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SLOS457A-JANUARY 2005-REVISED APRIL 2008

DUAL AUDIO OPERATIONAL AMPLIFIER

FEATURES

- Operating Voltage . . . ±2 V to ±18 V
- Low Noise Voltage . . . 1.2 µVrms (Typ)
- Wide GBW . . . 15 MHz (Typ)
- Low THD . . . 0.05% (Typ)

- Slew Rate . . . 5.5 V/µsec (Typ)
- Suitable for Applications Such as Audio Preamplifier, Active Filter, Headphone Amplifier, Industrial Measurement Equipment

DESCRIPTION/ORDERING INFORMATION

The RC4560 is a high-gain, wide-bandwidth, dual operational amplifier capable of driving 20 V peak-to-peak into 400- Ω loads. The RC4560 combines many of the features of the RC4558, but with wider bandwidth and higher slew rate, making this device ideal for active filters, data and telecommunications, and many instrumentation applications.

ORDERING INFORMATION⁽¹⁾

T _A	PACK	AGE ⁽²⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – P	Tube of 50	RC4560IP	RC4560IP
	SOIC – D	Tube of 75	RC4560ID	DAFCOL
–40°C to 85°C		Reel of 2500	RC4560IDR	R4560I
		Tube of 150	RC4560IPW	D 45 COL
	TSSOP – PW	Reel of 2000	RC4560IPWR	R4560I

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.

(2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.



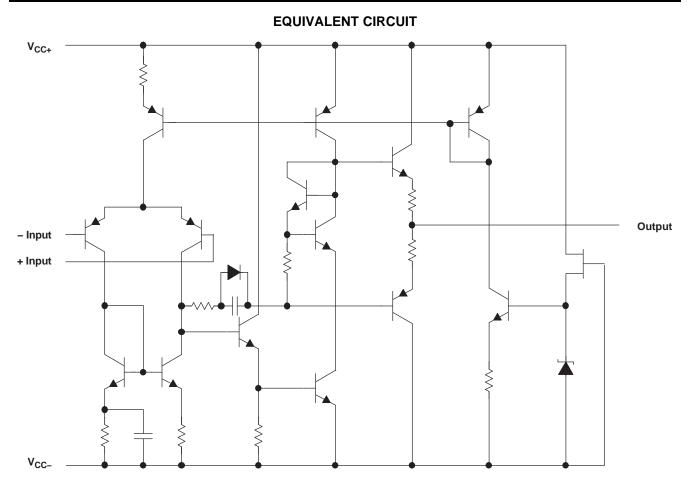
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INSTRUMENTS

EXAS



ABSOLUTE MAXIMUM RATINGS⁽¹⁾

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

$V_{\text{CC}\pm}$	Supply voltage	±18 V	
	Input voltage (any input)	±15 V	
	Output current	±50 mA	
		D package	97°C/W
θ_{JA}	Package thermal impedance ⁽²⁾⁽³⁾	P package	85°C/W
		PW package	149°C/W
TJ	Operating virtual junction temperature	· ·	150°C
T _{stg}	Storage temperature range	-60°C to 125°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) Maximum power dissipation is a function of T_J(max), θ_{JA}, and T_A. The maximum T_J of 150°C can impact reliability.
 (2) The nearborn of T_J(max) - T_A)/θ_{JA}. Operating at the absolute maximum T_J of 150°C can impact reliability.
 (3) The nearborn of the maximum T_J of 150°C can impact reliability.

(3) The package thermal impedance is calculated in accordance with JESD 51-7.

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RECOMMENDED OPERATING CONDITIONS

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

		MIN	MAX	UNIT
V_{CC+}	Supply veltage	2	16	V
V _{CC} -	Supply voltage	-2	-16	v
V _{ID}	Differential input voltage		±30	V
VICR	Input common mode range	-14	14	V
T _A	Operating free-air temperature range	-40	85	°C

ELECTRICAL CHARACTERISTICS

 $V_{CC\pm}=\pm 15$ V, $T_{A}=25^{\circ}C$ (unless otherwise noted)

