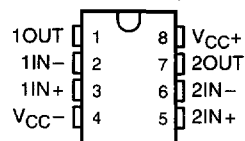


# RC4558, RC4558Y, RM4558, RV4558 DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

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- 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 Typ
- Gain and Phase Match Between Amplifiers
- Low Noise . . . 8 nV/√Hz Typ at 1 kHz
- Designed To Be Interchangeable With Raytheon RC4558, RM4558, and RV4558

D, DB, JG, P, OR PW PACKAGE  
(TOP VIEW)



## description

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

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

### AVAILABLE OPTIONS

T <sub>A</sub>	V <sub>IO</sub> max AT 25°C	PACKAGED DEVICES					CHIP FORM (Y)
		SMALL OUTLINE (D)	SSOP (DBLE)	CERAMIC DIP (JG)	PLASTIC DIP (P)	SSOP (PWLE)	
0°C to 70°C	6 mV	RC4558D	RC4558DBLE	—	RC4558P	RC4558PWLE	RC4558Y
-40°C to 85°C	6 mV	RV4558D	—	—	RV4558P	—	—
-55°C to 125°C	6 mV	—	—	RM4558JG	—	—	—

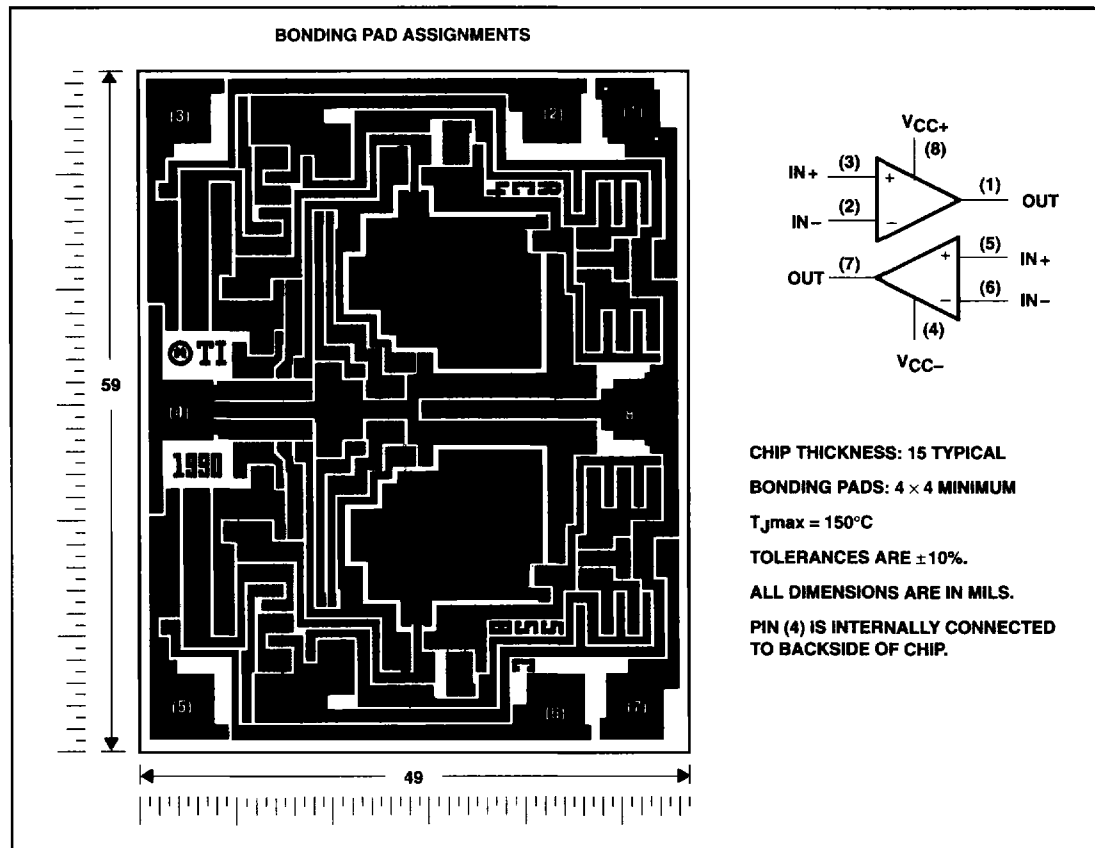
The D package is available taped and reeled. Add the suffix R to the device type (e.g., RC4558DR). The DB and PW packages are available only left-end taped and reeled. RC4558Y is tested at 25°C.

