

OPA244
OPA2244
OPA4244

MicroPower, Single-Supply OPERATIONAL AMPLIFIERS MicroAmplifier™ Series

FEATURES

- **MicroSIZE PACKAGES**
 OPA244 (Single): SOT-23-5
 OPA2244 (Dual): MSOP-8
 OPA4244 (Quad): TSSOP-14
- **MicroPOWER:** $I_Q = 50\mu\text{A}/\text{channel}$
- **SINGLE SUPPLY OPERATION**
- **WIDE BANDWIDTH:** 430kHz
- **WIDE SUPPLY RANGE:**
 Single Supply: 2.2V to 36V
 Dual Supply: $\pm 1.1\text{V}$ to $\pm 18\text{V}$

APPLICATIONS

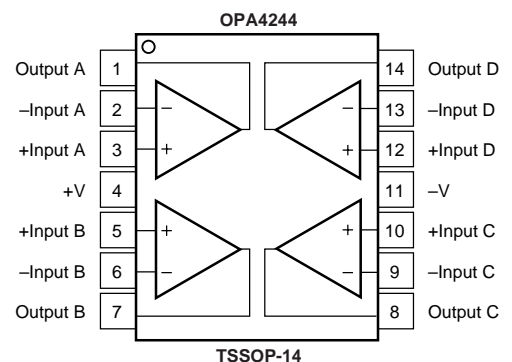
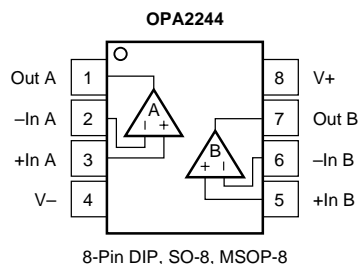
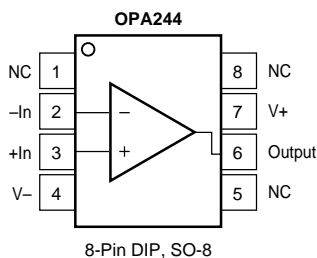
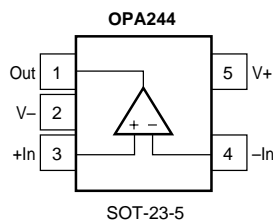
- **BATTERY POWERED SYSTEMS**
- **PORTABLE EQUIPMENT**
- **PCMCIA CARDS**
- **BATTERY PACKS AND POWER SUPPLIES**
- **CONSUMER PRODUCTS**

DESCRIPTION

The OPA244 (single), OPA2244 (dual), and OPA4244 (quad) op amps are designed for very low quiescent current ($50\mu\text{A}/\text{channel}$), yet achieve excellent bandwidth. Ideal for battery powered and portable instrumentation, all versions are offered in micro packages for space-limited applications. The dual and quad versions feature completely independent circuitry for lowest crosstalk and freedom from interaction, even when overdriven or overloaded.

The OPA244 series is easy to use and free from phase inversion and overload problems found in some other op amps. These amplifiers are stable in unity gain and excellent performance is maintained as they swing to their specified limits. They can be operated from single (+2.2V to +36V) or dual supplies ($\pm 1.1\text{V}$ to $\pm 18\text{V}$). The input common-mode voltage range includes ground—ideal for many single supply applications. All versions have similar performance. However, there are some differences, such as common-mode rejection. All versions are interchangeable in most applications.

All versions are offered in miniature, surface-mount packages. OPA244 (single version) comes in the tiny 5-lead SOT-23-5 surface mount, SO-8 surface mount, and 8-pin DIP. OPA2244 (dual version) is available in the MSOP-8 surface mount, SO-8 surface-mount, and 8-pin DIP. The OPA4244 (quad) comes in the TSSOP-14 surface mount. They are fully specified from -40°C to $+85^\circ\text{C}$ and operate from -55°C to $+125^\circ\text{C}$. A SPICE Macromodel is available for design analysis.



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 Twx: 910-952-1111 • Internet: <http://www.burr-brown.com/> • Cable: BBRCORP • Telex: 066-6491 • FAX: (520) 889-1510 • Immediate Product Info: (800) 548-6132

SPECIFICATIONS: $V_S = +2.6V$ to $+36V$

Boldface limits apply over the specified temperature range, $T_A = -40^{\circ}C$ to $+85^{\circ}C$

At $T_A = +25^{\circ}C$, $R_L = 20k\Omega$ connected to ground, unless otherwise noted.

