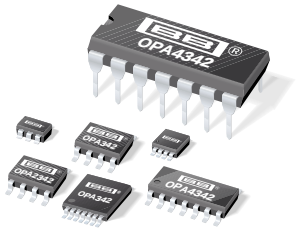
# THE DATASHEET OF

# OPA342NA/250G4

Burr-Brown Products
from Texas Instruments




# OPA342
# OPA2342
# OPA4342

www.ti.com

# Low-Cost, Low-Power, Rail-to-Rail OPERATIONAL AMPLIFIERS
## *Micro*Amplifier™ Series

## FEATURES

- LOW QUIESCENT CURRENT: 150μA typ
- RAIL-TO-RAIL INPUT
- RAIL-TO-RAIL OUTPUT (within 1mV)
- SINGLE SUPPLY CAPABILITY
- LOW COST
- *Micro*SIZE PACKAGE OPTIONS:
  SOT23-5
  MSOP-8
  TSSOP-14
- BANDWIDTH: 1MHz
- SLEW RATE: 1V/μs
- THD + NOISE: 0.006%

## APPLICATIONS

- COMMUNICATIONS
- PCMCIA CARDS
- DATA ACQUISITION
- PROCESS CONTROL
- AUDIO PROCESSING
- ACTIVE FILTERS
- TEST EQUIPMENT
- CONSUMER ELECTRONICS

## DESCRIPTION

The OPA342 series rail-to-rail CMOS operational amplifiers are designed for low-cost, low-power, miniature applications. They are optimized to operate on a single supply as low as 2.5V with an input common-mode voltage range that extends 300mV beyond the supplies.

Rail-to-rail input/output and high-speed operation make them ideal for driving sampling Analog-to-Digital Converters (ADC). They are also well suited for general-purpose and audio applications and providing I/V conversion at the output of Digital-to-Analog Converters (DAC). Single, dual, and quad versions have identical specs for design flexibility.

The OPA342 series offers excellent dynamic response with a quiescent current of only 250μA max. Dual and quad designs feature completely independent circuitry for lowest crosstalk and freedom from interaction.

| PACKAGE | SINGLE OPA342 | DUAL OPA2342 | QUAD OPA4342 |
|---|---|---|---|
| SOT23-5 | ✔ | | |
| MSOP-8 | | ✔ | |
| SO-8 | ✔ | ✔ | |
| TSSOP-14 | | | ✔ |
| SO-14 | | | ✔ |
| DIP-14 | | | ✔ |

**SPICE MODEL available at www.burr-brown.com.**

TEXAS INSTRUMENTS

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# SPECIFICATIONS: $V_S$ = 2.7V to 5.5V

At $T_A$ = +25°C, $R_L$ = 10kΩ connected to $V_S$/2 and $V_{OUT}$ = $V_S$/2, unless otherwise noted.
**Boldface** limits apply over the temperature range, $T_A$ = –40°C to +85°C.

| PARAMETER | | CONDITION | OPA342NA, UA<br>OPA2342EA, UA<br>OPA4342EA, UA, PA<br>MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **OFFSET VOLTAGE** | | | | | | |
| Input Offset Voltage | $V_{OS}$ | $V_{CM}$ = $V_S$/2 | | ±1 | ±6 | mV |
| **$T_A$ = –40°C to +85°C** | | | | **±1** | **±6** | **mV** |
| **vs Temperature** | **$dV_{OS}/dT$** | | | **±3** | | µV/°C |
| vs Power Supply | PSRR | $V_S$ = 2.7V to 5.5V, $V_{CM}$ < (V+) -1.8V | | 30 | 200 | µV/V |
| **$T_A$ = –40°C to +85°C** | | **$V_S$ = 2.7V to 5.5V, $V_{CM}$ < (V+) -1.8V** | | | **250** | **µV/V** |
| Channel Separation, dc | | | | 0.2 | | µV/V |
| f = 1kHz | | | | 132 | | dB |
| **INPUT BIAS CURRENT** | | | | | | |
| Input Bias Current | $I_B$ | | | ±0.2 | ±10 | pA |
| **$T_A$ = –40°C to +85°C** | | | | **See Typical Curve** | | **pA** |
| Input Offset Current | $I_{OS}$ | | | ±0.2 | ±10 | pA |
| **NOISE** | | | | | | |
| Input Voltage Noise, f = 0.1Hz to 50kHz | | | | 8 | | µVrms |
| Input Voltage Noise Density, f = 1kHz | $e_n$ | | | 30 | | nV/√Hz |
| Current Noise Density, f = 1kHz | $i_n$ | | | 0.5 | | fA/√Hz |
| **INPUT VOLTAGE RANGE** | | | | | | |
| Common-Mode Voltage Range | $V_{CM}$ | | –0.3 | | (V+) + 0.3 | V |
| Common-Mode Rejection Ratio | CMRR | $V_S$ = +5.5V, –0.3V < $V_{CM}$ < (V+) - 1.8 | 76 | 88 | | dB |
| **$T_A$ = –40°C to +85°C** | | **$V_S$ = +5.5V, –0.3V < $V_{CM}$ < (V+) - 1.8** | **74** | | | **dB** |
| Common-Mode Rejection Ratio | CMRR | $V_S$ = +5.5V, –0.3V < $V_{CM}$ < 5.8V | 66 | 78 | | dB |
| **$T_A$ = –40°C to +85°C** | | **$V_S$ = +5.5V, –0.3V < $V_{CM}$ < 5.8V** | **64** | | | **dB** |
| Common-Mode Rejection Ratio | CMRR | $V_S$ = +2.7V, –0.3V < $V_{CM}$ < 3V | 62 | 74 | | dB |
| **$T_A$ = –40°C to +85°C** | | **$V_S$ = +2.7V, –0.3V < $V_{CM}$ < 3V** | **60** | | | **dB** |
| **INPUT IMPEDANCE** | | | | | | |
| Differential | | | | $10^{13}$ \|\| 3 | | Ω \|\| pF |
| Common-Mode | | | | $10^{13}$ \|\| 6 | | Ω \|\| pF |
| **OPEN-LOOP GAIN** | | | | | | |
| Open-Loop Voltage Gain | $A_{OL}$ | $R_L$ = 100kΩ, 10mV < $V_O$ < (V+) – 10mV | 104 | 124 | | dB |
| **$T_A$ = –40°C to +85°C** | | **$R_L$ = 100kΩ, 10mV < $V_O$ < (V+) – 10mV** | **100** | | | **dB** |
| | | $R_L$ = 5kΩ, 400mV < $V_O$ < (V+) – 400mV | 96 | 114 | | dB |
| **$T_A$ = –40°C to +85°C** | | **$R_L$ = 5kΩ, 400mV < $V_O$ < (V+) – 400mV** | **90** | | | **dB** |
| **FREQUENCY RESPONSE** | | $C_L$ = 100pF | | | | |
| Gain-Bandwidth Product | GBW | G = 1 | | 1 | | MHz |
| Slew Rate | SR | | | 1 | | V/µs |
| Settling Time, 0.1% | | $V_S$ = 5.5V, 2V Step | | 5 | | µs |
| 0.01% | | $V_S$ = 5.5V, 2V Step | | 8 | | µs |
| Overload Recovery Time | | $V_{IN}$ • G = $V_S$ | | 2.5 | | µs |
| Total Harmonic Distortion + Noise, f = 1kHz | THD+N | $V_S$ = 5.5V, $V_O$ = 3Vp-p[1], G = 1 | | 0.006 | | % |
| **OUTPUT** | | | | | | |
| Voltage Output Swing from Rail[2] | | $R_L$ = 100kΩ, $A_{OL}$ ≥ 96dB | | 1 | | mV |
| | | $R_L$ = 100kΩ, $A_{OL}$ ≥ 104dB | | 3 | 10 | mV |
| **$T_A$ = –40°C to +85°C** | | **$R_L$ = 100kΩ, $A_{OL}$ ≥ 100dB** | | | **10** | **mV** |
| | | $R_L$ = 5kΩ, $A_{OL}$ ≥ 96dB | | 20 | 400 | mV |
| **$T_A$ = –40°C to +85°C** | | **$R_L$ = 5kΩ, $A_{OL}$ ≥ 90dB** | | | **400** | **mV** |
| Short-Circuit Current | $I_{SC}$ | Per Channel | | ±15 | | mA |
| Capacitive Load Drive | $C_{LOAD}$ | | | See Typical Curve | | |
| **POWER SUPPLY** | | | | | | |
| Specified Voltage Range | $V_S$ | | 2.7 | | 5.5 | V |
| Operating Voltage Range | | | | 2.5 to 5.5 | | V |
| Quiescent Current (per amplifier) | $I_Q$ | $I_O$ = 0A | | 150 | 250 | µA |
| **$T_A$ = –40°C to +85°C** | | | | | **300** | **µA** |
| **TEMPERATURE RANGE** | | | | | | |
| Specified Range | | | –40 | | +85 | °C |
| Operating Range | | | –55 | | +125 | °C |
| Storage Range | | | –65 | | +150 | °C |
| Thermal Resistance | $\theta_{JA}$ | | | | | |
| SOT23-5 Surface Mount | | | | 200 | | °C/W |
| MSOP-8 Surface Mount | | | | 150 | | °C/W |
| SO-8 Surface Mount | | | | 150 | | °C/W |
| TSSOP-14 Surface Mount | | | | 100 | | °C/W |
| SO-14 Surface Mount | | | | 100 | | °C/W |
| DIP-14 | | | | 100 | | °C/W |