	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V _{IO}	Input offset voltage	R _S ≤ 10 kΩ		0.5	6	mV
I _{IO}	Input offset current			5	200	nA
I _{IB}	Input bias current			40	500	nA
A _{VD}	Large-signal differential voltage amplification	$R_L \ge 2 \ k\Omega, \ V_O = \pm 10 \ V$	86	100		dB
r _i	Input resistance		0.3	5		MΩ
	Output voltage owing	$R_L \ge 2 k\Omega$	±12	±14		V
Vo	Output voltage swing	I _O = 25 mA	±10	±12.5		v
VICR	Common-mode input voltage range		±12	±14		V
CMRR	Common-mode rejection ratio	R _S ≤ 10 kΩ	70	90		dB
k _{SVR}	Supply-voltage rejection ratio ⁽¹⁾	R _S ≤ 10 kΩ	76.5	90		dB
I _{CC}	Supply current (all amplifiers)			4.3	5.7	mA

(1) Measured with V_{CC±} differentially varied simultaneously from ±4 V to ±15 V

OPERATING CHARACTERISTICS

 $V_{CC\pm} = \pm 15 \text{ V}, \text{ } T_A = 25^{\circ}\text{C}$ (unless otherwise noted)

	PARAMETER	TEST CONDITIONS	TYP	UNIT
SR	Slew rate at unity gain		5.5	V/µs
GBW	Gain bandwidth product		15	MHz
THD	Total harmonic distortion	$V_0 = 5 \text{ V}, \text{ R}_L = 2 \text{ k}\Omega, \text{ f} = 1 \text{ kHz}, \text{ A}_{VD} = 20 \text{ dB}$	0.05	%
Vn	Equivalent input noise voltage	RIAA, R _S ≤ 2 kΩ, 30-kHz LPF	1.2	μVrms

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TEXAS INSTRUMENTS

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
RC4560ID	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IDE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IDG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IDR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IDRE4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IDRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IP	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
RC4560IPE4	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
RC4560IPW	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IPWE4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IPWG4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IPWR	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IPWRE4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
RC4560IPWRG4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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



PACKAGE OPTION ADDENDUM

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TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*	All dimensions are nominal												
	Device		Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
	RC4560IDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
Γ	RC4560IPWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1



PACKAGE MATERIALS INFORMATION

26-Apr-2008



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
RC4560IDR	SOIC	D	8	2500	340.5	338.1	20.6
RC4560IPWR	TSSOP	PW	8	2000	346.0	346.0	29.0

P(R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- 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.



PW (R-PDSO-G28)

PLASTIC SMALL OUTLINE



NOTES:

A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 B. This drawing is subject to change without notice.

Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.

Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.

E. Falls within JEDEC MO-153



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE

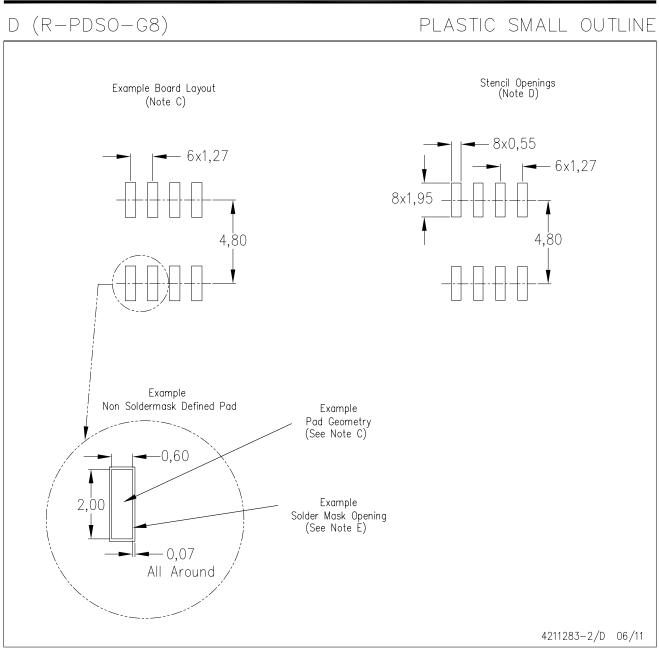


NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AA.



LAND PATTERN DATA



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G8)

PLASTIC SMALL OUTLINE



Α. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994. Ŗ. This drawing is subject to change without notice.

🖄 Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.

Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.

E. Falls within JEDEC MO-153



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