| PARAMETER | CONDITION | OPA244NA, PA, UA | | | UNITS |
|---|--|---|---|---|--|
| | | MIN | TYP ⁽¹⁾ | MAX | |
| OFFSET VOLTAGE Input Offset Voltage $T_A = -40^{\circ}C$ to $85^{\circ}C$ vs Temperature vs Power Supply $T_A = -40^{\circ}C$ to $85^{\circ}C$ | V_{OS} $V_S = \pm 7.5V, V_{CM} = 0$ dV_{OS}/dT $PSRR$ $T_A = -40^{\circ}C$ to $85^{\circ}C$ $V_S = +2.6V$ to $+36V$ $V_S = +2.6V$ to $+36V$ | | ± 0.7 ± 4 5 | ± 1.5 ± 2 50 50 | mV mV $\mu V/^{\circ}C$ $\mu V/V$ $\mu V/V$ |
| INPUT BIAS CURRENT Input Bias Current Input Offset Current | I_B I_{OS} $V_{CM} = V_S/2$ $V_{CM} = V_S/2$ | | -10 ± 1 | -25 ± 10 | nA nA |
| NOISE Input Voltage Noise, $f = 0.1kHz$ to $10kHz$ Input Voltage Noise Density, $f = 1kHz$ Current Noise Density, $f = 1kHz$ | e_n i_n | | 0.4 22 40 | | $\mu Vp-p$ nV/\sqrt{Hz} fA/\sqrt{Hz} |
| INPUT VOLTAGE RANGE Common-Mode Voltage Range Common-Mode Rejection $T_A = -40^{\circ}C$ to $85^{\circ}C$ | V_{CM} CMRR $V_S = \pm 18V, V_{CM} = -18V$ to $+17.1V$ $V_S = \pm 18V, V_{CM} = -18V$ to $+17.1V$ | 0 84 84 | 98 | $(V+) - 0.9$ | V dB dB |
| INPUT IMPEDANCE Differential Common-Mode | | | $10^6 \parallel 2$ $10^9 \parallel 2$ | | $\Omega \parallel pF$ $\Omega \parallel pF$ |
| OPEN-LOOP GAIN Open-Loop Voltage Gain $T_A = -40^{\circ}C$ to $85^{\circ}C$ | A_{OL} $V_O = 0.5V$ to $(V+) - 0.9$ $V_O = 0.5V$ to $(V+) - 0.9$ | 86 86 | 106 | | dB dB |
| FREQUENCY RESPONSE Gain-Bandwidth Product Slew Rate Settling Time 0.01% Overload Recovery Time | GBW SR $G = 1$ 10V Step $V_{IN} \cdot \text{Gain} = V_S$ | | 430 -0.1/+0.16 150 8 | | kHz V/ μs μs μs |
| OUTPUT Voltage Output, Positive $T_A = -40^{\circ}C$ to $85^{\circ}C$ Voltage Output, Negative $T_A = -40^{\circ}C$ to $85^{\circ}C$ Voltage Output, Positive $T_A = -40^{\circ}C$ to $85^{\circ}C$ Voltage Output, Negative $T_A = -40^{\circ}C$ to $85^{\circ}C$ Short-Circuit Current Capacitive Load Drive | V_O $A_{OL} \geq 80dB, R_L = 20k\Omega$ to $V_S/2$ $A_{OL} \geq 80dB, R_L = 20k\Omega$ to $V_S/2$ $A_{OL} \geq 80dB, R_L = 20k\Omega$ to $V_S/2$ $A_{OL} \geq 80dB, R_L = 20k\Omega$ to $V_S/2$ $A_{OL} \geq 80dB, R_L = 20k\Omega$ to Ground $A_{OL} \geq 80dB, R_L = 20k\Omega$ to Ground $A_{OL} \geq 80dB, R_L = 20k\Omega$ to Ground $A_{OL} \geq 80dB, R_L = 20k\Omega$ to Ground $A_{OL} \geq 80dB, R_L = 20k\Omega$ to Ground I_{SC} C_{LOAD} | $(V+) - 0.9$ $(V+) - 0.9$ 0.5 0.5 0.1 0.1 -25/+12 | $(V+) - 0.75$ $(V+) - 0.75$ 0.2 0.2 $(V+) - 0.75$ $(V+) - 0.75$ 0.1 0.1 -25/+12 | | V V V V V V V V mA |
| POWER SUPPLY Specified Voltage Range Minimum Operating Voltage Quiescent Current $T_A = -40^{\circ}C$ to $85^{\circ}C$ | V_S $T_A = -40^{\circ}C$ to $85^{\circ}C$ I_Q $I_O = 0$ $I_O = 0$ | +2.6 | +2.2 50 | +36 60 70 | V V μA μA |
| TEMPERATURE RANGE Specified Range Operating Range Storage Range Thermal Resistance SOT-23-5 Surface-Mount SO-8 Surface-Mount 8-Pin DIP | θ_{JA} | -40 -55 -65 | | 85 125 150 | $^{\circ}C$ $^{\circ}C$ $^{\circ}C$ $^{\circ}C/W$ $^{\circ}C/W$ $^{\circ}C/W$ |

NOTE: (1) $V_S = +15V$.

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SPECIFICATIONS: $V_S = +2.6V$ to $+36V$

Boldface limits apply over the specified temperature range, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

At $T_A = +25^\circ\text{C}$, $R_L = 20\text{k}\Omega$ connected to ground, unless otherwise noted.

| PARAMETER | CONDITION | OPA2244EA, PA, UA | | | UNITS |
|---|--|---|--|---|--|
| | | MIN | TYP ⁽¹⁾ | MAX | |
| OFFSET VOLTAGE Input Offset Voltage $T_A = -40^\circ\text{C}$ to 85°C vs Temperature vs Power Supply $T_A = -40^\circ\text{C}$ to 85°C Channel Separation | V_{OS} $V_S = \pm 7.5V, V_{CM} = 0$ dV_{OS}/dT $PSRR$ $T_A = -40^\circ\text{C}$ to 85°C $V_S = +2.6V$ to $+36V$ $V_S = +2.6V$ to $+36V$ | | ± 0.7 ± 4 5 140 | ± 1.5 ± 2 50 50 | mV mV $\mu\text{V}/^\circ\text{C}$ $\mu\text{V}/V$ $\mu\text{V}/V$ dB |
| INPUT BIAS CURRENT Input Bias Current Input Offset Current | I_B I_{OS} $V_{CM} = V_S/2$ $V_{CM} = V_S/2$ | | -10 ± 1 | -25 ± 10 | nA nA |
| NOISE Input Voltage Noise, $f = 0.1\text{kHz}$ to 10kHz Input Voltage Noise Density, $f = 1\text{kHz}$ Current Noise Density, $f = 1\text{kHz}$ | e_n i_n | | 0.4 22 40 | | $\mu\text{Vp-p}$ $\text{nV}/\sqrt{\text{Hz}}$ $\text{fA}/\sqrt{\text{Hz}}$ |
| INPUT VOLTAGE RANGE Common-Mode Voltage Range Common-Mode Rejection $T_A = -40^\circ\text{C}$ to 85°C | V_{CM} CMRR $V_S = \pm 18V, V_{CM} = -18V$ to $+17.1V$ $V_S = \pm 18V, V_{CM} = -18V$ to $+17.1V$ | 0 72 72 | 98 | $(V+) - 0.9$ | V dB dB |
| INPUT IMPEDANCE Differential Common-Mode | | | $10^6 \parallel 2$ $10^9 \parallel 2$ | | $\Omega \parallel \text{pF}$ $\Omega \parallel \text{pF}$ |
| OPEN-LOOP GAIN Open-Loop Voltage Gain $T_A = -40^\circ\text{C}$ to 85°C | A_{OL} $V_O = 0.5V$ to $(V+) - 0.9$ $V_O = 0.5V$ to $(V+) - 0.9$ | 86 86 | 106 | | dB dB |
| FREQUENCY RESPONSE Gain-Bandwidth Product Slew Rate Settling Time 0.01% Overload Recovery Time | GBW SR G = 1 10V Step $V_{IN} \cdot \text{Gain} = V_S$ | | 430 $-0.1/+0.16$ 150 8 | | kHz V/ μs μs μs |
| OUTPUT Voltage Output, Positive $T_A = -40^\circ\text{C}$ to 85°C Voltage Output, Negative $T_A = -40^\circ\text{C}$ to 85°C Voltage Output, Positive $T_A = -40^\circ\text{C}$ to 85°C Voltage Output, Negative $T_A = -40^\circ\text{C}$ to 85°C Short-Circuit Current Capacitive Load Drive | V_O I_{SC} C_{LOAD} $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to $V_S/2$ $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to $V_S/2$ $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to $V_S/2$ $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground See Typical Curve | $(V+) - 0.9$ $(V+) - 0.9$ 0.5 0.5 0.1 0.1 $-25/+12$ | $(V+) - 0.75$ $(V+) - 0.75$ 0.2 0.2 $(V+) - 0.75$ $(V+) - 0.75$ 0.1 0.1 | | V V V V V V V V mA |
| POWER SUPPLY Specified Voltage Range Minimum Operating Voltage Quiescent Current (per amplifier) $T_A = -40^\circ\text{C}$ to 85°C | V_S I_Q $T_A = -40^\circ\text{C}$ to 85°C $I_O = 0$ $I_O = 0$ | +2.6 | +2.2 40 | +36 50 63 | V V μA μA |
| TEMPERATURE RANGE Specified Range Operating Range Storage Range Thermal Resistance MSOP-8 Surface-Mount SO-8 Surface-Mount 8-Pin DIP | θ_{JA} | -40 -55 -65 | | 85 125 150 | $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}/W$ $^\circ\text{C}/W$ $^\circ\text{C}/W$ |

