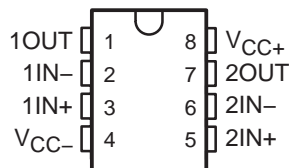


# RC4580 DUAL AUDIO OPERATIONAL AMPLIFIER

SLOS412C – APRIL 2003 – REVISED MARCH 2004

- Operating Voltage . . .  $\pm 2\text{ V}$  to  $\pm 18\text{ V}$
- Low Noise Voltage . . .  $0.8\ \mu\text{Vrms}$  (TYP)
- Wide GBW . . . 12 MHz (TYP)
- Low THD . . . 0.0005% (TYP)
- Slew Rate . . .  $5\text{ V}/\mu\text{s}$  (TYP)
- Suitable for Applications Such As Audio Preamplifier, Active Filter, Headphone Amplifier, Industrial Measurement Equipment
- Drop-In Replacement for NJM4580
- Pin and Function Compatible With LM833, NE5532, NJM4558/9, and NJM4560/2/5

D, P, OR PW PACKAGE  
(TOP VIEW)



## description/ordering information

The RC4580 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, low harmonic distortion, and high output current, all of which make the device ideally suited for audio electronics, such as audio preamplifiers and active filters, as well as industrial measurement equipment. When high output current is required, the RC4580 also can be used as a headphone amplifier. Due to its wide operating supply voltage, the RC4580 also can be used in low-voltage applications.

## ORDERING INFORMATION

TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING	
-40°C to 85°C	PDIP (P)	Tube of 50	RC4580IP	RC4580IP	
		SOIC (D)	Tube of 75	RC4580ID	R4580I
	Reel of 2500		RC4580IDR		
	TSSOP (PW)		Tube of 150	RC4580IPW	R4580I
			Reel of 2000	RC4580IPWR	

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



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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**

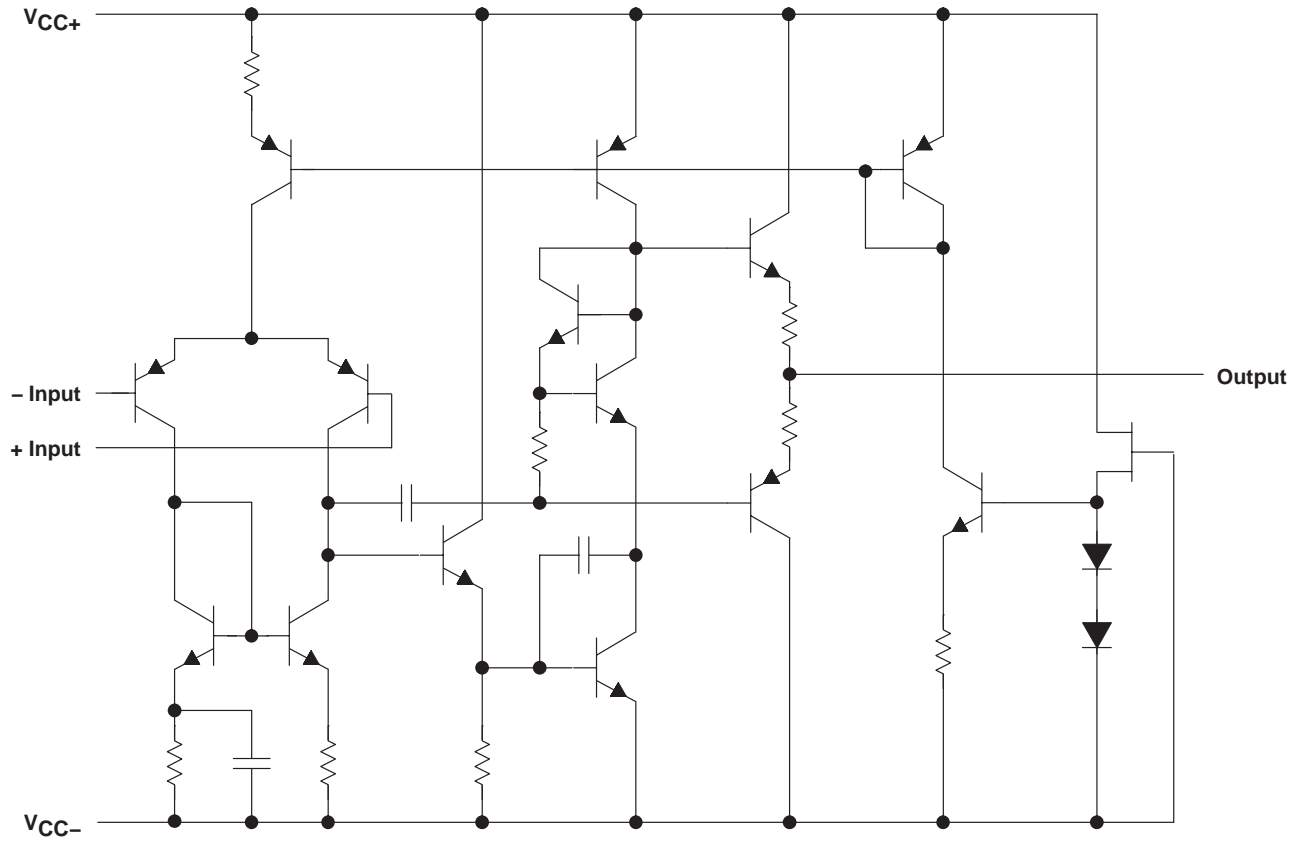
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# RC4580 DUAL AUDIO OPERATIONAL AMPLIFIER

