

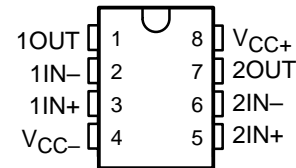
TL4581

DUAL LOW-NOISE HIGH-DRIVE OPERATIONAL AMPLIFIER

SLVS457A – JANUARY 2003 – REVISED MARCH 2003

- **Equivalent Input Noise Voltage**
5 nV/ $\sqrt{\text{Hz}}$ Typ at 1 kHz
- **Unity-Gain Bandwidth . . . 10 MHz Typ**
- **High Slew Rate . . . 9 V/ μs Typ**
- **Peak-to-Peak Output Voltage Swing**
32 V Typ, With $V_{CC\pm} = \pm 18\text{ V}$ and $R_L = 600\ \Omega$
- **Wide Supply-Voltage Range . . . $\pm 3\text{ V}$ to $\pm 20\text{ V}$**
- **Common-Mode Rejection Ratio . . . 100 dB Typ**
- **High dc Voltage Gain . . . 100 V/mV Typ**
- **Applications: Audio PreAmps, Active Filters, Headphone Amps**
- **End Equipment: DVD/CD/CDRW Players; Set-Top Boxes**

D, P, OR PS PACKAGE
(TOP VIEW)



description/ordering information

The TL4581 is a dual operational amplifier that has been designed optimally for audio applications, such as improving tone control. It offers low noise, high-gain bandwidth, good slew, and high output current drive for driving capacitive loads. These features make the TL4581 ideally suited for audio applications, such as audio preamps and active filters. When high output current is required, the TL4581 also can be used as a headphone amplifier.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – P	Tube of 50	TL4581P	TL4581P
	SOIC – D	Tube of 75	TL4581D	T4581
		Reel of 2500	TL4581DR	
	SOP – PS	Reel of 2000	TL4581PSR	T4581

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2003, Texas Instruments Incorporated

TL4581

DUAL LOW-NOISE HIGH-DRIVE OPERATIONAL AMPLIFIER

SLVS457A – JANUARY 2003 – REVISED MARCH 2003

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

Supply voltage (see Note 1): V_{CC+}	22 V
V_{CC-}	-22 V
Input voltage, either input (see Notes 1 and 2)	$V_{CC\pm}$
Input current (see Note 3)	± 10 mA
Duration of output short circuit (see Note 4)	Unlimited
Operating virtual junction temperature, T_J	150°C
Package thermal impedance, θ_{JA} (see Notes 5 and 6): D package	97°C/W
P package	85°C/W
PS package	95°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, T_{stg}	-65°C to 150°C

† 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.

- NOTES:
1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-} .
 2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage.
 3. Excessive input current will flow if a differential input voltage in excess of approximately 0.6 V is applied between the inputs, unless some limiting resistance is used.
 4. The output may be shorted to ground or either power supply. Temperature and/or supply voltages must be limited to ensure the maximum dissipation rating is not exceeded.
 5. Maximum power dissipation is a function of $T_{J(max)}$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_{J(max)} - T_A) / \theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 6. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

	MIN	MAX	UNIT
V_{CC+} Supply voltage	5	15	V
V_{CC-} Supply voltage	-5	-15	V
T_A Operating free-air temperature range	0	70	°C



TL4581

DUAL LOW-NOISE HIGH-DRIVE OPERATIONAL AMPLIFIER

SLVS457A – JANUARY 2003 – REVISED MARCH 2003

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

PARAMETER		TEST CONDITIONS†		MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$V_O = 0$	$T_A = 25^\circ\text{C}$	0.5	4		mV
			$T_A = 0^\circ\text{C to } 70^\circ\text{C}$			5	
I_{IO}	Input offset current	$T_A = 25^\circ\text{C}$		10	150		nA
		$T_A = 0^\circ\text{C to } 70^\circ\text{C}$				200	
I_{IB}	Input bias current	$T_A = 25^\circ\text{C}$		200	800		nA
		$T_A = 0^\circ\text{C to } 70^\circ\text{C}$				1000	
V_{ICR}	Common-mode input-voltage range			± 12	± 13		V
V_{OPP}	Maximum peak-to-peak output-voltage swing	$R_L \geq 600\ \Omega$	$V_{CC\pm} = \pm 15\text{ V}$	24	26		V
			$V_{CC\pm} = \pm 18\text{ V}$	30	32		
A_{VD}	Large-signal differential-voltage amplification	$R_L \geq 600\ \Omega$, $V_O = \pm 10\text{ V}$	$T_A = 25^\circ\text{C}$	15	50		V/mV
			$T_A = 0^\circ\text{C to } 70^\circ\text{C}$	10			
		$R_L \geq 2\text{ k}\Omega$, $V_O = \pm 10\text{ V}$	$T_A = 25^\circ\text{C}$	25	100		
			$T_A = 0^\circ\text{C to } 70^\circ\text{C}$	15			
A_{vd}	Small-signal differential-voltage amplification	$f = 10\text{ kHz}$		2.2		V/mV	
B_{OM}	Maximum-output-swing bandwidth	$R_L = 600\ \Omega$	$V_O = \pm 10\text{ V}$	140			kHz
			$V_{CC\pm} = \pm 18\text{ V}$, $V_O = \pm 14\text{ V}$	100			
B_1	Unity-gain bandwidth	$R_L = 600\ \Omega$,	$C_L = 100\text{ pF}$	10			MHz
r_i	Input resistance			30	300		k Ω
z_o	Output impedance	$A_{VD} = 30\text{ dB}$, $R_L = 600\ \Omega$, $f = 10\text{ kHz}$		0.3			Ω
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICR}\text{ min}$		70	100		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$)	$V_{CC\pm} = \pm 9\text{ V to } \pm 15\text{ V}$, $V_O = 0$		80	100		dB
I_{OS}	Output short-circuit current			10	38	60	mA
I_{CC}	Total supply current	$V_O = 0$,	No load	8	16		mA
	Crosstalk attenuation (V_{O1}/V_{O2})	$V_{O1} = 10\text{ V}$ peak,	$f = 1\text{ kHz}$	110			dB