NOTE: (1) $V_S = +15V$.

SPECIFICATIONS: $V_S = +2.6V$ to $+36V$

Boldface limits apply over the specified temperature range, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

At $T_A = +25^\circ\text{C}$, $R_L = 20\text{k}\Omega$ connected to ground, unless otherwise noted.

| PARAMETER | CONDITION | OPA4244EA | | | UNITS |
|---|--|---|--|---|--|
| | | MIN | TYP ⁽¹⁾ | MAX | |
| OFFSET VOLTAGE Input Offset Voltage $T_A = -40^\circ\text{C}$ to 85°C vs Temperature vs Power Supply $T_A = -40^\circ\text{C}$ to 85°C Channel Separation | V_{OS} $V_S = \pm 7.5V, V_{CM} = 0$ dV_{OS}/dT $PSRR$ $T_A = -40^\circ\text{C}$ to 85°C $V_S = +2.6V$ to $+36V$ $V_S = +2.6V$ to $+36V$ | | ± 0.7 ± 4 5 140 | ± 1.5 ± 2 50 50 | mV mV $\mu\text{V}/^\circ\text{C}$ $\mu\text{V}/V$ $\mu\text{V}/V$ dB |
| INPUT BIAS CURRENT Input Bias Current Input Offset Current | I_B I_{OS} $V_{CM} = V_S/2$ $V_{CM} = V_S/2$ | | -10 ± 1 | -25 ± 10 | nA nA |
| NOISE Input Voltage Noise, $f = 0.1\text{kHz}$ to 10kHz Input Voltage Noise Density, $f = 1\text{kHz}$ Current Noise Density, $f = 1\text{kHz}$ | e_n i_n | | 0.4 22 40 | | $\mu\text{Vp-p}$ $\text{nV}/\sqrt{\text{Hz}}$ $\text{fA}/\sqrt{\text{Hz}}$ |
| INPUT VOLTAGE RANGE Common-Mode Voltage Range Common-Mode Rejection $T_A = -40^\circ\text{C}$ to 85°C | V_{CM} CMRR $V_S = \pm 18V, V_{CM} = -18V$ to $+17.1V$ $V_S = \pm 18V, V_{CM} = -18V$ to $+17.1V$ | 0 82 82 | | $(V+) - 0.9$ 104 | V dB dB |
| INPUT IMPEDANCE Differential Common-Mode | | | $10^6 \parallel 2$ $10^9 \parallel 2$ | | $\Omega \parallel \text{pF}$ $\Omega \parallel \text{pF}$ |
| OPEN-LOOP GAIN Open-Loop Voltage Gain $T_A = -40^\circ\text{C}$ to 85°C | A_{OL} $V_O = 0.5V$ to $(V+) - 0.9$ $V_O = 0.5V$ to $(V+) - 0.9$ | 86 86 | 106 | | dB dB |
| FREQUENCY RESPONSE Gain-Bandwidth Product Slew Rate Settling Time 0.01% Overload Recovery Time | GBW SR $G = 1$ 10V Step $V_{IN} \cdot \text{Gain} = V_S$ | | 430 $-0.1/+0.16$ 150 8 | | kHz $\text{V}/\mu\text{s}$ μs μs |
| OUTPUT Voltage Output, Positive $T_A = -40^\circ\text{C}$ to 85°C Voltage Output, Negative $T_A = -40^\circ\text{C}$ to 85°C Voltage Output, Positive $T_A = -40^\circ\text{C}$ to 85°C Voltage Output, Negative $T_A = -40^\circ\text{C}$ to 85°C Short-Circuit Current Capacitive Load Drive | V_O I_{SC} C_{LOAD} $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to $V_S/2$ $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to $V_S/2$ $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to $V_S/2$ $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground $A_{OL} \geq 80\text{dB}, R_L = 20\text{k}\Omega$ to Ground See Typical Curve | $(V+) - 0.9$ $(V+) - 0.9$ 0.5 0.5 0.1 0.1 $-25/+12$ | $(V+) - 0.75$ $(V+) - 0.75$ 0.2 0.2 $(V+) - 0.75$ $(V+) - 0.75$ 0.1 0.1 | | V V V V V V V V mA |
| POWER SUPPLY Specified Voltage Range Minimum Operating Voltage Quiescent Current (per amplifier) $T_A = -40^\circ\text{C}$ to 85°C | V_S I_Q $T_A = -40^\circ\text{C}$ to 85°C $I_O = 0$ $I_O = 0$ | +2.6 | +2.2 40 | +36 60 70 | V V μA μA |
| TEMPERATURE RANGE Specified Range Operating Range Storage Range Thermal Resistance TSSOP-14 Surface Mount | θ_{JA} | -40 -55 -65 | | 85 125 150 | $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}$ $^\circ\text{C}/W$ |

NOTE: (1) $V_S = +15V$.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

| | |
|---|----------------------------|
| Supply Voltage, V+ to V- | 36V |
| Input Voltage Range ⁽²⁾ | (V-) – 0.3V to (V+) + 0.3V |
| Input Current ⁽²⁾ | 10mA |
| Output Short-Circuit ⁽³⁾ | Continuous |
| Operating Temperature | –55°C to +125°C |
| Storage Temperature | –65°C to +150°C |
| Junction Temperature | 150°C |
| Lead Temperature (soldering, 10s) | 300°C |
| ESD Capability | 2000V |

NOTES: (1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. (2) Inputs are diode-clamped to the supply rails and should be current-limited to 10mA or less if input voltages can exceed rails by more than 0.3V. (3) Short-circuit to ground, one amplifier per package.