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## equivalent schematic



# RC4580 DUAL AUDIO OPERATIONAL AMPLIFIER

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

Supply voltage, $V_{CC+}$ .....	±18 V
Input voltage (any input) .....	±15 V
Differential input voltage, $V_{ID}$ .....	±30 V
Output current .....	±50 mA
Package thermal impedance, $\theta_{JA}$ (see Notes 1 and 2): D package .....	97°C/W
P package .....	85°C/W
PW package .....	149°C/W
Operating virtual junction temperature, $T_J$ .....	150°C
Storage temperature range, $T_{Stg}$ .....	–60°C to 125°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. Maximum power dissipation is a function of  $T_J(\text{max})$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(\text{max}) - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can affect reliability.  
 2. The package thermal impedance is calculated in accordance with JESD 51-7.

## recommended operating conditions

		MIN	MAX	UNIT
$V_{CC+}$	Supply voltage	2	16	V
$V_{CC-}$		–2	–16	
$V_{ICR}$	Input common-mode voltage range	–13.5	13.5	V
$T_A$	Operating free-air temperature range	–40	85	°C

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{IO}$	Input offset voltage	$R_S \leq 10\text{ k}\Omega$		0.5	3	mV
$I_{IO}$	Input offset current			5	200	nA
$I_{IB}$	Input bias current			100	500	nA
$A_{VD}$	Large-signal differential-voltage amplification	$R_L \geq 2\text{ k}\Omega$ , $V_O = \pm 10\text{ V}$	90	110		dB
$V_{OM}$	Output voltage swing	$R_L \geq 2\text{ k}\Omega$	±12	±13.5		V
$V_{ICR}$	Common-mode input voltage range		±12	±13.5		V
CMRR	Common-mode rejection ratio	$R_S \leq 10\text{ k}\Omega$	80	110		dB
$k_{SVR}^\ddagger$	Supply-voltage rejection ratio	$R_S \leq 10\text{ k}\Omega$	80	110		dB
$I_{CC}$	Supply current (all amplifiers)			6	9	mA

‡ Measured with  $V_{CC\pm}$  varied simultaneously

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
SR	Slew rate at unity gain	$R_L \geq 2\text{ k}\Omega$	5	V/ $\mu\text{s}$
GBW	Gain-bandwidth product	$f = 10\text{ kHz}$	12	MHz
THD	Total harmonic distortion	$V_O = 5\text{ V}$ , $R_L = 2\text{ k}\Omega$ , $f = 1\text{ kHz}$ , $A_{VD} = 20\text{ dB}$	0.0005%	
$V_n$	Equivalent input noise voltage	RIAA, $R_S \leq 2.2\text{ k}\Omega$ , 30-kHz LPF	0.8	$\mu\text{Vrms}$