NOTES: (1) $V_{OUT}$ = 0.25V to 3.25V. (2) Output voltage swings are measured between the output and power-supply rails.

## ABSOLUTE MAXIMUM RATINGS[1]

| | |
|---|---|
| Supply Voltage, V+ to V- | 7.5V |
| Signal Input Terminals, Voltage[2] | (V–) –0.5V to (V+) +0.5V |
| 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 Tolerance (Human Body Model) | 4000V |

NOTES: (1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only. Functional operation of the device at these conditions, or beyond the specified operating conditions, is not implied. (2) Input terminals are diode-clamped to the power supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less. (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.

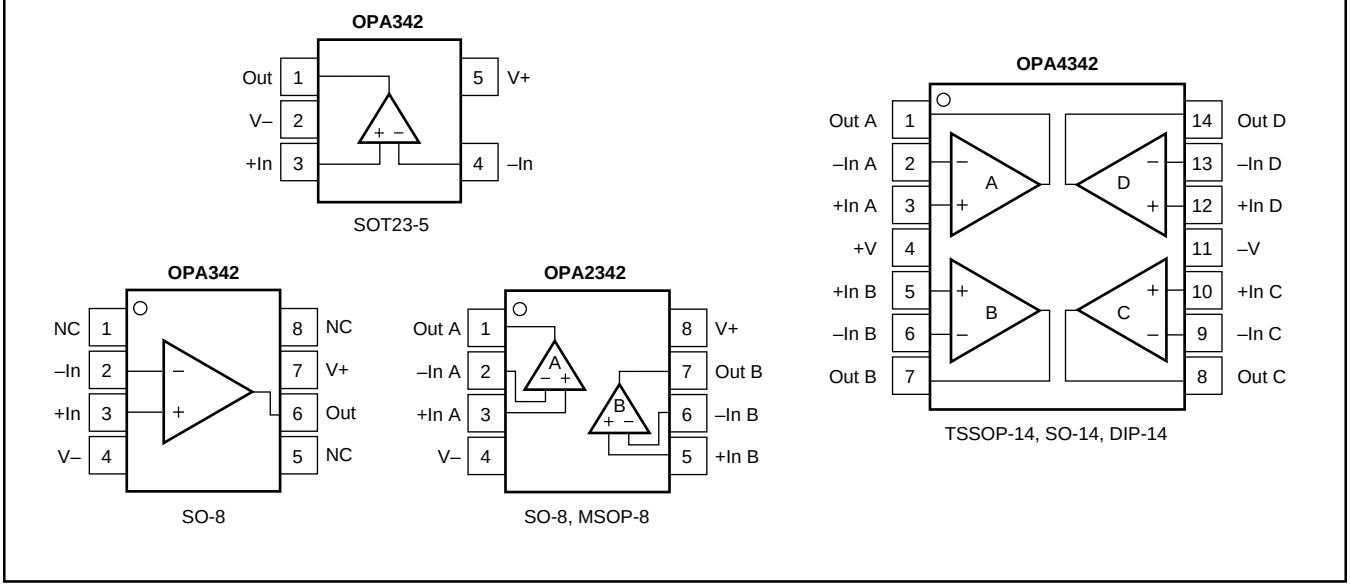
ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## PACKAGE/ORDERING INFORMATION

| PRODUCT | PACKAGE | PACKAGE DRAWING NUMBER | SPECIFIED TEMPERATURE RANGE | PACKAGE MARKING | ORDERING NUMBER[1] | TRANSPORT MEDIA |
|---|---|---|---|---|---|---|
| OPA342NA | SOT23-5 | 331 | –40°C to +85°C | B42 | OPA342NA/250 | Tape and Reel |
| " | " | " | " | " | OPA342NA/3K | Tape and Reel |
| OPA342UA | SO-8 | 182 | –40°C to +85°C | OPA342UA | OPA342UA | Rails |
| " | " | " | " | " | OPA342UA/2K5 | Tape and Reel |
| OPA2342EA | MSOP-8 | 337 | –40°C to +85°C | C42 | OPA2342EA/250 | Tape and Reel |
| " | " | " | " | " | OPA2342EA/2K5 | Tape and Reel |
| OPA2342UA | SO-8 | 182 | –40°C to +85°C | OPA2342UA | OPA2342UA | Rails |
| " | " | " | " | " | OPA2342UA/2K5 | Tape and Reel |
| OPA4342EA | TSSOP-14 | 357 | –40°C to +85°C | OPA4342EA | OPA4342EA/250 | Tape and Reel |
| " | " | " | " | " | OPA4342EA/2K5 | Tape and Reel |
| OPA4342UA | SO-14 | 235 | –40°C to +85°C | OPA4342UA | OPA4342UA | Rails |
| " | " | " | " | " | OPA4342UA/2K5 | Tape and Reel |
| OPA4342PA | DIP-14 | 010 | –40°C to +85°C | OPA4342PA | OPA4342PA | Rails |

NOTE: (1) Models with a slash (/) are available only in Tape and Reel in the quantities indicated (e.g., /3K indicates 3000 devices per reel). Ordering 3000 pieces of "OPA342NA/3K" will get a single 3000-piece Tape and Reel.