ELECTROSTATIC DISCHARGE SENSITIVITY

This 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 its published specifications.

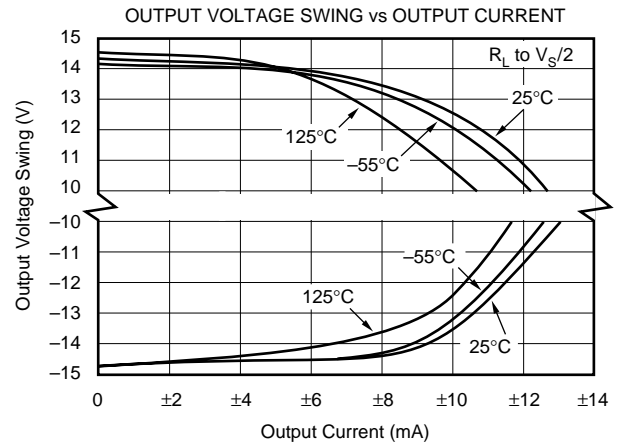
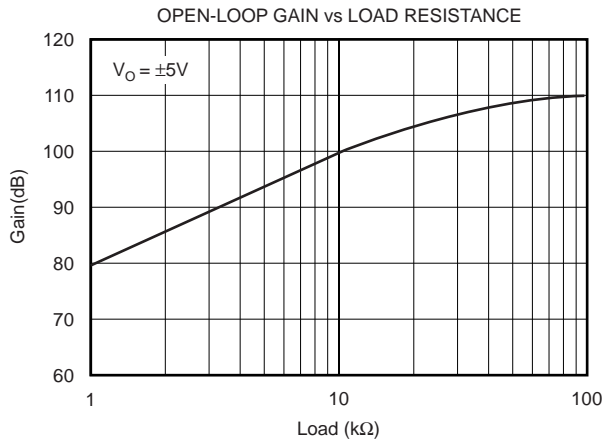
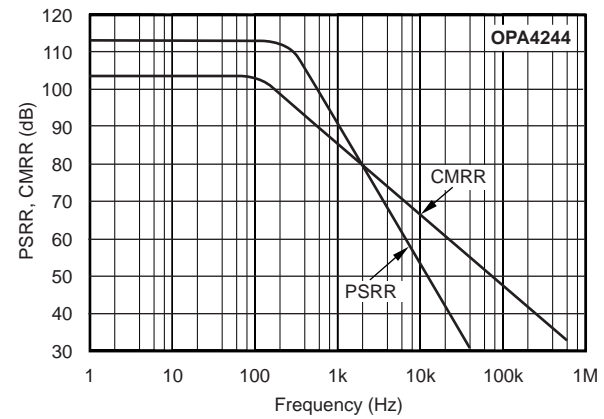
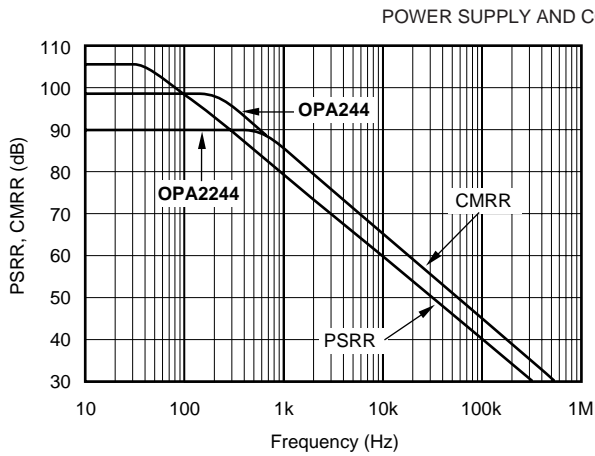
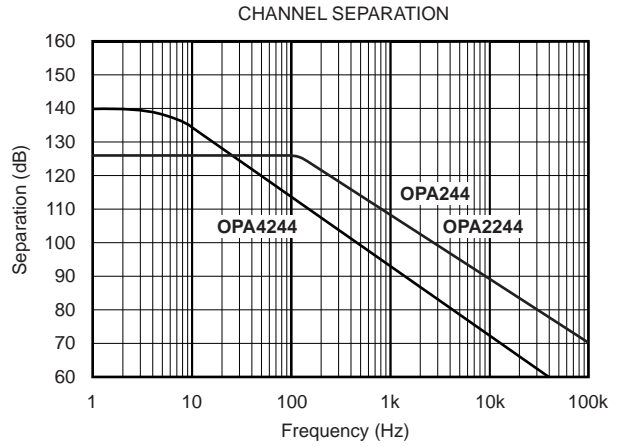
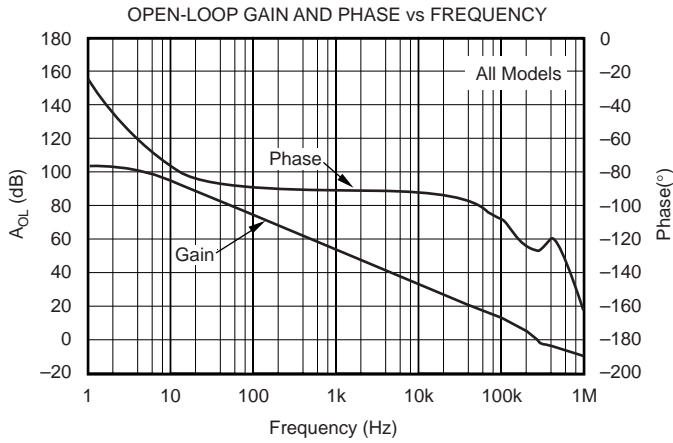
PACKAGE/ORDERING INFORMATION

