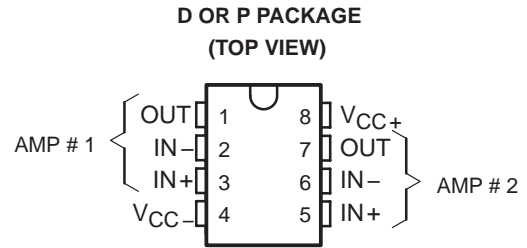


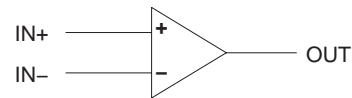
# RC4559 DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIER

SLOS074 – D2785, OCTOBER 1983 — REVISED JUNE 1988

- **Matched Gain and Offset Between Amplifiers**
- **Unity-Gain Bandwidth . . . 3 MHz Min**
- **Slew Rate . . . 1.5 V/ns Min**
- **Low Equivalent Input Noise Voltage**  
2  $\mu$ V/Hz Max (20 Hz to 20 kHz)
- **No Frequency Compensation Required**
- **No Latch Up**
- **Wide Common-Mode Voltage Range**
- **Low Power Consumption**
- **Designed to be Interchangeable with Raytheon RC4559**



**symbol (each amplifier)**



### AVAILABLE OPTIONS

SYMBOLIZATION		OPERATING TEMPERATURE RANGE	$V_{IO}$ max at 25°C
DEVICE	PACKAGE SUFFIX		
RC4559	D, P	-0°C to 70°C	6 mV

The D packages are available taped and reeled. Add the suffix R to the device type when ordering. (i.e., RC4559DR)

### **description**

The RC4559 is a dual high-performance operational amplifier. The high common-mode input voltage and the absence of latch-up make this amplifier ideal for low-noise signal applications such as audio preamplifiers and signal conditioners. This amplifier features a guaranteed dynamic performance and output drive capability that far exceeds that of the general-purpose type amplifiers.

The RC4559 is characterized for operation from 0°C to 70°C.

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

Supply voltage $V_{CC+}$ (see Note 1)	18 V
Supply voltage $V_{CC-}$ (see Note 1)	-18 V
Differential input voltage (see Note 2)	$\pm 30$ V
Input voltage (any input, see Notes 1 and 3)	$\pm 15$ V
Duration of output short-circuit to ground, one amplifier at a time (see Note 4)	unlimited
Continuous total dissipation	500 mW
Operating free-air temperature range	0°C to 70°C
Storage temperature range	-65°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES: 1. All voltage values, unless otherwise noted, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is 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.

# RC4559

## DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIER

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

PARAMETER		TEST CONDITIONS†	$T_A$ ‡	MIN	TYP	MAX	UNIT
$V_{IO}$	Input offset voltage	$V_O = 0$	25°C		2	6	mV
			Full Range			7.5	
$I_{IO}$	Input offset current	$V_O = 0$	25°C		5	100	nA
			Full range			200	
$I_{IB}$	Input bias current	$V_O = 0$	25°C		40	250	nA
			Full range			500	
$V_I$	Input voltage range		25°C	±12	±13		V
$V_{OM}$	Maximum peak output voltage swing	$R_L \geq 3\text{ k}\Omega$	25°C	±12	±13		V
		$R_L = 600\ \Omega$	25°C	±9.5	±10		
		$R_L \geq 2\text{ k}\Omega$	Full range	±10			
$V_I$	Input voltage range	$V_O = \pm 10\text{ V}$ , $R_L = 2\text{ k}\Omega$	25°C	20	300		V/mV
			Full range	15			
$B_{OM}$	Maximum output-swing bandwidth	$V_{OPP} = 20\text{ V}$ , $R_L = 2\text{ k}\Omega$	25°C	24	32		kHz
$B_1$	Unity-gain bandwidth		25°C	3	4		MHz
$r_i$	Input resistance		25°C	0.3	1		M $\Omega$
CMRR	Common-mode rejection ratio	$V_O = 0$	25°C	80	100		dB
$k_{SVS}$	Supply voltage sensitivity ( $\Delta V_{IO}/\Delta V_{CC}$ )	$V_O = 0$	25°C		10	75	$\mu\text{V}/\text{V}$
$V_n$	Equivalent input noise voltage (closed loop)	$A_{VD} = 100$ , $R_S = 1\text{ k}\Omega$ , $f = 20\text{ Hz to } 20\text{ kHz}$	25°C		1.4	2	$\mu\text{V}$
$I_n$	Equivalent input noise current	$f = 20\text{ Hz to } 20\text{ kHz}$	25°C		25		pA
$I_{CC}$	Supply current (both amplifiers)	No load, No signal	25°C		3.3	5.6	mA
			0°C		4	6.6	
			70°C		3	5	
$V_{O1}/V_{O2}$	Crosstalk attenuation	$A_{VD} = 100$ , $R_S = 1\text{ k}\Omega$ , $f = 10\text{ kHz}$	25°C		90		dB

† All characteristics are specified under open-loop operation, unless otherwise noted.

‡ Full range operating free-air temperature range is 0°C to 70°C.

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{IO}$	Input offset voltage	$V_O = 0$		±0.2		mV
$I_{IO}$	Input offset current	$V_O = 0$		±7.5		nA
$I_{IB}$	Input bias current	$V_O = 0$		±15		nA
$A_{VD}$	Large-signal differential voltage amplification	$V_O = \pm 10\text{ V}$ , $R_L = 2\text{ k}\Omega$		±1		dB

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	$V_I = 20\text{ mV}$ , $R_L = 2\text{ k}\Omega$ , $C_L = 100\text{ pF}$		80		$\mu\text{s}$
	Overshoot			18%		
SR	Slew rate at unity gain	$V_I = 10\text{ mV}$ , $R_L = 2\text{ k}\Omega$ , $C_L = 100\text{ pF}$	1.5	2		V/ $\mu\text{s}$



**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
RC4559D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	0 to 70	RC4559	<a href="#">Samples</a>
RC4559DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	0 to 70	RC4559	<a href="#">Samples</a>
RC4559P	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	NIPDAU	N / A for Pkg Type	0 to 70	RC4559P	<a href="#">Samples</a>
RC4559PE4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	NIPDAU	N / A for Pkg Type	0 to 70	RC4559P	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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**TAPE AND REEL INFORMATION**



**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
RC4559DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
RC4559DR	SOIC	D	8	2500	340.5	338.1	20.6

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Falls within JEDEC MS-001 variation BA.





# EXAMPLE BOARD LAYOUT

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON .005 INCH [0.125 MM] THICK STENCIL  
SCALE:8X

4214825/C 02/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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