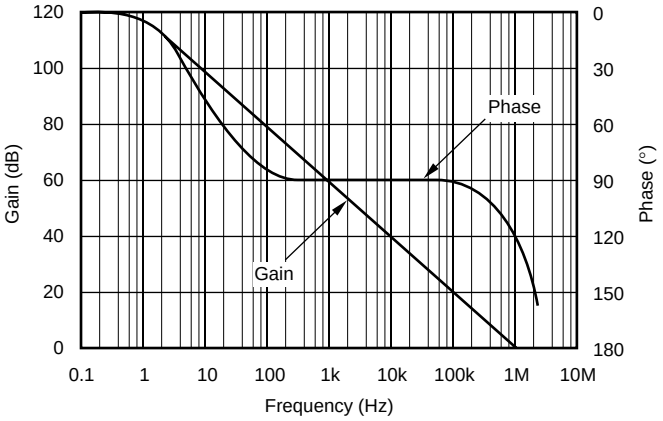
## PIN CONFIGURATIONS



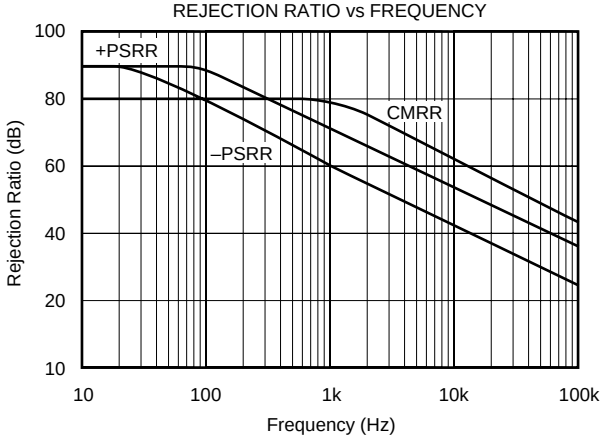
# TYPICAL PERFORMANCE CURVES

At $T_A$ = +25°C, $V_S$ = +5V, and $R_L$ = 10kΩ connected to $V_S$/2, unless otherwise noted.

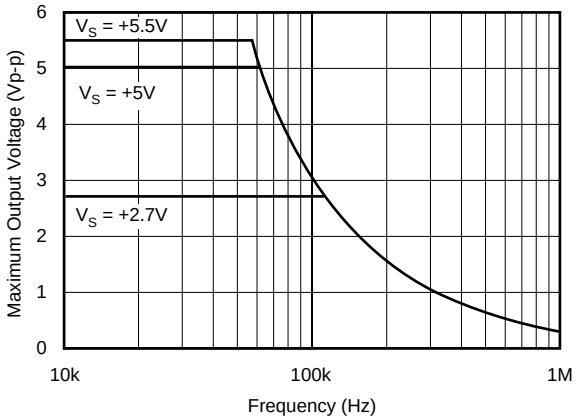
OPEN-LOOP GAIN/PHASE vs FREQUENCY



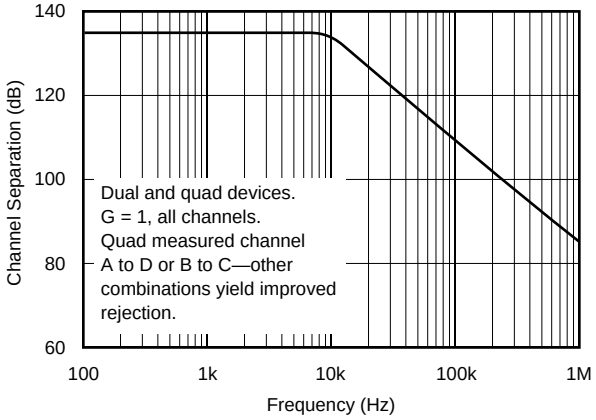

POWER SUPPLY AND COMMON-MODE REJECTION RATIO vs FREQUENCY



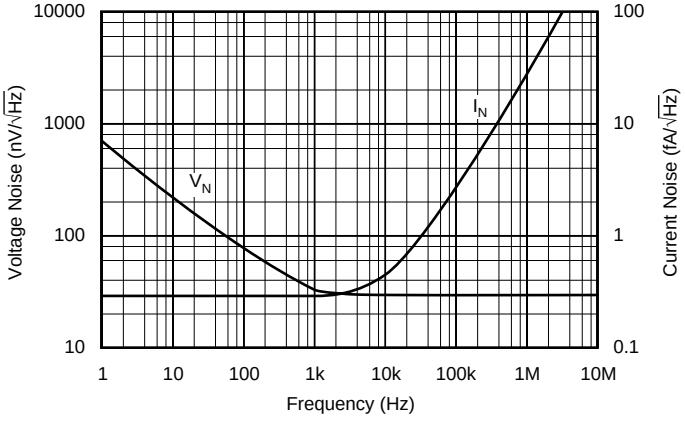

MAXIMUM OUTPUT VOLTAGE vs FREQUENCY



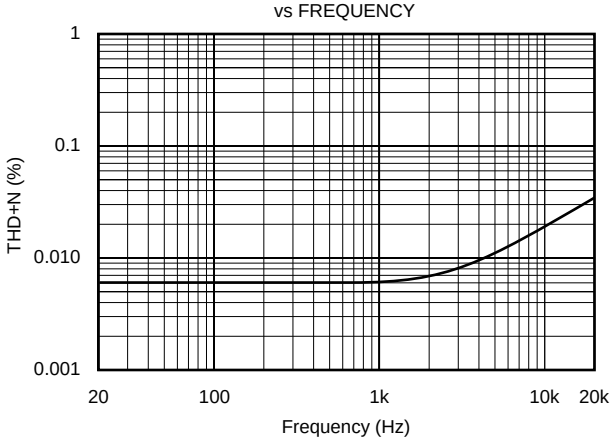

CHANNEL SEPARATION vs FREQUENCY




VOLTAGE AND CURRENT NOISE SPECTRAL DENSITY vs FREQUENCY



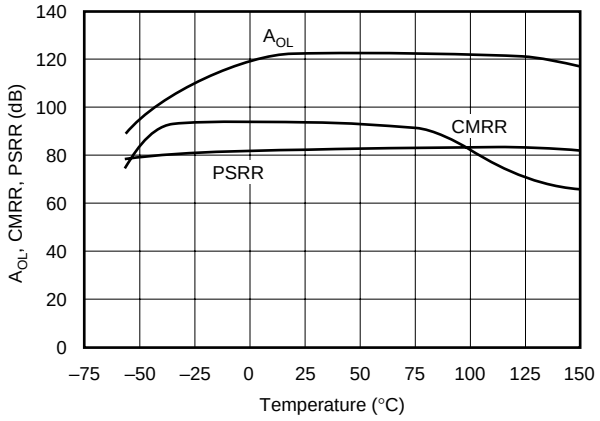

TOTAL HARMONIC DISTORTION + NOISE vs FREQUENCY



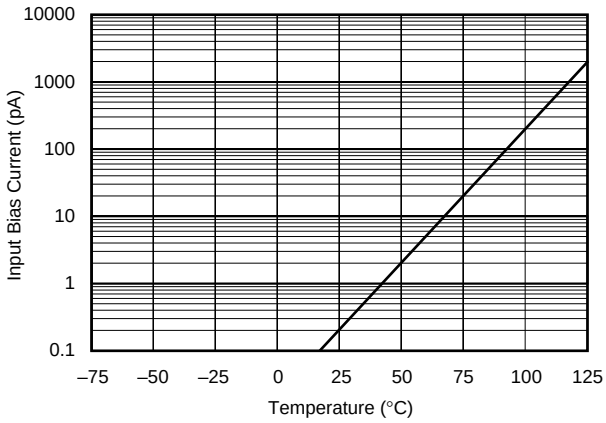
# TYPICAL PERFORMANCE CURVES (Cont.)

At $T_A$ = +25°C, $V_S$ = +5V, and $R_L$ = 10kΩ connected to $V_S$/2, unless otherwise noted.

