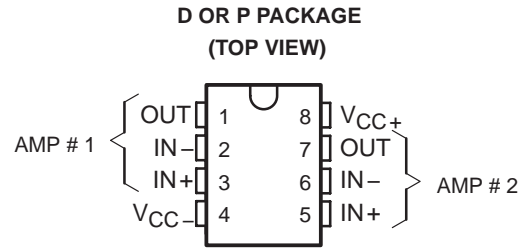


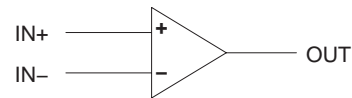
RC4559 DUAL HIGH-PERFORMANCE OPERATIONAL AMPLIFIER

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 μ 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)	± 30 V
Input voltage (any input, see Notes 1 and 3)	± 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 Ω
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	$\mu\text{V/V}$
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	μV
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		μs
	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/ μs



PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
RC4559D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4559DE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4559DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4559DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4559DRE4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4559DRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4559P	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
RC4559PE4	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type

⁽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.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

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

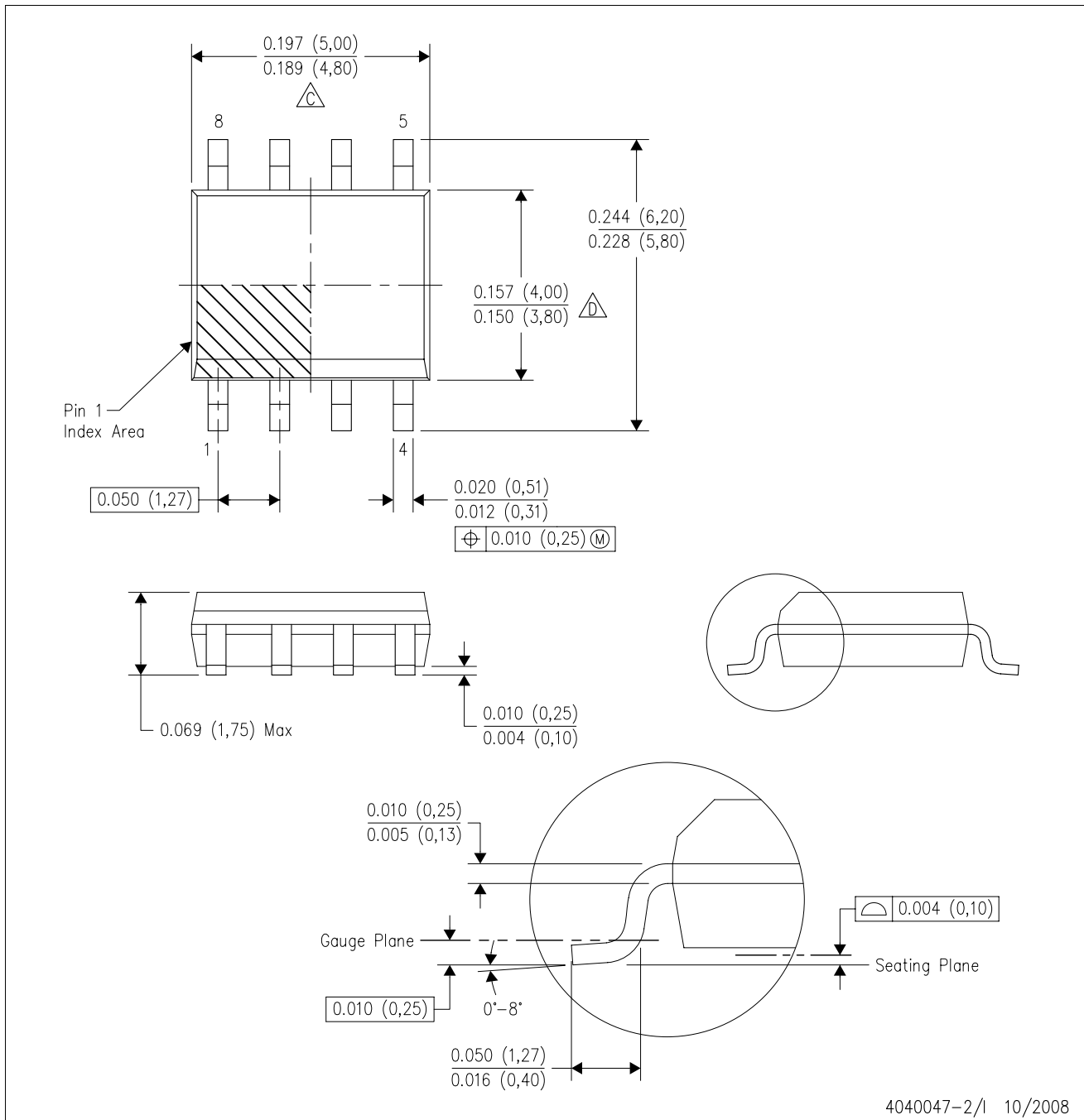


*All dimensions are nominal

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

D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AA.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated