



OPA604

FET-Input, Low Distortion OPERATIONAL AMPLIFIER

FEATURES

- LOW DISTORTION: 0.0003% at 1kHz
- LOW NOISE: $10\text{nV}/\sqrt{\text{Hz}}$
- HIGH SLEW RATE: $25\text{V}/\mu\text{s}$
- WIDE GAIN-BANDWIDTH: 20MHz
- UNITY-GAIN STABLE
- WIDE SUPPLY RANGE: $V_s = \pm 4.5$ to $\pm 24\text{V}$
- DRIVES 600Ω LOAD
- DUAL VERSION AVAILABLE (OPA2604)

APPLICATIONS

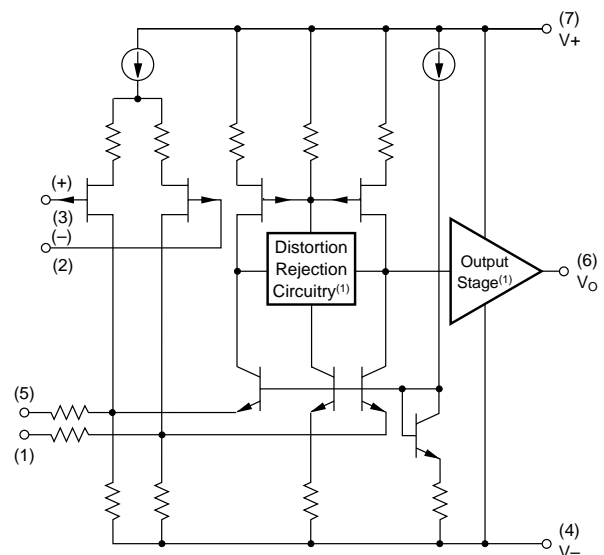
- PROFESSIONAL AUDIO EQUIPMENT
- PCM DAC I/V CONVERTER
- SPECTRAL ANALYSIS EQUIPMENT
- ACTIVE FILTERS
- TRANSDUCER AMPLIFIER
- DATA ACQUISITION

DESCRIPTION

The OPA604 is a FET-input operational amplifier designed for enhanced AC performance. Very low distortion, low noise and wide bandwidth provide superior performance in high quality audio and other applications requiring excellent dynamic performance.

New circuit techniques and special laser trimming of dynamic circuit performance yield very low harmonic distortion. The result is an op amp with exceptional sound quality. The low-noise FET input of the OPA604 provides wide dynamic range, even with high source impedance. Offset voltage is laser-trimmed to minimize the need for interstage coupling capacitors.

The OPA604 is available in 8-pin plastic mini-DIP and SO-8 surface-mount packages, specified for the -25°C to $+85^\circ\text{C}$ temperature range.



NOTE: (1) Patents Granted: #5053718, 5019789

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SPECIFICATIONS

ELECTRICAL

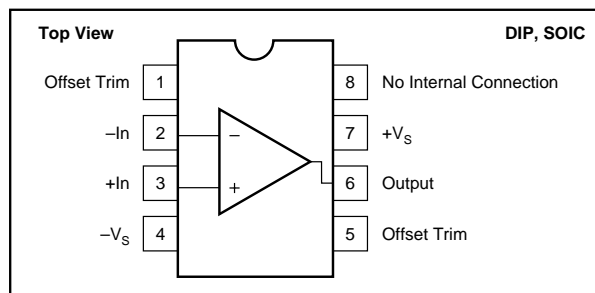
$T_A = +25^{\circ}\text{C}$, $V_S = \pm 15\text{V}$ unless otherwise noted.