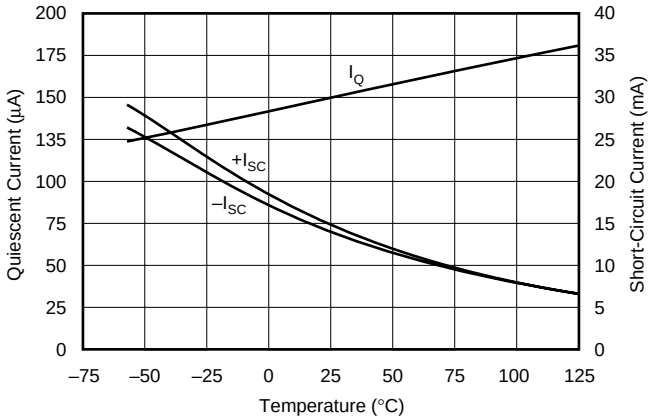
OPEN-LOOP GAIN, COMMON-MODE REJECTION RATIO, AND POWER SUPPLY REJECTION vs TEMPERATURE



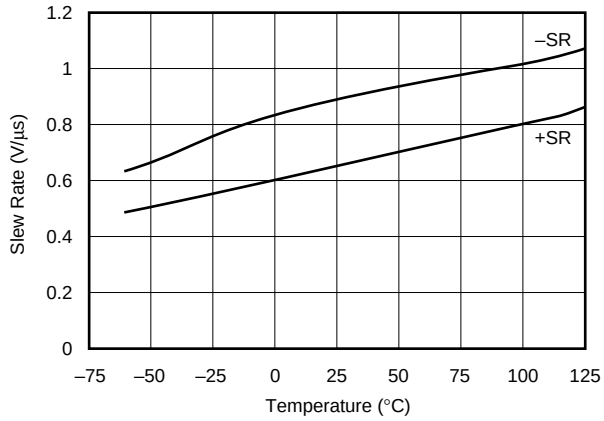

INPUT BIAS CURRENT vs TEMPERATURE



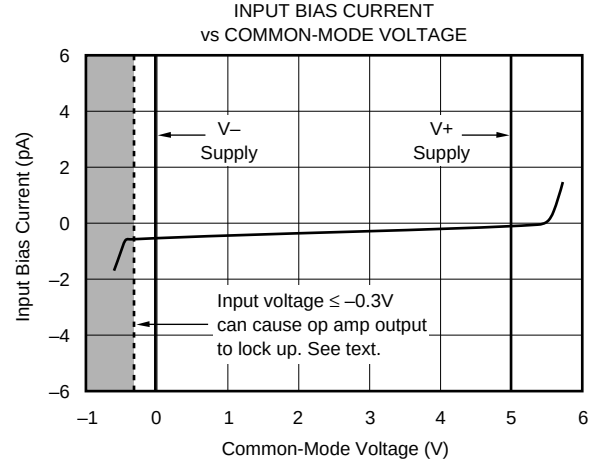

QUIESCENT CURRENT AND SHORT-CIRCUIT CURRENT vs TEMPERATURE



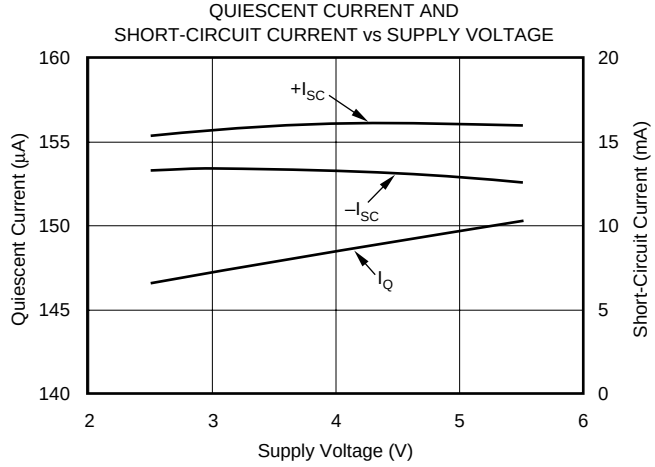

SLEW RATE vs TEMPERATURE




INPUT BIAS CURRENT vs COMMON-MODE VOLTAGE



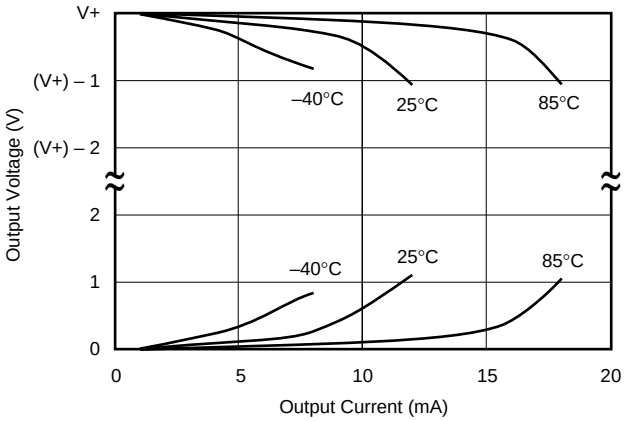

QUIESCENT CURRENT AND SHORT-CIRCUIT CURRENT vs SUPPLY VOLTAGE



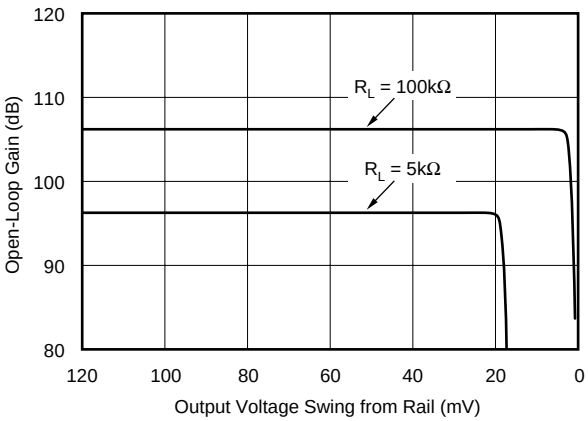
# TYPICAL PERFORMANCE CURVES (Cont.)

At $T_A$ = +25°C, $V_S$ = +5V, and $R_L$ = 10kΩ connected to $V_S$/2, unless otherwise noted.

