

RC4558 Dual General-Purpose Operational Amplifier

1 Features

- 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

2 Applications

- DVD Recorders and Players
- Pro Audio Mixers

3 Description

The RC4558 device is a dual general-purpose operational amplifier, with each half electrically similar to the μA741 , except that offset null capability is not provided.

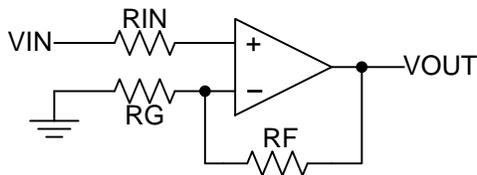
The high common-mode input voltage range and the absence of latch-up make this amplifier ideal for voltage-follower applications. The device is short-circuit protected, and the internal frequency compensation ensures stability without external components.

Device Information(1)

PART NUMBER	PACKAGE (PIN)	BODY SIZE
RC4558	SOIC (8)	4.90 mm x 3.91 mm
	SOIC (8)	3.00 mm x 3.00 mm
	PDIP (8)	9.81 mm x 6.35 mm
	TSSOP (8)	3.00 mm x 4.40 mm
	SOP (8)	6.20 mm x 5.30 mm

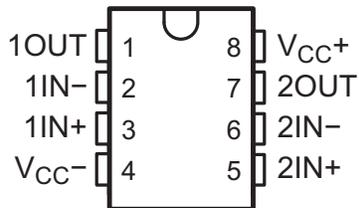
(1) For all available packages, see the orderable addendum at the end of the datasheet.

Noninverting Amplifier Schematic



5 Pin Configuration and Functions

**D, DGK, P, PS, OR PW PACKAGE
(TOP VIEW)**



Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
1IN+	3	I	Noninverting input
1IN-	2	I	Inverting Input
1OUT	1	O	Output
2IN+	5	I	Noninverting input
2IN-	6	I	Inverting Input
2OUT	7	O	Output
V _{CC} +	8	—	Positive Supply
V _{CC} -	4	—	Negative Supply

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

		MIN	MAX	UNIT
V _{CC+}	Supply voltage ⁽²⁾		18	V
V _{CC-}			-18	
V _{ID}	Differential input voltage ⁽³⁾		±30	V
V _I	Input voltage (any input) ⁽²⁾⁽⁴⁾		±15	V
	Duration of output short circuit to ground, one amplifier at a time ⁽⁵⁾		Unlimited	
T _J	Operating virtual junction temperature		150	°C

- (1) 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.
- (2) All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-}.
- (3) Differential voltages are at IN+ with respect to IN-.
- (4) The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
- (5) Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

6.2 Handling Ratings

		MIN	MAX	UNIT	
T _{stg}	Storage temperature range	-65	150	°C	
V _(ESD)	Electrostatic discharge	Human body model (HBM), per AEC Q100-002 ⁽¹⁾	0	500	V
		Charged device model (CDM), per AEC Q100-011 ⁽²⁾	0	1000	

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

		MIN	MAX	UNIT	
V _{CC+}	Supply voltage	5	15	V	
V _{CC-}		-5	-15		
T _A	Operating free-air temperature	RC4558	0	70	°C
		RC4558I	-40	85	

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾	RC4558					UNIT	
	D	DGK	P	PS	PW		
	8 PINS						
R _{θJA}	Junction-to-ambient thermal resistance	97	172	85	95	149	°C/W

- (1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, [SPRA953](#).

6.5 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS ⁽¹⁾	T_A ⁽²⁾	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$V_O = 0$	25°C	0.5	6	7.5	mV
			Full range				
I_{IO}	Input offset current	$V_O = 0$	25°C	5	200	300	nA
			Full range				
I_{IB}	Input bias current	$V_O = 0$	25°C	150	500	800	nA
			Full range				
V_{ICR}	Common-mode input voltage range		25°C	±12	±14		V
V_{OM}	Maximum output voltage swing	$R_L = 10\text{ k}\Omega$	25°C	±12	±14		V
			Full range	±10	±13		
		$R_L = 2\text{ k}\Omega$	Full range	±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	15	V/mV
			Full range				
B_1	Unity-gain bandwidth		25°C		3		MHz
r_i	Input resistance		25°C	0.3	5		M Ω
CMRR	Common-mode rejection ratio		25°C	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	$\mu\text{V/V}$
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		$\text{nV}/\sqrt{\text{Hz}}$
I_{CC}	Supply current (both amplifiers)	$V_O = 0$, No load	25°C	2.5	5.6		mA
			T_A min	3	6.6		
			T_A max	2.3	5		
P_D	Total power dissipation (both amplifiers)	$V_O = 0$, No load	25°C	75	170		mW
			T_A min	90	200		
			T_A max	70	150		
V_{O1}/V_{O2}	Crosstalk attenuation	Open loop	$R_S = 1\text{ k}\Omega$, $f = 10\text{ kHz}$	25°C	85		dB
		$A_{VD} = 100$			105		

(1) All characteristics are measured under open-loop conditions with zero common-mode input voltage, unless otherwise specified.

(2) Full range is 0°C to 70°C for RC4558 and –40°C to 85°C for RC4558L.

6.6 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	$V_I = 20\text{ mV}$,	$R_L = 2\text{ k}\Omega$,	$C_L = 100\text{ pF}$		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/ μs