| PRODUCT | PACKAGE | PACKAGE DRAWING NUMBER | SPECIFIED TEMPERATURE RANGE | PACKAGE MARKING | ORDERING NUMBER ⁽¹⁾ | TRANSPORT MEDIA |
|---------------|------------------------|------------------------|-----------------------------|-----------------|--------------------------------|-----------------|
| Single | | | | | | |
| OPA244NA | SOT-23-5 Surface-Mount | 331 | –40°C to +85°C | A44 | OPA244NA/250 | Tape and Reel |
| " | " | " | " | " | OPA244NA/3K | Tape and Reel |
| OPA244PA | 8-Pin DIP | 006 | –40°C to +85°C | OPA244PA | OPA244PA | Rails |
| OPA244UA | SO-8 Surface-Mount | 182 | –40°C to +85°C | OPA244UA | OPA244UA | Rails |
| " | " | " | " | " | OPA244UA/2K5 | Tape and Reel |
| Dual | | | | | | |
| OPA2244EA | MSOP-8 Surface-Mount | 337 | –40°C to +85°C | A44 | OPA2244EA/250 | Tape and Reel |
| " | " | " | " | " | OPA2244EA/2K5 | Tape and Reel |
| OPA2244PA | 8-Pin DIP | 006 | –40°C to +85°C | OPA2244PA | OPA2244PA | Rails |
| OPA2244UA | SO-8 Surface-Mount | 182 | –40°C to +85°C | OPA2244UA | OPA2244UA | Rails |
| " | " | " | " | " | OPA2244UA/2K5 | Tape and Reel |
| Quad | | | | | | |
| OPA4244EA | TSSOP-14 Surface-Mount | 357 | –40°C to +85°C | OPA4244EA | OPA4244EA/250 | Tape and Reel |
| " | " | " | " | " | OPA4244EA/2K5 | Tape and Reel |

NOTE: (1) Products followed by a slash (/) are only available in Tape and Reel in the quantities indicated (e.g., /250 indicates 250 devices per reel). Ordering 3000 pieces of "OPA244NA/3K" will get a single 3000 piece Tape and Reel.

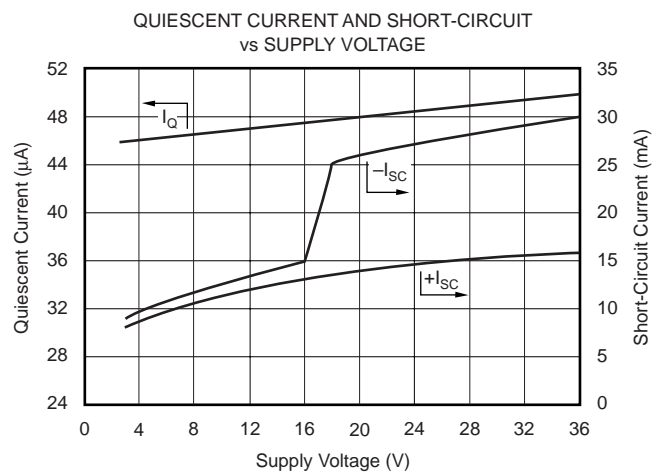
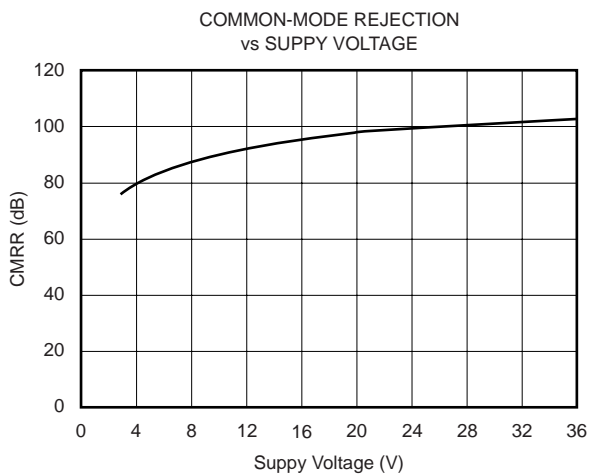
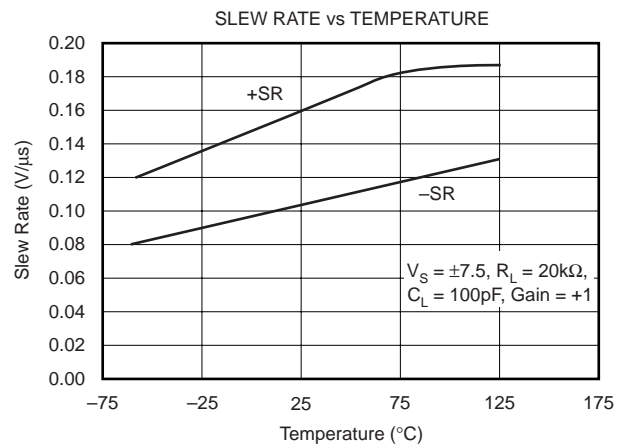
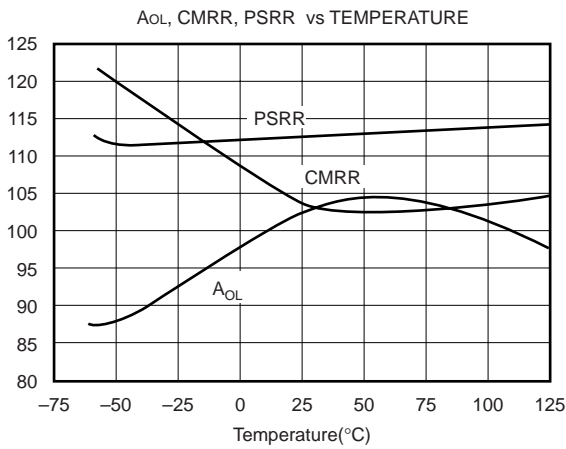
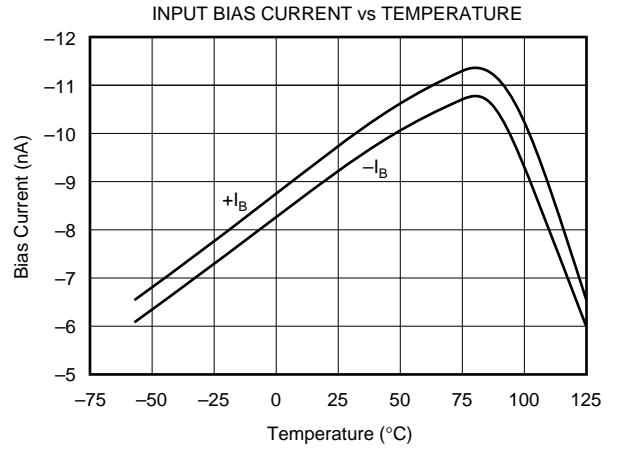
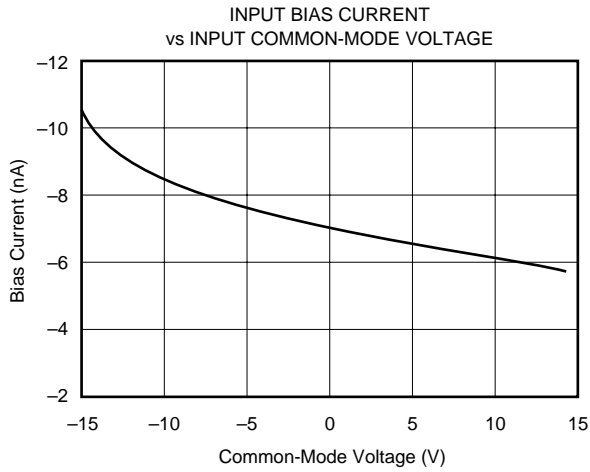
TYPICAL PERFORMANCE CURVES