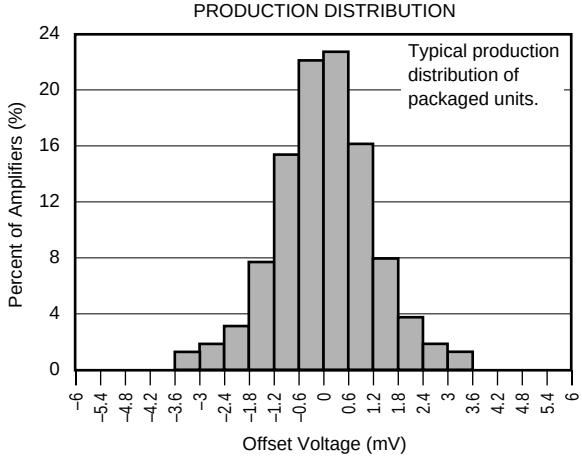
OUTPUT VOLTAGE SWING vs OUTPUT CURRENT



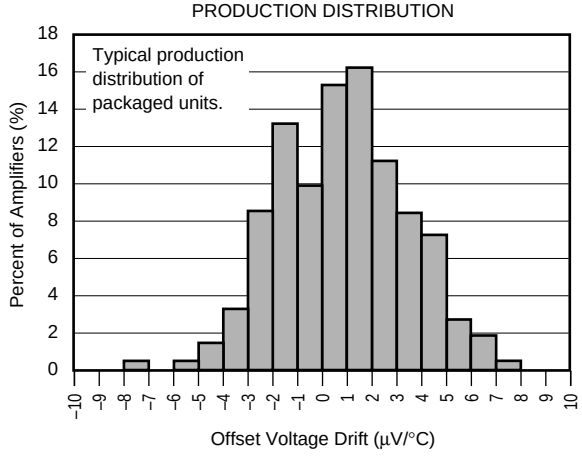

OPEN-LOOP GAIN vs OUTPUT VOLTAGE SWING



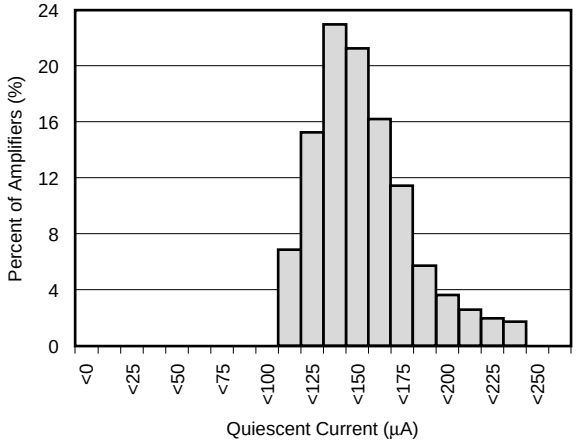

OFFSET VOLTAGE
PRODUCTION DISTRIBUTION



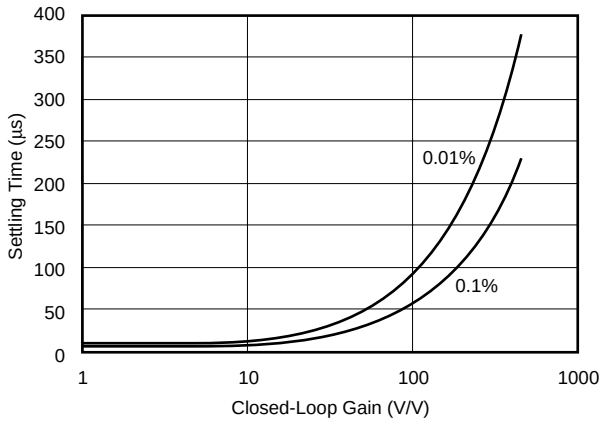

OFFSET VOLTAGE DRIFT
PRODUCTION DISTRIBUTION




QUIESCENT CURRENT
PRODUCTION DISTRIBUTION



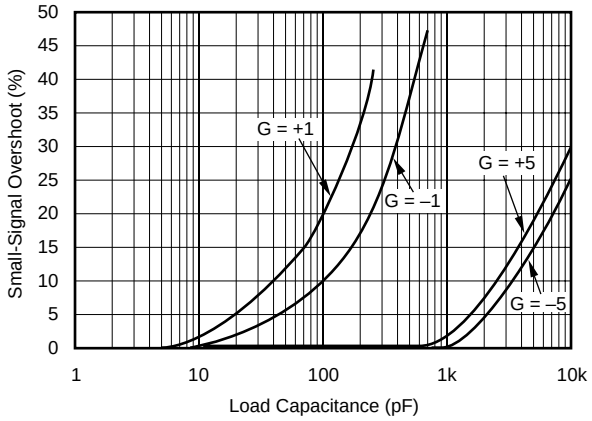

SETTLING TIME vs CLOSED-LOOP GAIN



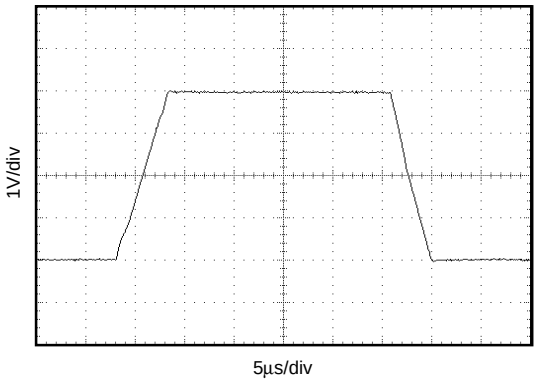
# TYPICAL PERFORMANCE CURVES (Cont.)

At $T_A$ = +25°C, $V_S$ = +5V, and $R_L$ = 10kΩ connected to $V_S$/2, unless otherwise noted.

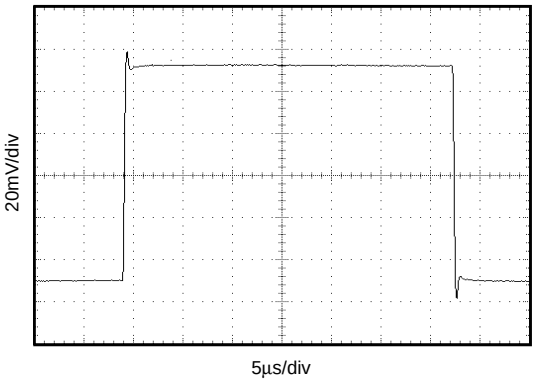
SMALL-SIGNAL OVERSHOOT vs LOAD CAPACITANCE




LARGE-SIGNAL STEP RESPONSE
G = +1, $R_L$ = 10kΩ, $C_L$ = 100pF




SMALL-SIGNAL STEP RESPONSE
G = +1, $R_L$ = 10kΩ, $C_L$ = 100pF



# APPLICATIONS INFORMATION

OPA342 series op amps are unity gain stable and can operate on a single supply, making them highly versatile and easy to use.

Rail-to-rail input and output swing significantly increases dynamic range, especially in low supply applications. Figure 1 shows the input and output waveforms for the OPA342 in unity-gain configuration. Operation is from $V_S$ = +5V with a 10kΩ load connected to $V_S/2$. The input is a 5Vp-p sinusoid. Output voltage is approximately 4.997Vp-p.

Power supply pins should be by passed with 0.01µF ceramic capacitors.

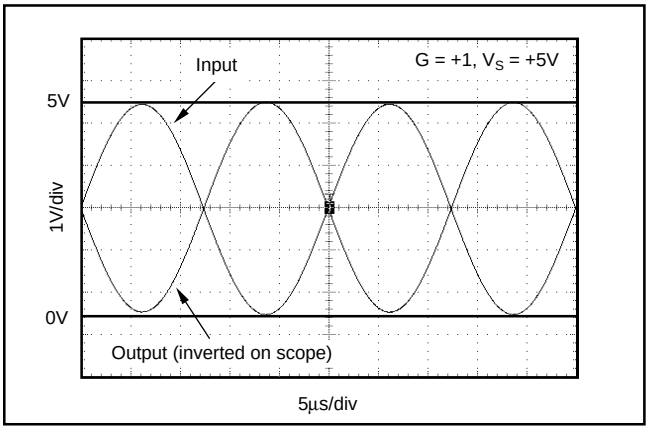



FIGURE 1. Rail-to-Rail Input and Output.

## OPERATING VOLTAGE

OPA342 series op amps are fully specified and guaranteed from +2.7V to +5.5V. In addition, many specifications apply from –40ºC to +85ºC. Parameters that vary significantly with operating voltages or temperature are shown in the Typical Performance Curves.

