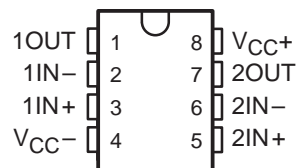


# RC4558, RC4558Y, RM4558, RV4558 DUAL GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

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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 $\sqrt{\text{Hz}}$  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  $\mu\text{A}741$  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	—	—	—

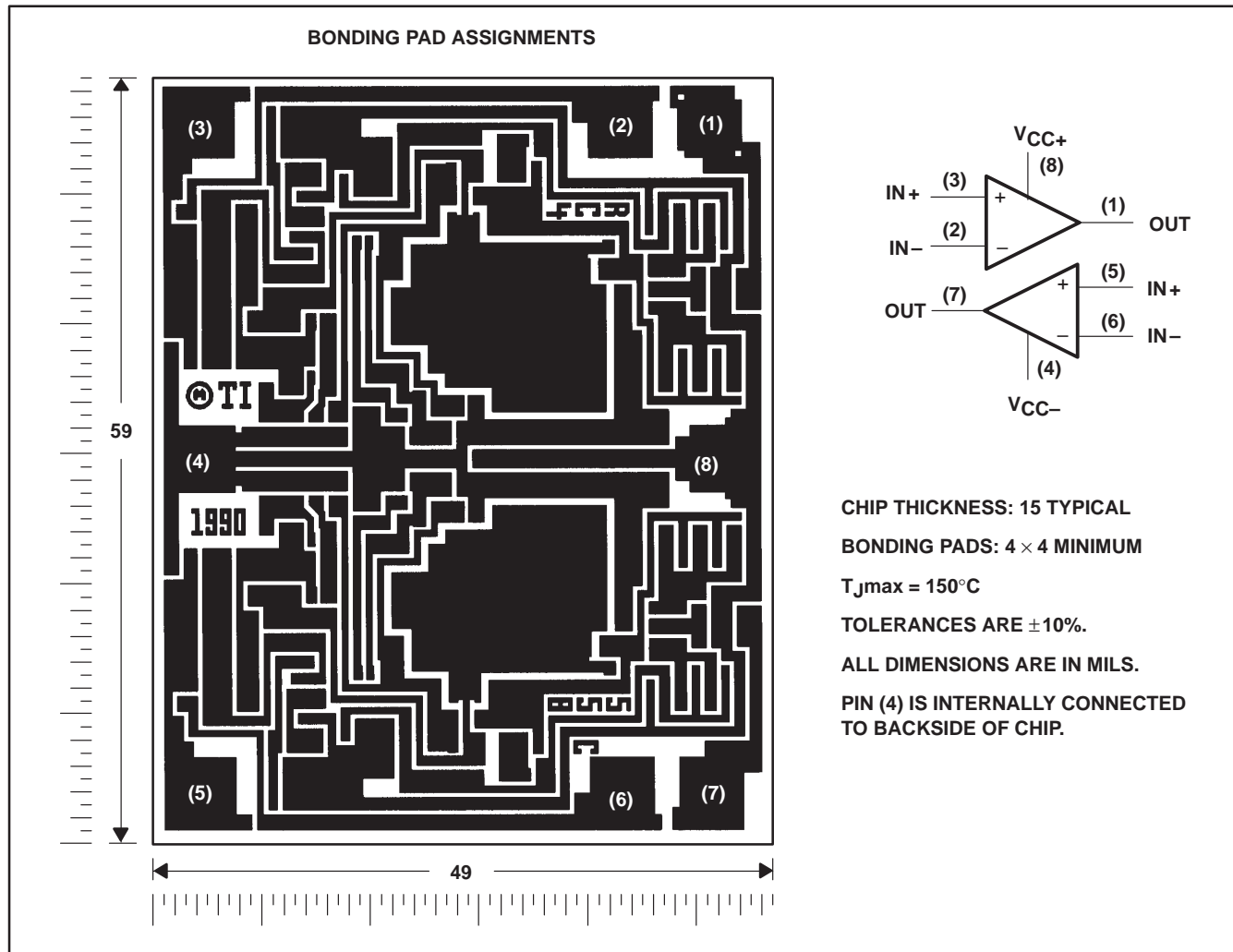
The D package is available taped and reeled. Add the suffix R to the device type (e.g., RC4558DR). The DB and PW packages are available only left-end taped and reeled. RC4558Y is tested at 25°C.

