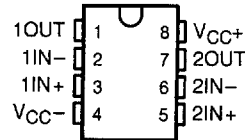


# RC4558, RC4558Y, RM4558, RV4558 DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS

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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 high-performance 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>IOMax</sub> 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.

PRODUCTION DATA information is 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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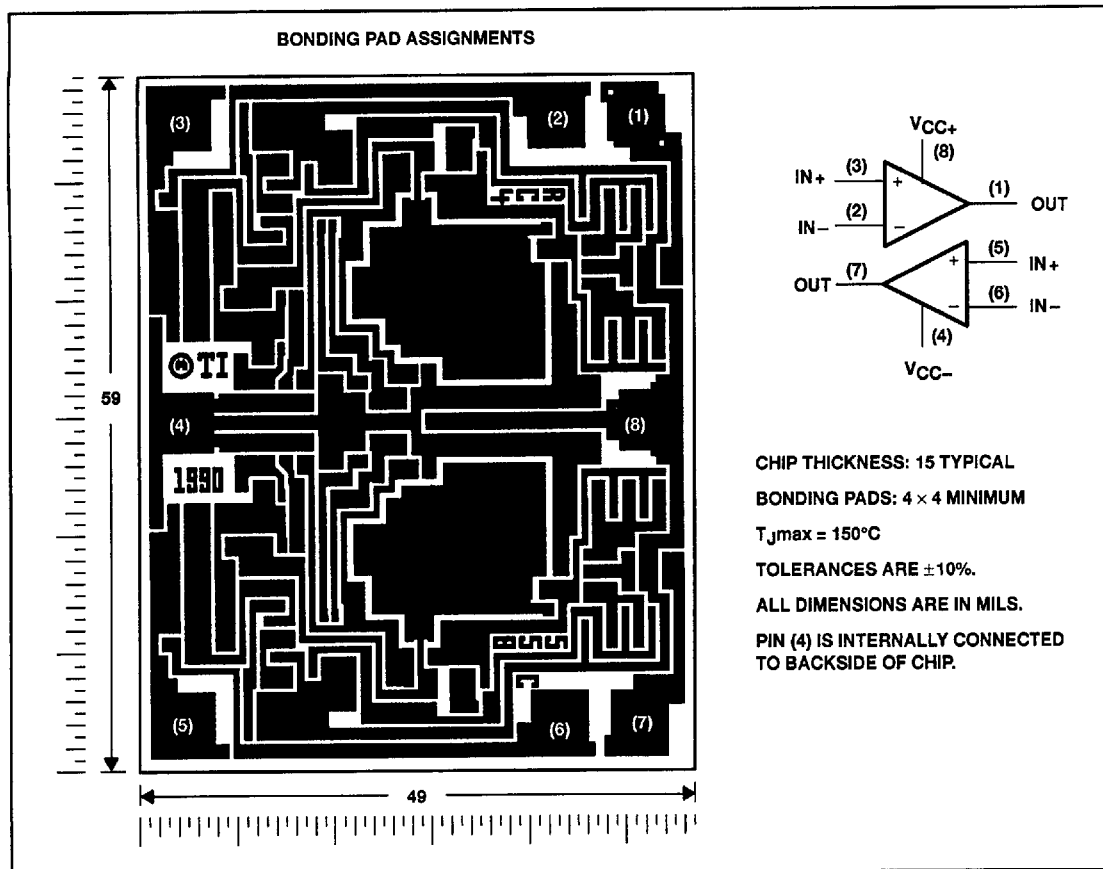
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# RC4558, RC4558Y, RM4558, RV4558 DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS

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## RC4558Y chip information

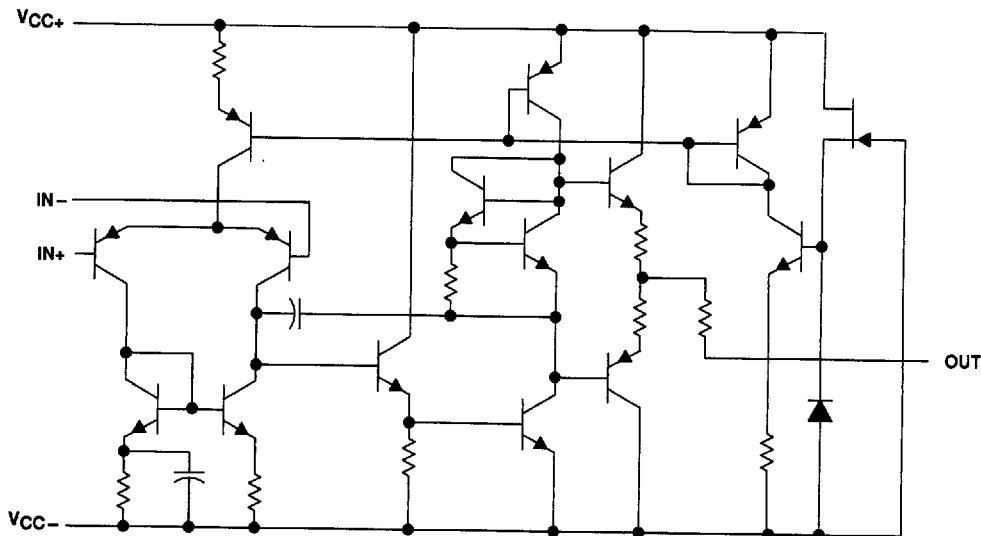
These chips, properly assembled, display characteristics similar to the RC4558. Thermal compression or ultrasonic bonding may be used on the doped-aluminum bonding pads. Chips may be mounted with conductive epoxy or a gold-silicon preform.



# RC4558, RC4558Y, RM4558, RV4558 DUAL HIGH-PERFORMANCE 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 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



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# RC4558, RC4558Y, RM4558, RV4558 DUAL HIGH-PERFORMANCE 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		±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	$\mu\text{V/V}$		
$V_n$ 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	dB			
					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.

## 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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# RC4558, RC4558Y, RM4558, RV4558 DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS

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**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
kSVS	Supply voltage sensitivity ( $\Delta V_{IO}/\Delta V_{CC}$ )	$V_{CC} = \pm 15\text{ V}$ to $\pm 9\text{ V}$	30	150		$\mu\text{V/V}$
$V_n$	Equivalent input noise voltage (closed-loop)	$A_{VD} = 100$ , $R_S = 100\ \Omega$ , $f = 1\text{ kHz}$ , $BW = 1\text{ Hz}$	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	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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