## RAIL-TO-RAIL INPUT

The input common-mode voltage range of the OPA342 series extends 300mV beyond the supply rails. This is achieved with a complementary input stage—an N-channel input differential pair in parallel with a P-channel differential pair (see Figure 2). The N-channel pair is active for input voltages close to the positive rail, typically (V+) – 1.3V to 300mV above the positive supply, while the P-channel pair is on for inputs from 300mV below the negative supply to approximately (V+) –1.3V. There is a small transition region, typically (V+) – 1.5V to (V+) – 1.1V, in which both pairs are on. This 400mV transition region can vary 300mV with process variation. Thus, the transition region (both stages on) can range from (V+) – 1.8V to (V+) – 1.4V on the low end, up to (V+) – 1.2V to (V+) – 0.8V on the high end. Within the 400mV transition region PSRR, CMRR, offset voltage, offset drift, and THD may be degraded compared to operation outside this region. For more information on designing with rail-to-rail input op amps, see Figure 3 “Design Optimization with Rail-to-Rail Input Op Amps.”

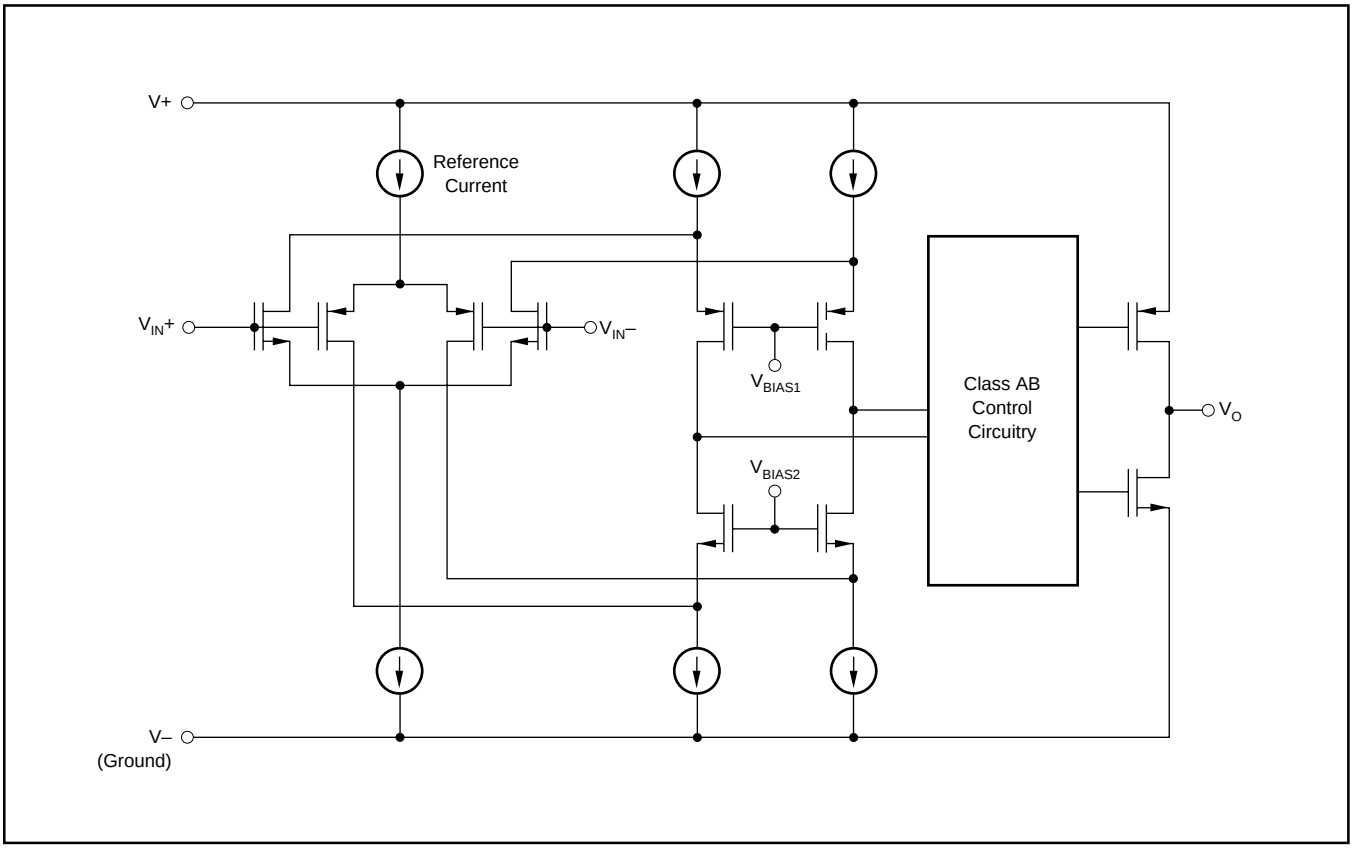



FIGURE 2. Simplified Schematic.

## DESIGN OPTIMIZATION WITH RAIL-TO-RAIL INPUT OP AMPS

Rail-to-rail op amps can be used in virtually any op amp configuration. To achieve optimum performance, however, applications using these special double-input-stage op amps may benefit from consideration of their special behavior.

In many applications, operation remains within the common-mode range of only one differential input pair. However some applications exercise the amplifier through the transition region of both differential input stages. Although the two input stages are laser trimmed for excellent matching, a small discontinuity may occur in this transition. Careful selection of the circuit configuration, signal levels and biasing can often avoid this transition region.

With a unity-gain buffer, for example, signals will traverse this transition at approximately 1.3V below V+ supply and may exhibit a small discontinuity at this point.

The common-mode voltage of the non-inverting amplifier is equal to the input voltage. If the input signal always remains less than the transition voltage, no discontinuity will be created. The closed-loop gain of this configuration can still produce a rail-to-rail output.

Inverting amplifiers have a constant common-mode voltage equal to $V_B$. If this bias voltage is constant, no discontinuity will be created. The bias voltage can generally be chosen to avoid the transition region.

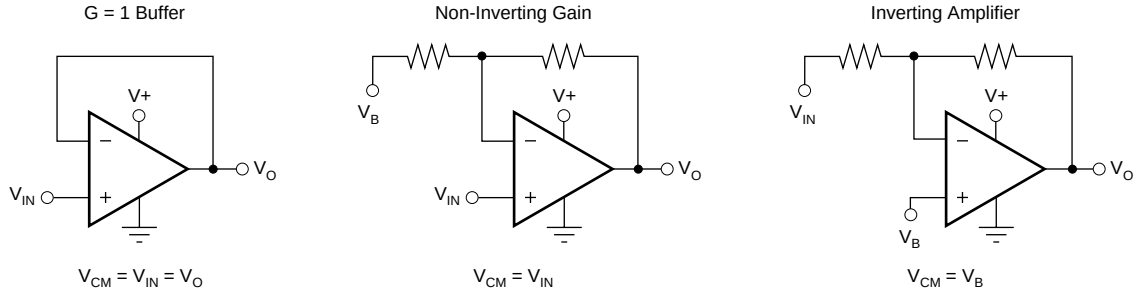



FIGURE 3. Design Optimization with Rail-to-Rail Input Op Amps.

### COMMON-MODE REJECTION

The CMRR for the OPA342 is specified in several ways so the best match for a given application may be used. First, the CMRR of the device in the common-mode range below the transition region ($V_{CM}$ < (V+) – 1.8V) is given. This specification is the best indicator of the capability of the device when the application requires use of one of the differential input pairs. Second, the CMRR at $V_S$ = 5.5V over the entire common-mode range is specified. Third, the CMRR at $V_S$ = 2.7V over the entire common-mode range is provided. These last two values include the variations seen through the transition region.