PARAMETER	CONDITION	OPA604AP, AU			UNITS
		MIN	TYP	MAX	
OFFSET VOLTAGE Input Offset Voltage Average Drift Power Supply Rejection	$V_S = \pm 5 \text{ to } \pm 24\text{V}$	80	± 1 ± 8 100	± 5	mV $\mu\text{V}/^{\circ}\text{C}$ dB
INPUT BIAS CURRENT⁽¹⁾ Input Bias Current Input Offset Current	$V_{CM} = 0\text{V}$ $V_{CM} = 0\text{V}$		50 ± 3		pA pA
NOISE Input Voltage Noise Noise Density: $f = 10\text{Hz}$ $f = 100\text{Hz}$ $f = 1\text{kHz}$ $f = 10\text{kHz}$ Voltage Noise, BW = 20Hz to 20kHz Input Bias Current Noise Current Noise Density, $f = 0.1\text{Hz}$ to 20kHz			25 15 11 10 1.5 4		$\text{nV}/\sqrt{\text{Hz}}$ $\text{nV}/\sqrt{\text{Hz}}$ $\text{nV}/\sqrt{\text{Hz}}$ $\text{nV}/\sqrt{\text{Hz}}$ $\mu\text{Vp-p}$ $\text{fA}/\sqrt{\text{Hz}}$
INPUT VOLTAGE RANGE Common-Mode Input Range Common-Mode Rejection	$V_{CM} = \pm 12\text{V}$	± 12 80	± 13 100		V dB
INPUT IMPEDANCE Differential Common-Mode			$10^{12} \parallel 8$ $10^{12} \parallel 10$		$\Omega \parallel \text{pF}$ $\Omega \parallel \text{pF}$
OPEN-LOOP GAIN Open-Loop Voltage Gain	$V_O = \pm 10\text{V}$, $R_L = 1\text{k}\Omega$	80	100		dB
FREQUENCY RESPONSE Gain-Bandwidth Product Slew Rate Settling Time: 0.01% 0.1% Total Harmonic Distortion + Noise (THD+N)	$G = 100$ 20Vp-p , $R_L = 1\text{k}\Omega$ $G = -1$, 10V Step $G = 1$, $f = 1\text{kHz}$ $V_O = 3.5\text{Vrms}$, $R_L = 1\text{k}\Omega$	15	20 25 1.5 1 0.0003		MHz V/ μs μs μs %
OUTPUT Voltage Output Current Output Short Circuit Current Output Resistance, Open-Loop	$R_L = 600\Omega$ $V_O = \pm 12\text{V}$	± 11	± 12 ± 35 ± 40 25		V mA mA Ω
POWER SUPPLY Specified Operating Voltage Operating Voltage Range Current		± 4.5	± 15 ± 5.3	± 24 ± 6	V V mA
TEMPERATURE RANGE Specification Storage Thermal Resistance ⁽²⁾ , θ_{JA}		-25 -40		+85 +125	$^{\circ}\text{C}$ $^{\circ}\text{C}$ $^{\circ}\text{C/W}$

NOTES: (1) Typical performance, measured fully warmed-up. (2) Soldered to circuit board—see text.

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PIN CONFIGURATION



ELECTROSTATIC DISCHARGE SENSITIVITY

Any integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet published specifications.

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage	±25V
Input Voltage	(V-) -1V to (V+) +1V
Output Short Circuit to Ground	Continuous
Operating Temperature	-40°C to +100°C
Storage Temperature	-40°C to +125°C
Junction Temperature	+150°C
Lead Temperature (soldering, 10s) AP	+300°C
Lead Temperature (soldering, 3s) AU	+260°C

ORDERING INFORMATION

MODEL	PACKAGE	TEMP. RANGE
OPA604AP	8-Pin Plastic DIP	-25°C to +85°C
OPA604AU	SO-8 Surface-Mount	-25°C to +85°C

PACKAGE INFORMATION

MODEL	PACKAGE	PACKAGE DRAWING NUMBER ⁽¹⁾
OPA604AP	8-Pin Plastic DIP	006
OPA604AU	SO-8 Surface-Mount	182

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix D of Burr-Brown IC Data Book.