At $T_A = 25^\circ\text{C}$, $V_S = +15\text{V}$, and $R_L = 20\text{k}\Omega$ connected to Ground, unless otherwise noted.



TYPICAL PERFORMANCE CURVES (Cont.)

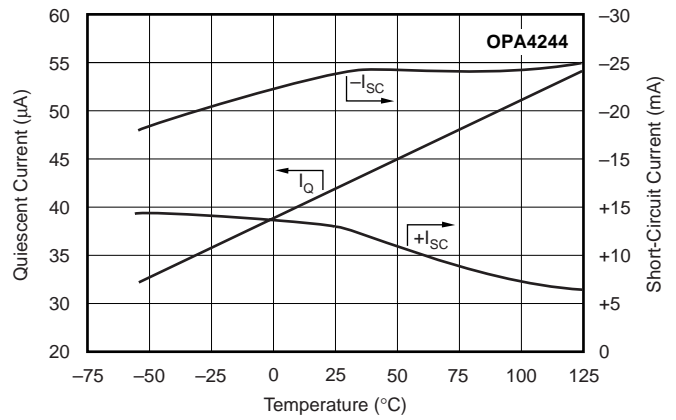
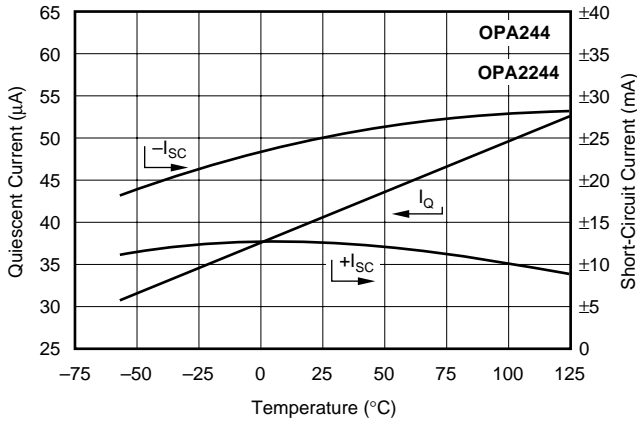
At $T_A = 25^\circ\text{C}$, $V_S = +15\text{V}$, and $R_L = 20\text{k}\Omega$ connected to Ground, unless otherwise noted.



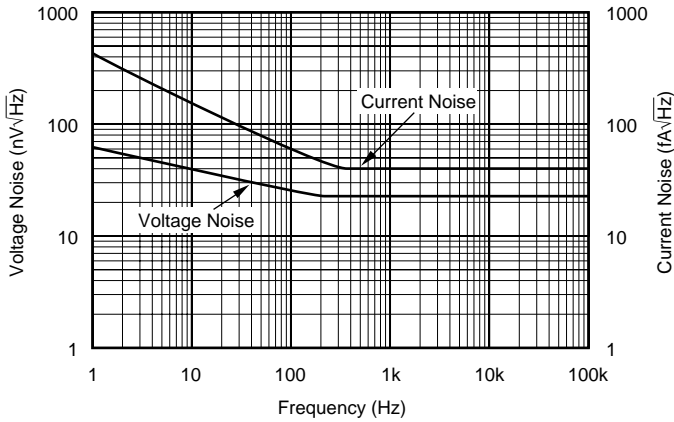
TYPICAL PERFORMANCE CURVES (Cont.)

At $T_A = 25^\circ\text{C}$, $V_S = +15\text{V}$, and $R_L = 20\text{k}\Omega$ connected to Ground, unless otherwise noted.

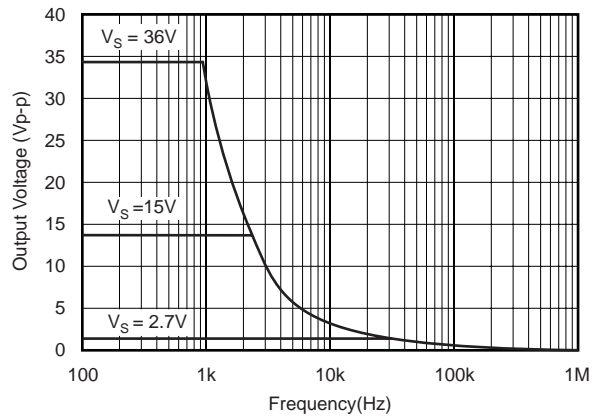
QUIESCENT AND SHORT-CIRCUIT CURRENT vs TEMPERATURE



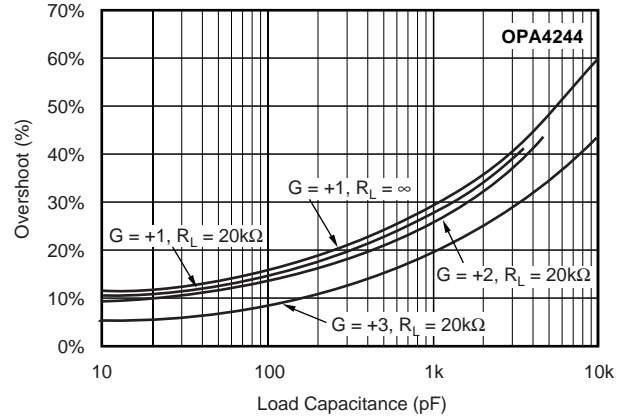
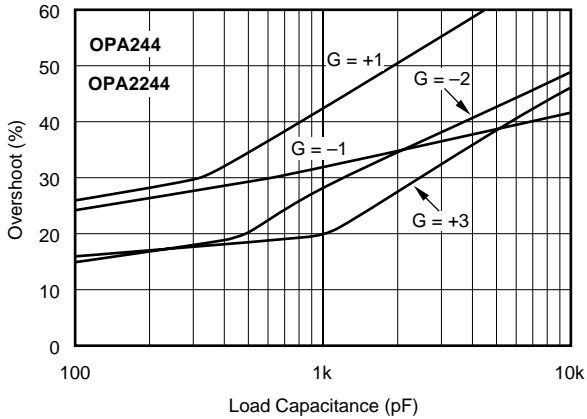
INPUT VOLTAGE AND CURRENT NOISE SPECTRAL DENSITY vs FREQUENCY