# RC4558, RC4558Y, RM4558, RV4558 DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

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## RC4558Y chip information

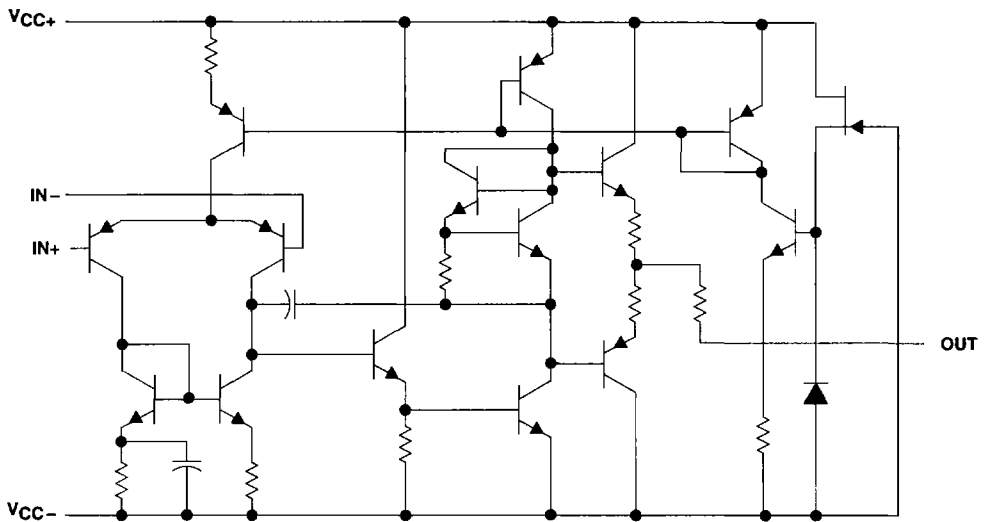
These chips, properly assembled, display characteristics similar to the RC4558. Thermal compression or ultrasonic bonding may be used on the doped-aluminum bonding pads. Chips may be mounted with conductive epoxy or a gold-silicon preform.



# RC4558, RC4558Y, RM4558, RV4558 DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

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## schematic (each amplifier)



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

	RC4558	RM4558	RV4558	UNIT
Supply voltage $V_{CC+}$ (see Note 1)	18	22	18	V
Supply voltage $V_{CC-}$ (see Note 1)	-18	-22	-18	V
Differential input voltage (see Note 2)	$\pm 30$	$\pm 30$	$\pm 30$	V
Input voltage (any input, see Notes 1 and 3)	$\pm 15$	$\pm 15$	$\pm 15$	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	0 to 70	-55 to 125	-40 to 85	$^{\circ}\text{C}$
Storage temperature range	-65 to 150	-65 to 150	-65 to 150	$^{\circ}\text{C}$
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: JG package		300		$^{\circ}\text{C}$
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D, DB, P, or PW 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 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. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

**DISSIPATION RATING TABLE**

PACKAGE	$T_A \leq 25^{\circ}\text{C}$	DERATING FACTOR ABOVE $T_A = 25^{\circ}\text{C}$	DERATE ABOVE $T_A$	$T_A = 70^{\circ}\text{C}$	$T_A = 85^{\circ}\text{C}$	$T_A = 125^{\circ}\text{C}$
	POWER RATING			POWER RATING	POWER RATING	POWER RATING
D	680 mW	5.8 mW/ $^{\circ}\text{C}$	33 $^{\circ}\text{C}$	464 mW	377 mW	N/A
DB or PW	525 mW	4.2 mW/ $^{\circ}\text{C}$	25 $^{\circ}\text{C}$	336 mW	N/A	N/A
JG	680 mW	8.4 mW/ $^{\circ}\text{C}$	69 $^{\circ}\text{C}$	672 mW	546 mW	210 mW
P	680 mW	8.0 mW/ $^{\circ}\text{C}$	65 $^{\circ}\text{C}$	640 mW	520 mW	N/A

# RC4558, RC4558Y, RM4558, RV4558 DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

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## recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, $V_{CC+}$	5	15	V
Supply voltage, $V_{CC-}$	-5	-15	V