# RC4580 DUAL AUDIO OPERATIONAL AMPLIFIER

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## TYPICAL CHARACTERISTICS

MAXIMUM OUTPUT VOLTAGE SWING  
vs  
LOAD RESISTANCE

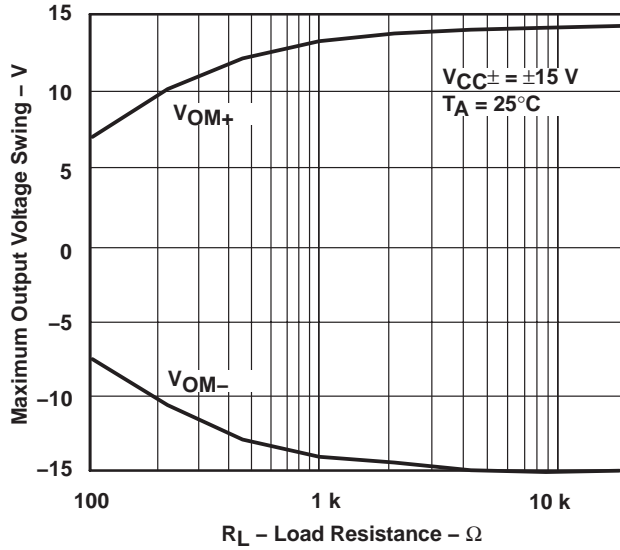


Figure 1

MAXIMUM OUTPUT VOLTAGE SWING  
vs  
FREQUENCY

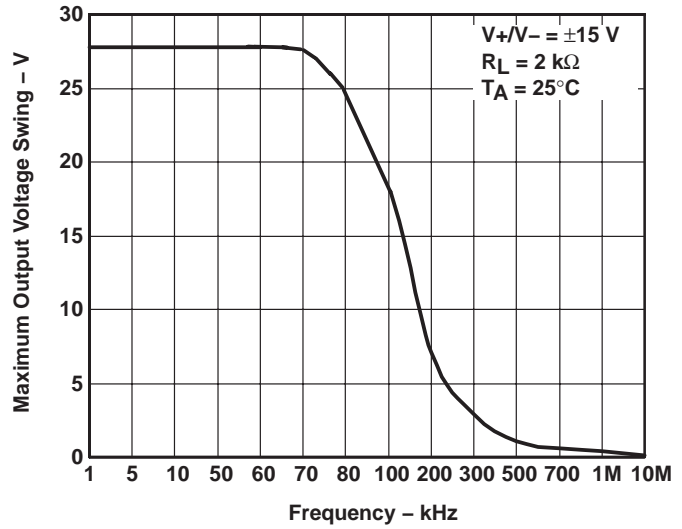


Figure 2

OUTPUT VOLTAGE SWING  
vs  
OUTPUT CURRENT