MAXIMUM OUTPUT VOLTAGE vs FREQUENCY



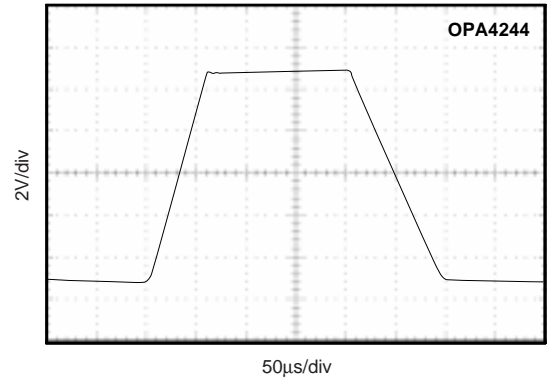
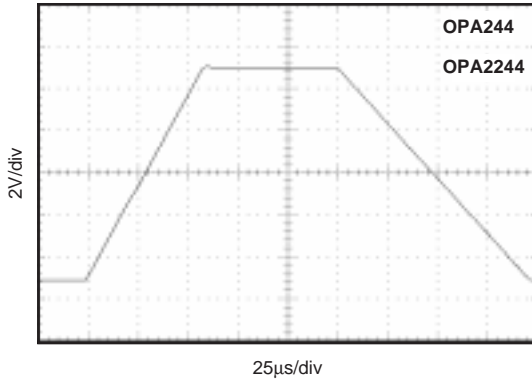
SMALL SIGNAL OVERSHOOT vs LOAD CAPACITANCE



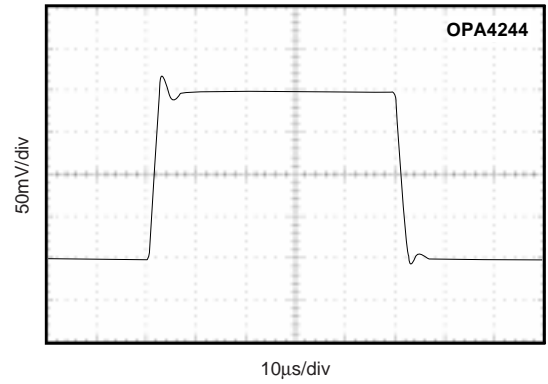
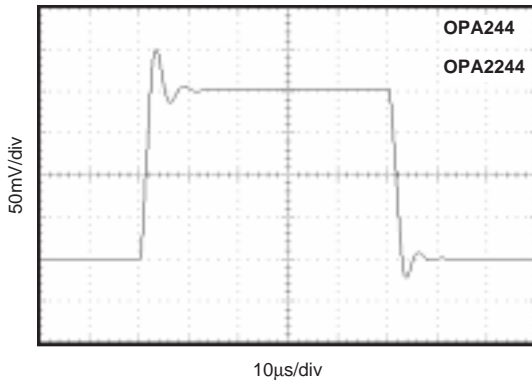
TYPICAL PERFORMANCE CURVES (Cont.)

At $T_A = 25^\circ\text{C}$, $V_S = +15\text{V}$, and $R_L = 20\text{k}\Omega$ connected to Ground, unless otherwise noted.

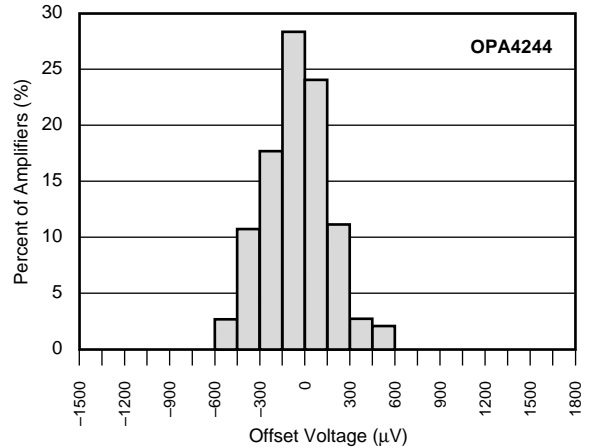
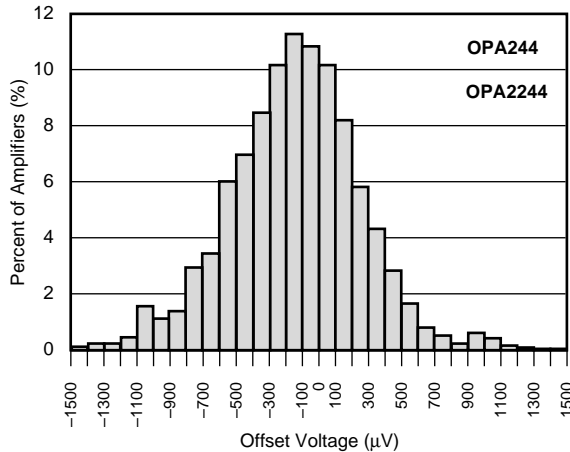
LARGE-SIGNAL STEP RESPONSE, $G = 1$, $C_L = 100\text{pF}$