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

PARAMETER	TEST CONDITIONS†	RC4558			RM4558			RV4558			UNIT	
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
$V_{IO}$ Input offset voltage	$V_O = 0$	25°C	0.5	6	0.5	5	0.5	6			mV	
		Full range		7.5		6		7.5				
$I_{IO}$ Input offset current	$V_O = 0$	25°C	5	200	5	200	5	200			nA	
		Full range		300		500		500				
$I_{IB}$ Input bias current	$V_O = 0$	25°C	150	500	140	500	140	500			nA	
		Full range		800		1500		1500				
$V_{ICR}$ 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	
		25°C	±10	±13	±10	±13	±10	±13				
		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	20	300	50	350	20	300			V/mV	
		Full range	15		25		15					
$B_1$ Unity-gain bandwidth		25°C		3	2	3.5		3			MHz	
$r_i$ Input resistance		25°C	0.3	5	0.3	5	0.3	5			M $\Omega$	
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			$\mu\text{V/V}$	
$V_n$ 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)	$V_O = 0$ , No load	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 $T_A$		2.3	5		2	5		2.3	5	
$P_D$ Total power dissipation (both amplifiers)	$V_O = 0$ , No load	25°C		75	170		75	170		75	170	mW
		MIN $T_A$		90	200		90	200		90	200	
		MAX $T_A$		70	150		60	150		70	150	
$V_{O1}/V_{O2}$ Crosstalk attenuation	Open loop $A_{VD} = 100$	$R_S = 1\text{ k}\Omega$ , $f = 10\text{ kHz}$	25°C		85		85		85		dB	
					105		105		105			

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



# RC4558, RC4558Y, RM4558, RV4558 DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

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

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$t_r$	Rise time	$V_I = 20\text{ mV}$ ,	$R_L = 2\text{ k}\Omega$	$C_L = 100\text{ pF}$		0.13		ns
	Overshoot					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		V/ $\mu$ s

**electrical characteristics,  $V_{CC+} = 15\text{ V}$ ,  $V_{CC-} = -15\text{ V}$ ,  $T_A = 25^\circ\text{C}$  (unless otherwise noted)**

PARAMETER		TEST CONDITIONS†		RC4558Y			UNIT
				MIN	TYP	MAX	
$V_{IO}$	Input offset voltage	$V_O = 0$		0.5	6		mV
$I_{IO}$	Input offset current	$V_O = 0$		5	200		nA
$I_{IB}$	Input bias current	$V_O = 0$		150	500		nA
$V_{ICR}$	Common-mode input voltage range			$\pm 12$	$\pm 14$		V
$V_{OM}$	Maximum output voltage swing	$R_L = 10\text{ k}\Omega$		$\pm 12$	$\pm 14$		V
		$R_L = 2\text{ k}\Omega$		$\pm 12$	$\pm 13$		
$A_{VD}$	Large-signal differential voltage amplification	$R_L = 2\text{ k}\Omega$	$V_O = \pm 10\text{ V}$	20	300		V/mV
$B_1$	Unity-gain bandwidth			3			MHz
$r_i$	Input resistance			0.3	5		M $\Omega$
CMRR	Common-mode rejection ratio			70	90		dB
$k_{SVS}$	Supply voltage sensitivity ( $\Delta V_{IO}/\Delta V_{CC}$ )	$V_{CC} = \pm 15\text{ V}$ to $\pm 9\text{ V}$		30	150		$\mu$ V/V
$V_n$	Equivalent input noise voltage (closed-loop)	$A_{VD} = 100$ ,	$R_S = 100\ \Omega$ , $BW = 1\text{ Hz}$	8			nV $\sqrt{\text{Hz}}$
$I_{CC}$	Supply current (both amplifiers)	$V_O = 0$ , No load		2.5	5.6		mA
$P_D$	Total power dissipation (both amplifiers)	$V_O = 0$ , No load		75	170		mW
$V_{O1}/V_{O2}$	Crosstalk attenuation	Open loop	$R_S = 1\text{ k}\Omega$ , $f = 10\text{ kHz}$	85			dB
		$A_{VD} = 100$		105			

† All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified.

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

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$t_r$	Rise time	$V_I = 20\text{ mV}$ ,	$R_L = 2\text{ k}\Omega$	$C_L = 100\text{ pF}$		0.13		ns
	Overshoot					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		V/ $\mu$ s