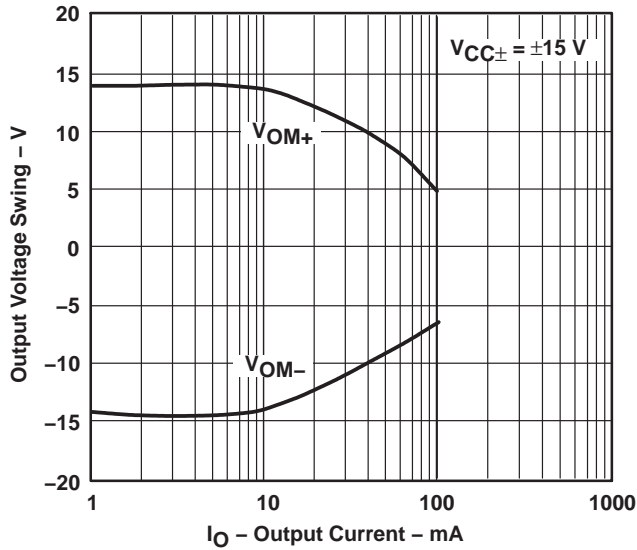


Figure 3

EQUIVALENT INPUT NOISE VOLTAGE  
vs  
FREQUENCY

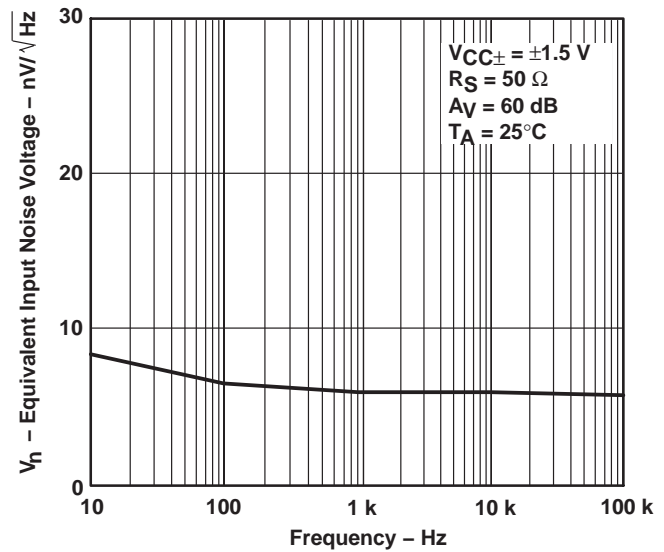


Figure 4

TYPICAL CHARACTERISTICS

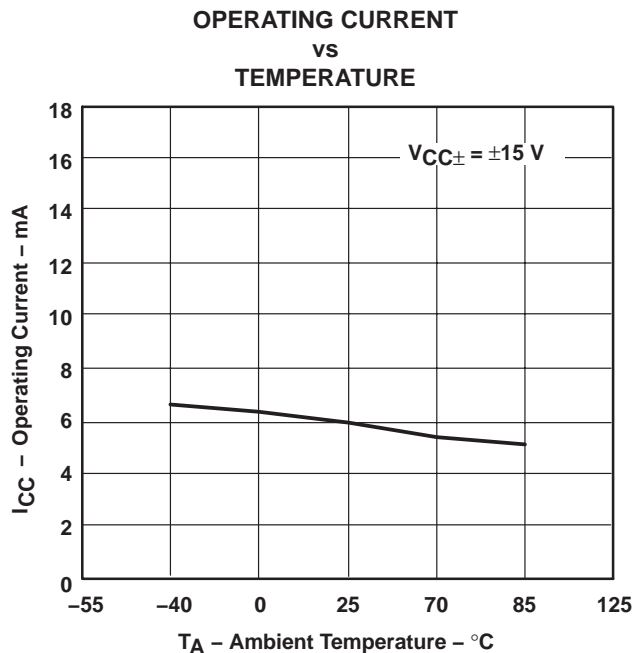


Figure 5

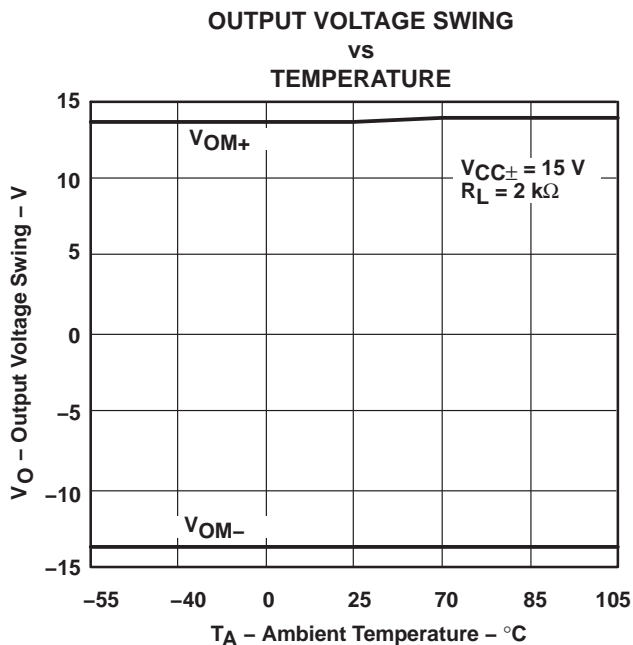


Figure 6

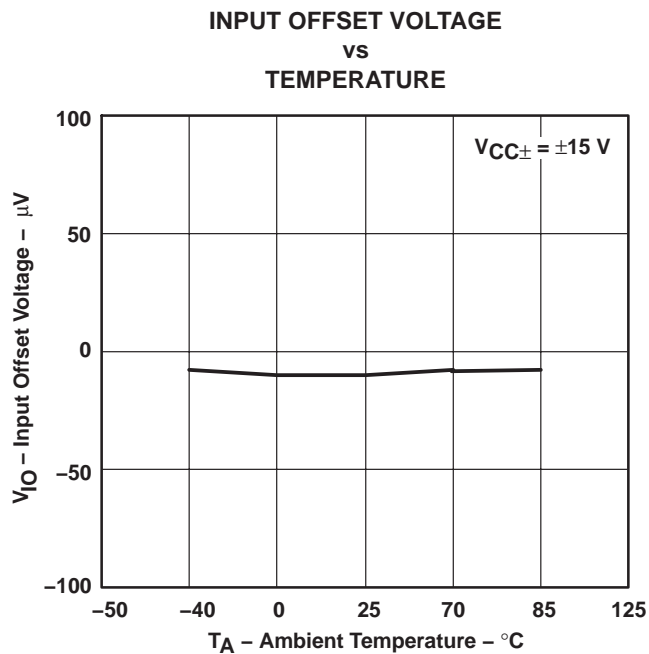


Figure 7

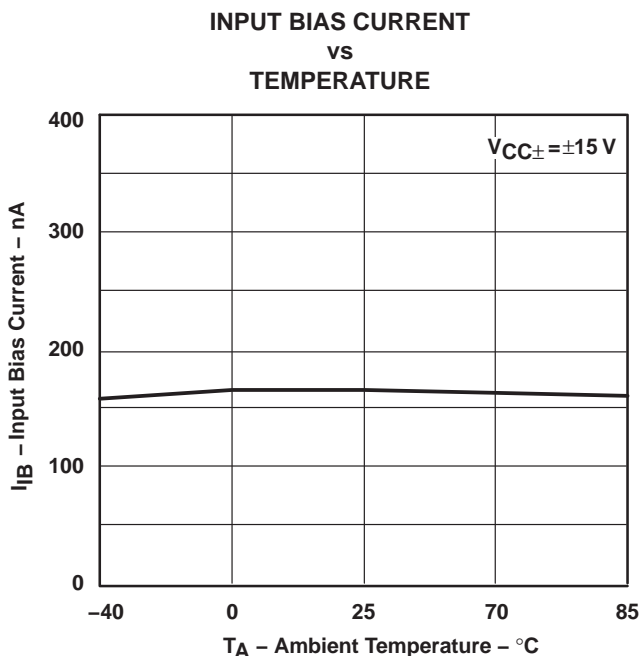


Figure 8