SMALL-SIGNAL STEP RESPONSE, $G = 1$, $C_L = 100\text{pF}$



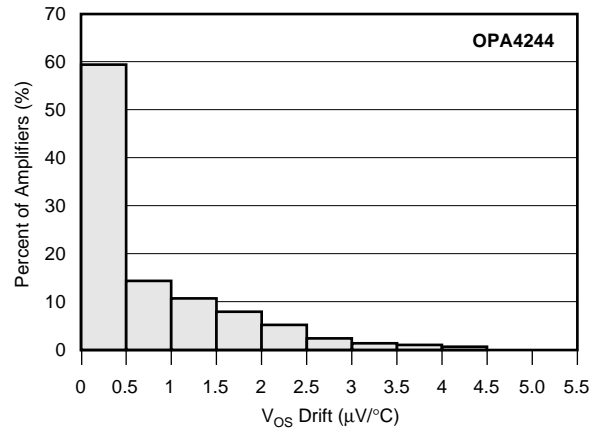
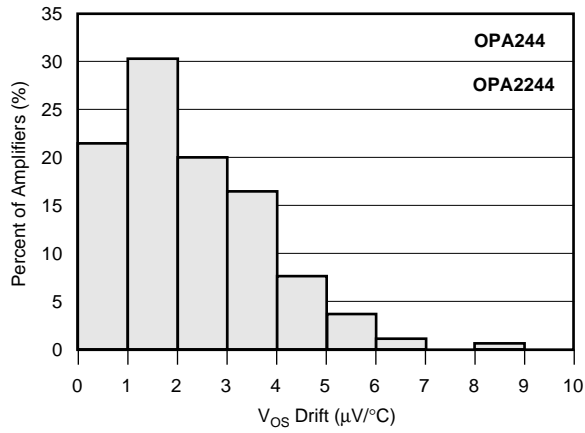
OFFSET VOLTAGE PRODUCTION DISTRIBUTION



TYPICAL PERFORMANCE CURVES (Cont.)

At $T_A = 25^\circ\text{C}$, $V_S = +15\text{V}$, and $R_L = 20\text{k}\Omega$ connected to Ground, unless otherwise noted.

OFFSET VOLTAGE PRODUCTION DISTRIBUTION



APPLICATIONS INFORMATION

The OPA244 is unity-gain stable and suitable for a wide range of general purpose applications. Power supply pins should be bypassed with 0.01µF ceramic capacitors.

OPERATING VOLTAGE

The OPA244 can operate from single supply (+2.2V to +36V) or dual supplies (±1.1 to ±18V) with excellent performance. Unlike most op amps which are specified at only one supply voltage, the OPA244 is specified for real world applications; a single set of specifications applies throughout the +2.6V to +36V (±1.3 to ±18V) supply range.

This allows a designer to have the same assured performance at any supply voltage within this range. In addition, many key parameters are guaranteed over the specified temperature range, -40°C to +85°C. Most behavior remains unchanged throughout the full operating voltage range. Parameters which vary significantly with operating voltage or temperature are shown in typical performance curves.

Useful information on solder pad design for printed circuit boards can be found in Burr-Brown's Application Bulletin AB-132B, "Solder Pad Recommendations for Surface-Mount Devices," easily found at Burr-Brown's web site (<http://www.burr-brown.com>).

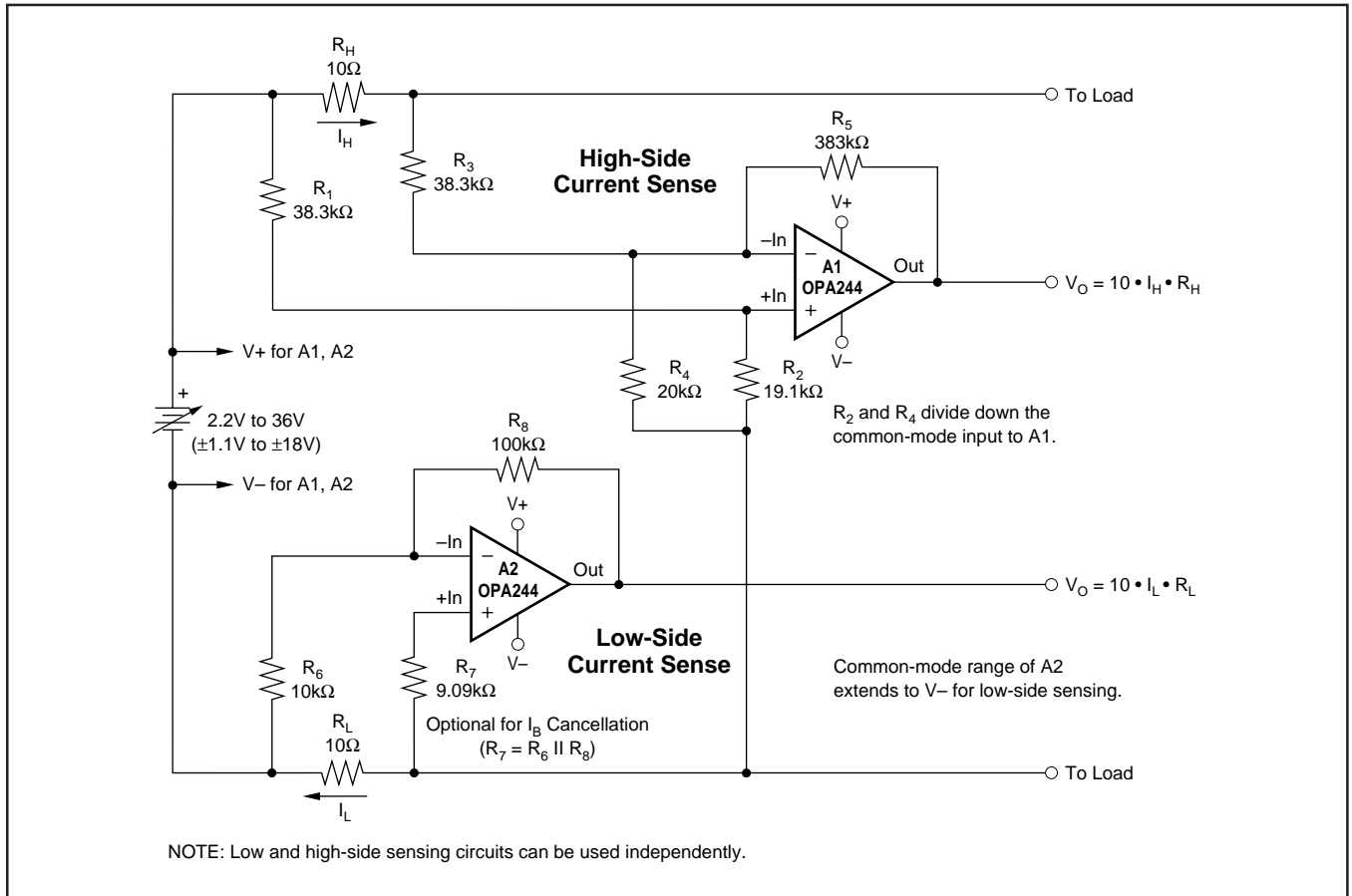


FIGURE 1. Low and High-Side Battery Current Sensing.