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

operating characteristics, $V_{CC\pm} = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
SR	Slew rate at unity gain				9		V/ μs
	Overshoot factor	$V_I = 100\text{ mV}$, $R_L = 600\ \Omega$,	$A_{VD} = 1$, $C_L = 100\text{ pF}$		10		%
V_n	Equivalent input noise voltage	$f = 30\text{ Hz}$			8		nV/ $\sqrt{\text{Hz}}$
		$f = 1\text{ kHz}$			5		
I_n	Equivalent input noise current	$f = 30\text{ Hz}$			2.7		pA/ $\sqrt{\text{Hz}}$
		$f = 1\text{ kHz}$			0.7		



P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



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

For the latest package information, go to http://www.ti.com/sc/docs/package/pkg_info.htm

D (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN

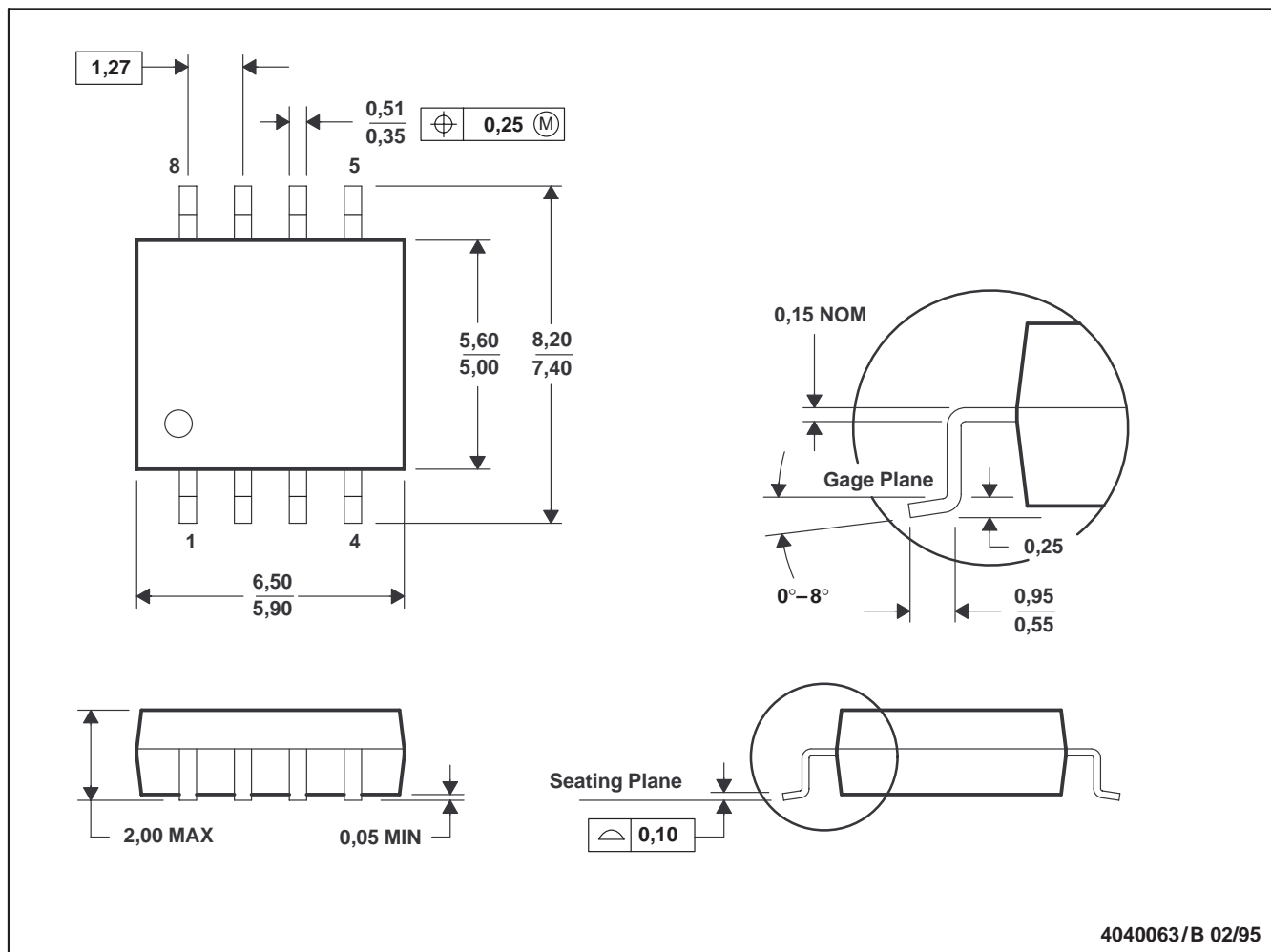


4040047/E 09/01

- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).
 D. Falls within JEDEC MS-012

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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 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.

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.

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265