# RC4580 DUAL AUDIO OPERATIONAL AMPLIFIER

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## TYPICAL CHARACTERISTICS

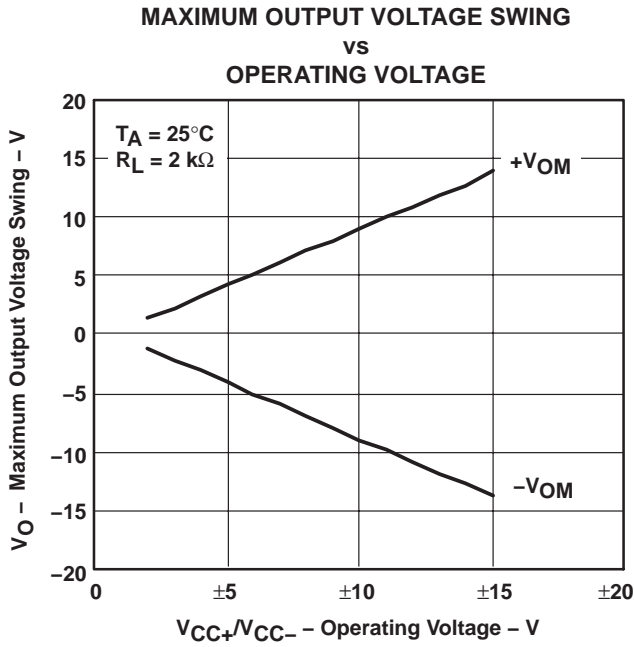


Figure 9

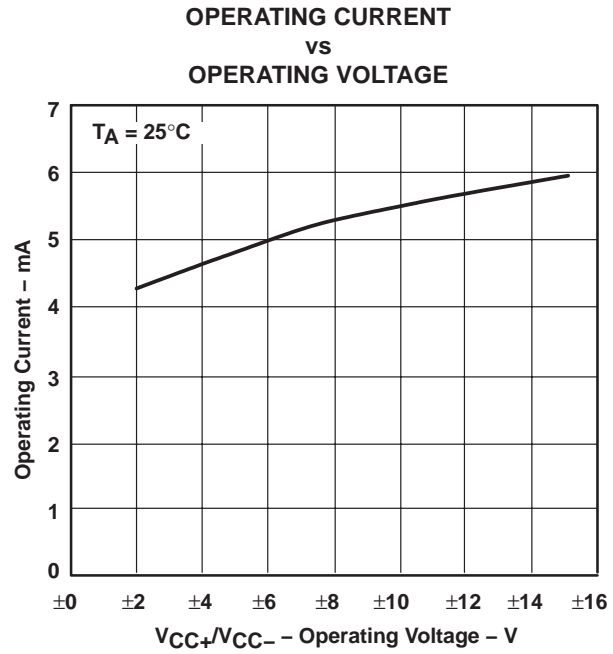


Figure 10

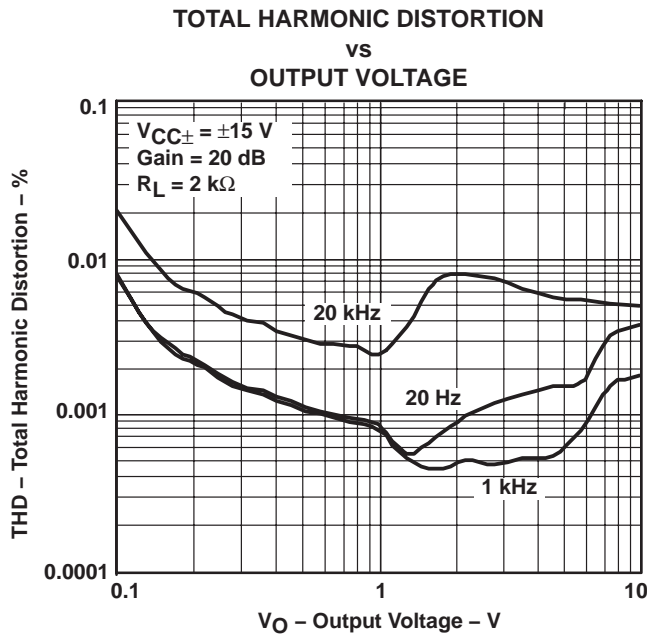


Figure 11

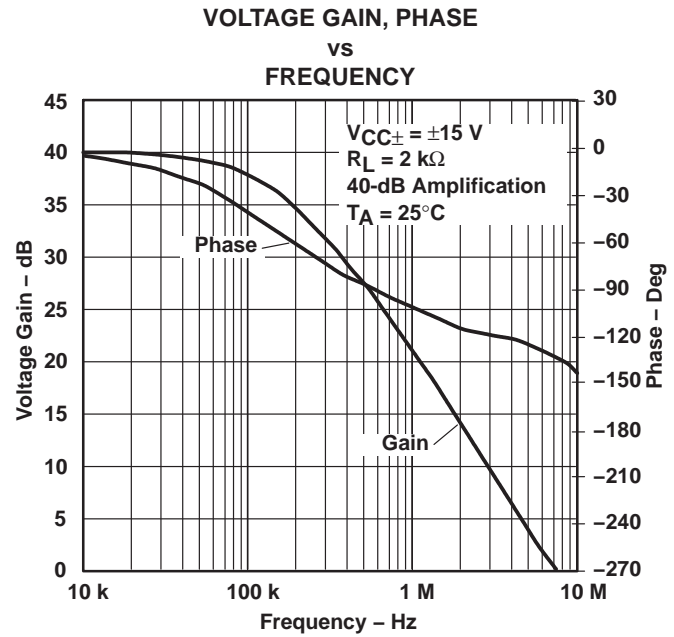


Figure 12

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
RC4580ID	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
RC4580IDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
RC4580IP	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
RC4580IPW	ACTIVE	TSSOP	PW	8	150	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
RC4580IPWR	ACTIVE	TSSOP	PW	8	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**None:** Not yet available Lead (Pb-Free).