### INPUT VOLTAGE BEYOND THE RAILS

If the input voltage can go more than 0.3V below the negative power supply rail (single-supply ground), special precautions are required. If the input voltage goes sufficiently negative, the op amp output may lock up in an inoperative state. A Schottky diode clamp circuit will prevent this—see Figure 4. The series resistor prevents excessive current (greater than 10mA) in the Schottky diode and in the internal ESD protection diode, if the input voltage can exceed the positive supply voltage. If the signal source is limited to less than 10mA, the input resistor is not required.

### RAIL-TO-RAIL OUTPUT

A class AB output stage with common-source transistors is used to achieve rail-to-rail output. This output stage is capable of driving 600Ω loads connected to any potential between V+ and ground. For light resistive loads (> 50kΩ), the output voltage can typically swing to within 1mV from supply rail. With moderate resistive loads (2kΩ to 50kΩ), the output can swing to within a few tens of milli-volts from the supply rails while maintaining high open-loop gain. See the typical performance curve "Output Voltage Swing vs Output Current."

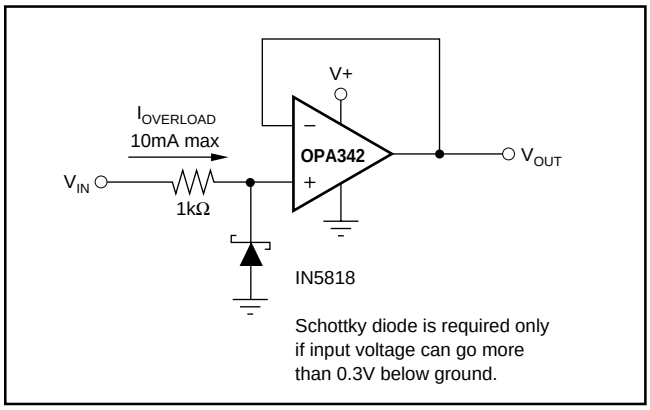



FIGURE 4. Input Current Protection for Voltages Exceeding the Supply Voltage.

### CAPACITIVE LOAD AND STABILITY

The OPA342 in a unity-gain configuration can directly drive up to 250pF pure capacitive load. Increasing the gain enhances the amplifier's ability to drive greater capacitive loads. See the typical performance curve "Small-Signal

Overshoot vs Capacitive Load." In unity-gain configurations, capacitive load drive can be improved by inserting a small (10Ω to 20Ω) resistor, $R_S$, in series with the output, as shown in Figure 5. This significantly reduces ringing while maintaining dc performance for purely capacitive loads. However, if there is a resistive load in parallel with the capacitive load, a voltage divider is created, introducing a dc error at the output and slightly reducing the output swing. The error introduced is proportional to the ratio $R_S/R_L$, and is generally negligible.

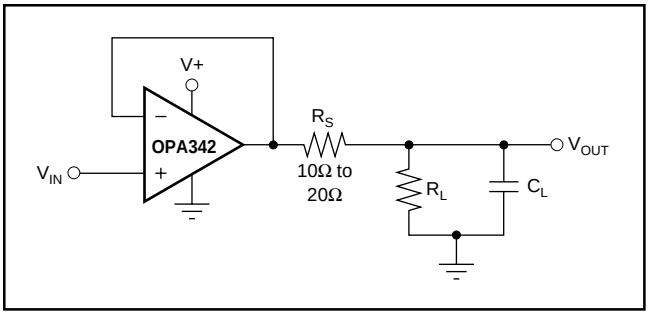



FIGURE 5. Series Resistor in Unity-Gain Configuration Improves Capacitive Load Drive.

## DRIVING A/D CONVERTERS

The OPA342 series op amps are optimized for driving medium-speed sampling ADCs. The OPA342 op amps buffer the ADC's input capacitance and resulting charge injection while providing signal gain.

Figures 6 shows the OPA342 in a basic noninverting configuration driving the ADS7822. The ADS7822 is a 12-bit, micro-power sampling converter in the MSOP-8 package. When used with the low-power, miniature packages of the OPA342, the combination is ideal for space-limited, low-power applications. In this configuration, an RC network at the ADC's input can be used to filter charge injection.

Figure 7 shows the OPA2342 driving an ADS7822 in a speech bandpass filtered data acquisition system. This small, low-cost solution provides the necessary amplification and signal conditioning to interface directly with an electret microphone. This circuit will operate with $V_S$ = +2.7V to +5V with less than 500µA quiescent current.

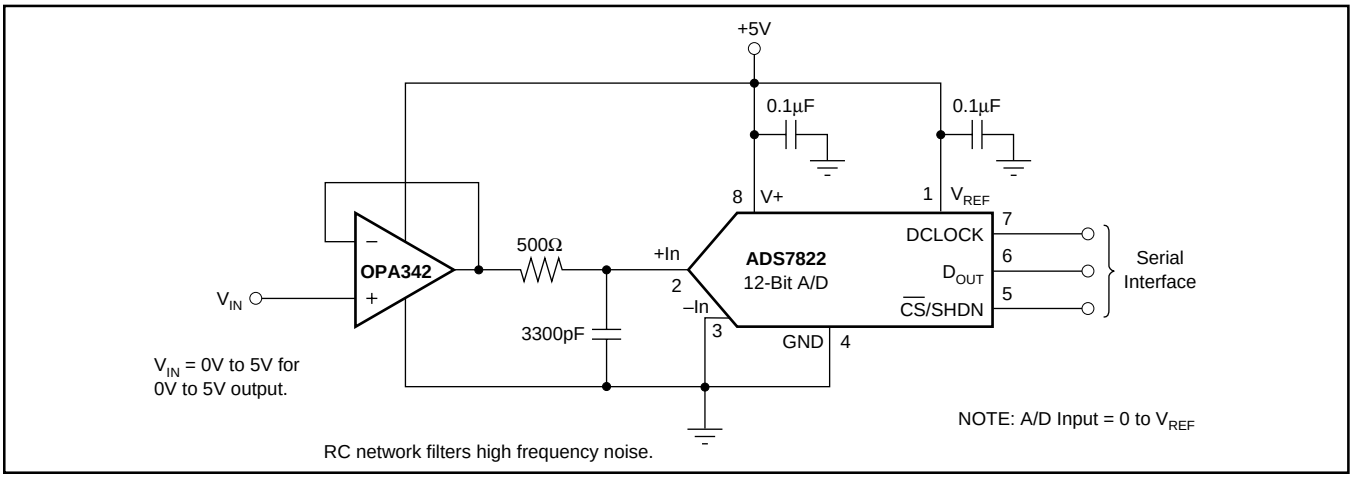



FIGURE 6. OPA342 in Noninverting Configuration Driving ADS7822.

