | 20 | 300 | | | V/mV | | |
| | | Full range | 25 | | | 15 | | | 15 | | | | |
| B_1 Unity-gain bandwidth | | 25°C | 2 | 3.5 | 3 | | 3 | | | | MHz | | |
| r_i Input resistance | | 25°C | 0.3 | 5 | 0.3 | 5 | 0.3 | 5 | | | MΩ | | |
| CMRR Common-mode rejection ratio | | 25°C | 70 | 90 | 70 | 90 | 70 | 90 | | | dB | | |
| k_{SVS} Supply voltage sensitivity ($\Delta V_{IO}/\Delta V_{CC}$) | $V_{CC} = \pm 15\text{ V}$ to $\pm 9\text{ V}$ | 25°C | 30 | 150 | 30 | 150 | 30 | 150 | | | $\mu\text{V/V}$ | | |
| V_n Equivalent input noise voltage (closed-loop) | $A_{VD} = 100$, $R_S = 100\ \Omega$, $f = 1\text{ kHz}$, $BW = 1\text{ Hz}$ | 25°C | 8 | | | 8 | | | 8 | | | nV/ $\sqrt{\text{Hz}}$ | |
| I_{CC} Supply current (Both amplifiers) | No load, $V_O = 0$ | 25°C | 2.5 | 5.6 | 2.5 | 5.6 | 2.5 | 5.6 | | | mA | | |
| | | MIN T_A | 3 | 6.6 | 3 | 6.6 | 3 | 6.6 | | | | | |
| | | MAX T_A | 2 | 5 | 2.3 | 5 | 2.3 | 5 | | | | | |
| P_D Total power dissipation (Both amplifiers) | No load, $V_O = 0$ | 25°C | 75 | 170 | 75 | 170 | 75 | 170 | | | mW | | |
| | | MIN T_A | 90 | 200 | 90 | 200 | 90 | 200 | | | | | |
| | | MAX T_A | 60 | 160 | 70 | 150 | 70 | 160 | | | | | |
| V_{O1}/V_{O2} Crosstalk attenuation | Open loop $A_{VD} = 100$ | $R_S = 1\text{ k}\Omega$, $f = 10\text{ kHz}$ | 25°C | 85 | | | 85 | | | 85 | | | dB |
| | | | 25°C | 105 | | | 105 | | | 105 | | | |

2
Operational Amplifiers

† All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified. Full range is -55°C to 125°C for RM4558, -40°C to 85°C for RV4558, and 0°C to 70°C for RC4558.

operating characteristics, $V_{CC+} = 15\text{ V}$, $V_{CC-} = -15\text{ V}$, $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | RM4558 | | | RV4558 | | | RC4558 | | | UNIT |
|----------------------------|--|--------|-----|-----|--------|-----|-----|--------|-----|-----|------------------|
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| t_r Rise time | $V_I = 20\text{ mV}$, $R_L = 2\text{ k}\Omega$ | 0.13 | | | 0.13 | | | 0.13 | | | ns |
| Overshoot | $C_L = 100\text{ pF}$ | 5% | | | 5% | | | 5% | | | |
| SR Slew rate at unity gain | $V_I = 10\text{ V}$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$ | 1.1 | 1.7 | | 1.1 | 1.7 | | 1.1 | 1.7 | | V/ μs |