**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.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

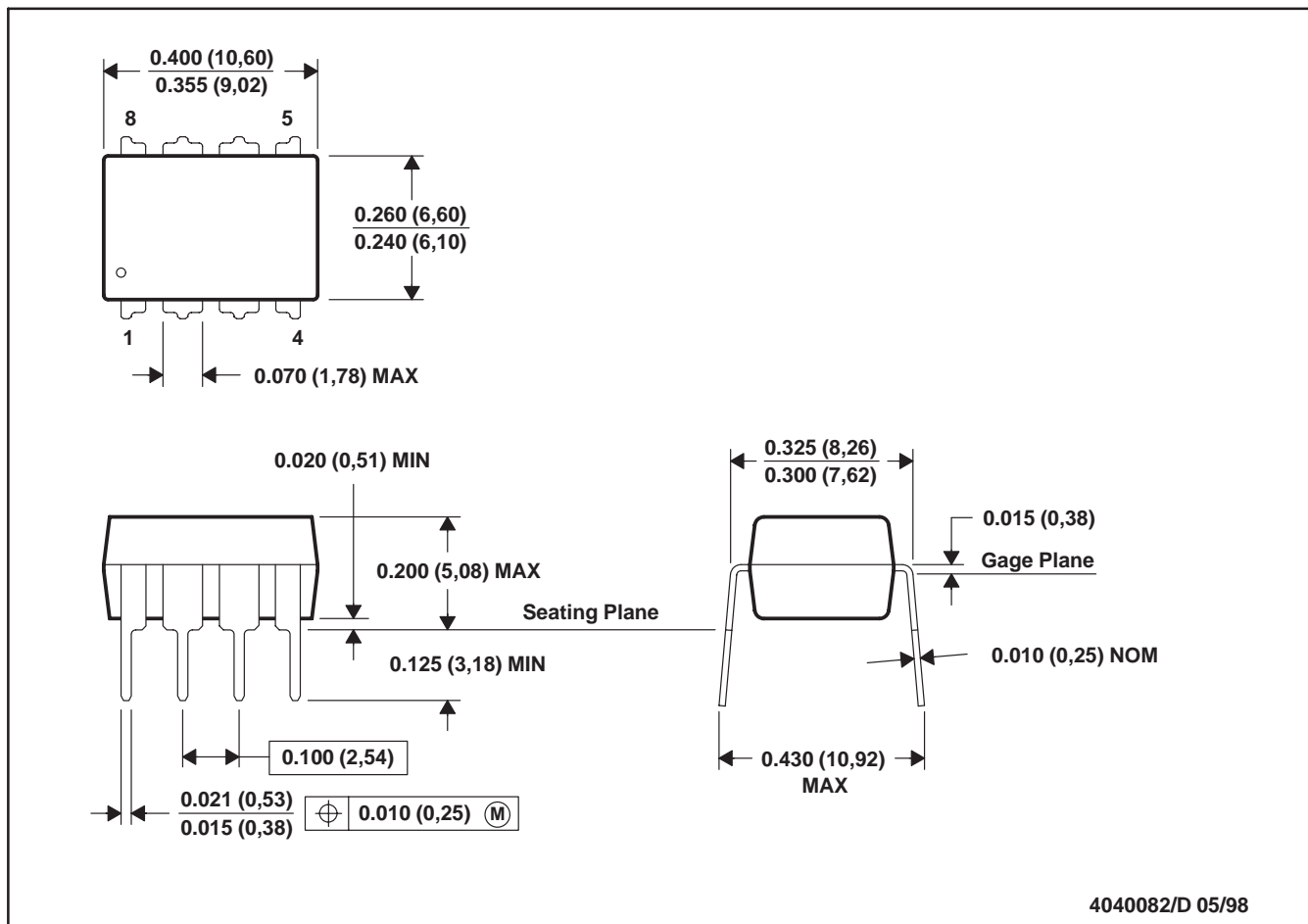
<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE