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

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## RC4558Y chip information

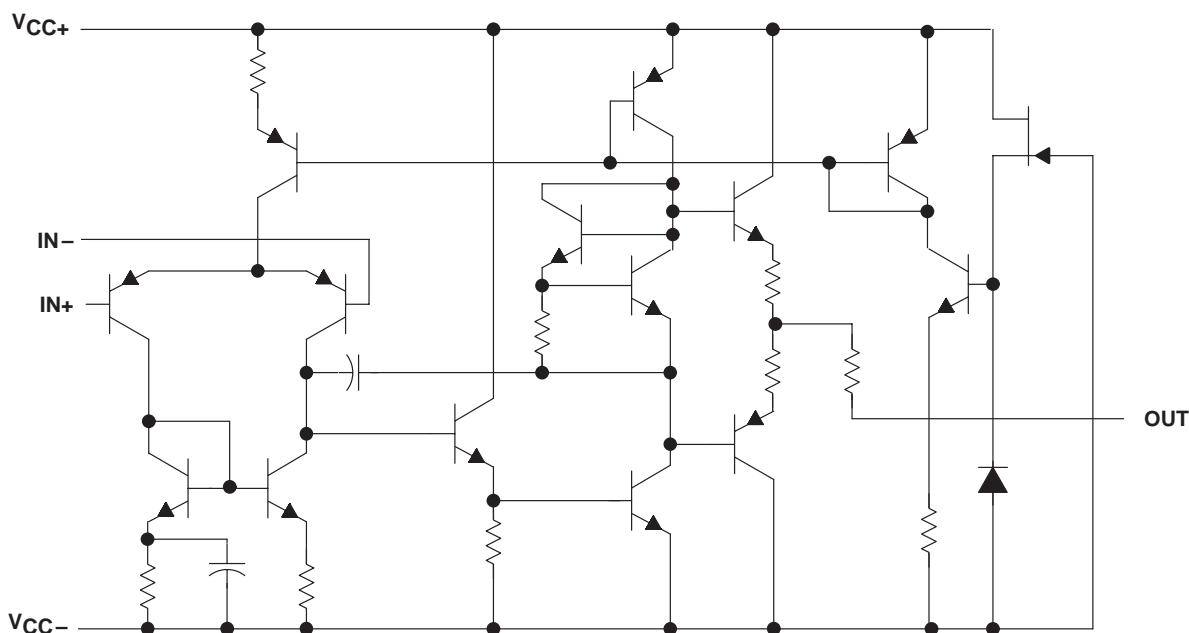
These chips, properly assembled, display characteristics similar to the RC4558. Thermal compression or ultrasonic bonding may be used on the doped-aluminum bonding pads. Chips may be mounted with conductive epoxy or a gold-silicon preform.



# 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  $\text{IN+}$  with respect to  $\text{IN-}$ .  
 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		$T_A = 70^{\circ}\text{C}$	$T_A = 85^{\circ}\text{C}$	$T_A = 125^{\circ}\text{C}$
	POWER RATING	ABOVE $T_A = 25^{\circ}\text{C}$	DERATE ABOVE $T_A$	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		
	$R_L = 2\text{ k}\Omega$	25°C	±10	±13	±10	±13	±10	±13			
	$R_L \geq 2\text{ k}\Omega$	Full range	±10			±10					
$A_{VD}$ 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	30	150	$\mu\text{V}/\text{V}$		
$V_n$ 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		$\text{nV}/\sqrt{\text{Hz}}$		
$I_{CC}$ 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	$R_S = 1\text{ k}\Omega$ , $f = 10\text{ kHz}$	25°C		85		85		dB		
	$A_{VD} = 100$		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/ $\mu\text{s}$

## 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	$\mu\text{V}/\text{V}$
$V_n$	Equivalent input noise voltage (closed-loop)	$A_{VD} = 100$ ,	$R_S = 100\ \Omega$ , $f = 1\text{ kHz}$ ,		8		$\text{nV}/\sqrt{\text{Hz}}$
$I_{CC}$	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/ $\mu\text{s}$





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