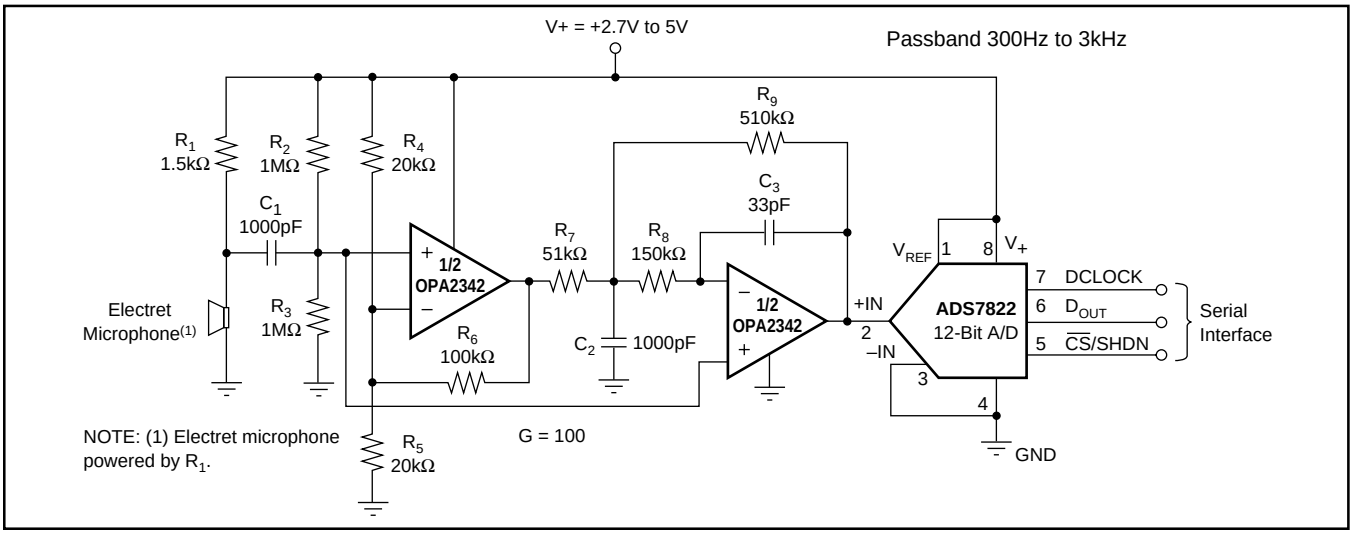



FIGURE 7. Speech Bandpass Filtered Data Acquisition System.

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OPA2342EA/250 | ACTIVE | VSSOP | DGK | 8 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAUAG | Level-2-260C-1 YEAR | -40 to 85 | C42 | Samples |
| OPA2342EA/250G4 | ACTIVE | VSSOP | DGK | 8 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAUAG | Level-2-260C-1 YEAR | -40 to 85 | C42 | Samples |
| OPA2342EA/2K5 | ACTIVE | VSSOP | DGK | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAUAG | Level-2-260C-1 YEAR | -40 to 85 | C42 | Samples |
| OPA2342UA | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA 2342UA | Samples |
| OPA2342UA/2K5 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA 2342UA | Samples |
| OPA342NA/250 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | B42 | Samples |
| OPA342NA/3K | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | B42 | Samples |
| OPA342NA/3KG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | B42 | Samples |
| OPA342UA | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA 342UA | Samples |
| OPA342UAG4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA 342UA | Samples |
| OPA4342EA/250 | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA 4342EA | Samples |
| OPA4342UA | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA4342UA | Samples |
| OPA4342UAG4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | OPA4342UA | Samples |

(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) RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
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**(3)** MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

**(4)** There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

**(5)** Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

**(6)** Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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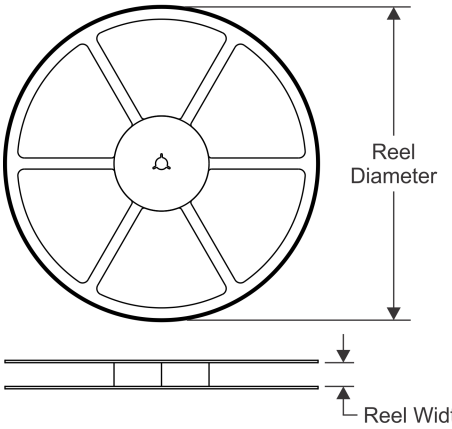
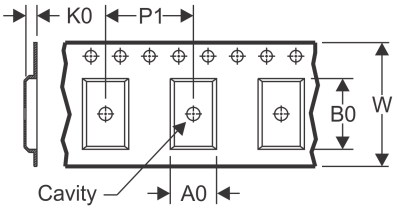
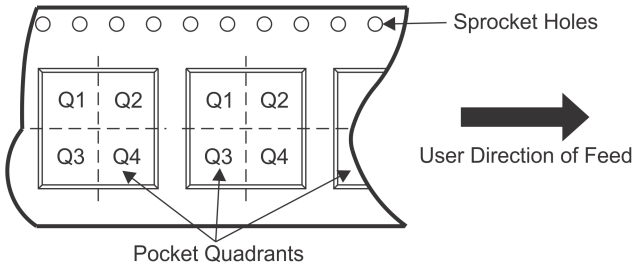



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

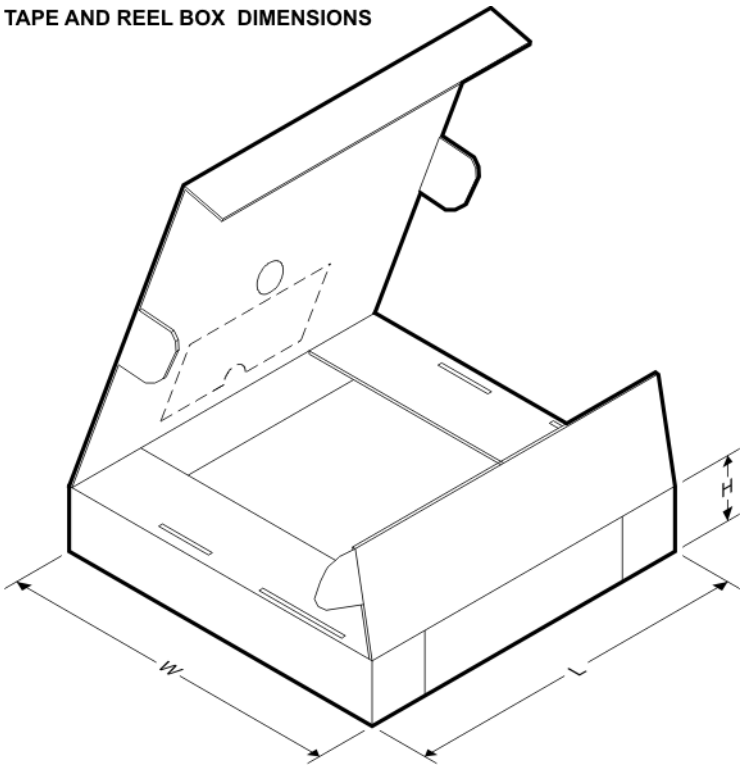
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPA2342EA/250 | VSSOP | DGK | 8 | 250 | 180.0 | 12.4 | 5.3 | 3.4 | 1.4 | 8.0 | 12.0 | Q1 |
| OPA2342EA/2K5 | VSSOP | DGK | 8 | 2500 | 330.0 | 12.4 | 5.3 | 3.4 | 1.4 | 8.0 | 12.0 | Q1 |
| OPA2342UA/2K5 | SOIC | D | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| OPA342NA/250 | SOT-23 | DBV | 5 | 250 | 178.0 | 8.4 | 3.3 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| OPA342NA/3K | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.3 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| OPA4342EA/250 | TSSOP | PW | 14 | 250 | 180.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |

**TAPE AND REEL BOX DIMENSIONS**




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| OPA2342EA/250 | VSSOP | DGK | 8 | 250 | 210.0 | 185.0 | 35.0 |
| OPA2342EA/2K5 | VSSOP | DGK | 8 | 2500 | 367.0 | 367.0 | 35.0 |
| OPA2342UA/2K5 | SOIC | D | 8 | 2500 | 367.0 | 367.0 | 35.0 |
| OPA342NA/250 | SOT-23 | DBV | 5 | 250 | 445.0 | 220.0 | 345.0 |
| OPA342NA/3K | SOT-23 | DBV | 5 | 3000 | 445.0 | 220.0 | 345.0 |
| OPA4342EA/250 | TSSOP | PW | 14 | 250 | 210.0 | 185.0 | 35.0 |

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