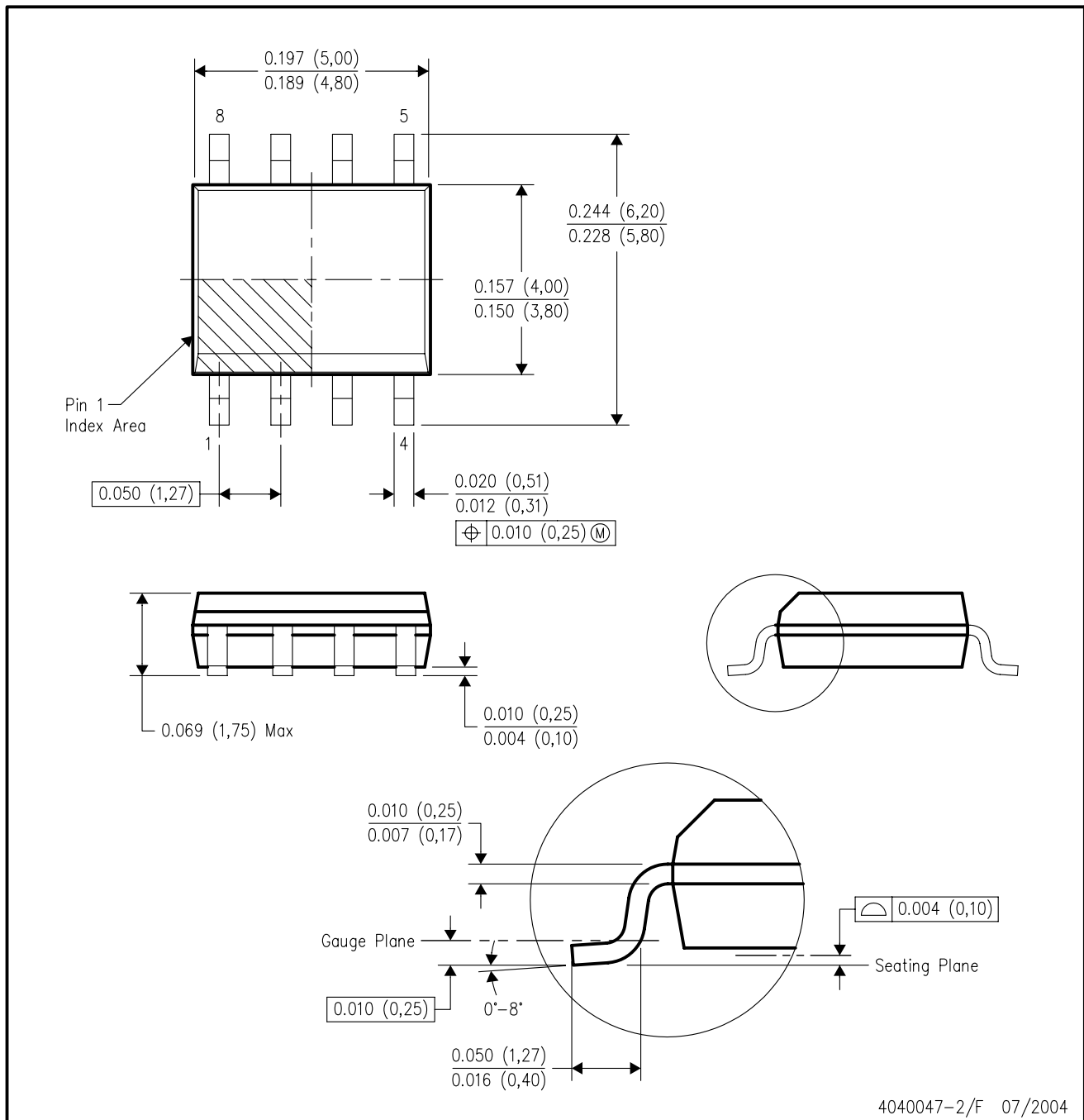


- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. Falls within JEDEC MS-001

For the latest package information, go to [http://www.ti.com/sc/docs/package/pkg\\_info.htm](http://www.ti.com/sc/docs/package/pkg_info.htm)

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 dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-012 variation AA.

PW (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- 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.  
 D. Falls within JEDEC MO-153

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