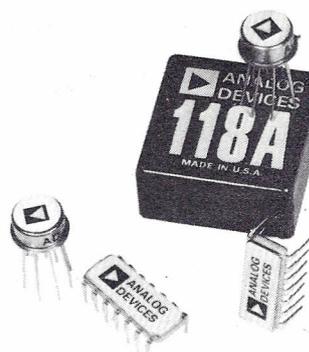


# GENERAL PURPOSE-MODERATE PERFORMANCE MODELS 118, 119, AD201, AD741, AD208, AD301AL



### GENERAL DESCRIPTION

Amplifiers in this group include Analog's lowest cost devices. They are best suited for general purpose designs with moderate drift requirements in the range from 5 to  $40\mu\text{V}/^\circ\text{C}$ , unity gain bandwidths to 1MHz, and full power response to 100kHz. Using silicon bipolar transistors as the differential input stage, bias currents range from 2 to 75nA placing upper limits of 10k to 100k ohms on circuit impedances for best performance. Typical applications include linear designs for summing, inverting, impedance buffering (followers) and active filtering. They are also useful for developing non-linear transfer functions.

### MODEL 118 A/K: LOWEST COST

The first op amp to consider for general purpose applications is model 118, a discrete component amplifier which surpasses the performance of lower cost IC's. It has high open loop gain and good slew rate with drifts of  $20\mu\text{V}/^\circ\text{C}$  (118A) and  $5\mu\text{V}/^\circ\text{C}$  (118K). Careful component selection and advanced design techniques yield low bias current and low thermal overshoots for improved performance over earlier discrete op amp designs.

### MODEL 119 A/K: 20mA OUTPUT

Model 119 A(K) is identical to 118 A(K) except for its higher 20mA output current at  $\pm 10\text{V}$ . For  $\pm 20$  volt output voltage requirements, select model 163 to replace model 118, and model 165 for model 119 replacement. (See page 50, "High Output-Voltage, Current.")

### AD201/AD201A: ADJUSTABLE BANDWIDTH

The low cost AD201 series combines the dynamic response flexibility, afforded by external frequency compensation, with good DC performance. Because frequency compensation is performed externally, the AD201 provides a greater degree of design control, and permits the dynamic operating characteristics to be fitted to the specific system application. Other models to consider in this series are AD101A (military grade) and AD301A (industrial grade). The device offers full short circuit protection, external offset voltage nulling, and the absence of latch-up. (See also Linear IC Section.)

### AD301AL: LOW COST, HIGH ACCURACY, SPEED

The low cost AD301AL combines the dynamic response flexibility afforded by external frequency compensation with excellent DC performance. The amplifier increases overall accu-

| Model  | Discrete   |  |
|--|--|--|
|  | A  | K  |
| Open Loop Gain<br>DC Rated Load, V/V min             | 250,000  |  |
| Rated Output, min                                    | $\pm 10\text{V}@5\text{mA}$                                  |  |
| Frequency Response                                   |  |  |
| Unity Gain, Small Signal                             | 1.5MHz   |  |
| Full Power Response, min                             | 100kHz   |  |
| Slewing Rate, min                                    | $6\text{V}/\mu\text{s}^1$                                    |  |
| Overload Recovery                                    | 0.5ms  |  |
| Input Offset Voltage                                 |  |  |
| Initial, $25^\circ\text{C}$ , (adj. to zero) max     | $\pm 5\text{mV}^2$   |  |
| Avg. vs. Temp, max<br>vs. Supply Voltage<br>vs. Time | $\pm 20$   | $\pm 5\mu\text{V}/^\circ\text{C}$<br>$\pm 10\mu\text{V}/\%$<br>$\pm 200\mu\text{V}/\text{mo.}$ |
| Input Bias Current                                   |  |  |
| Initial, $25^\circ\text{C}$ , max                    | $\pm 35\text{nA}$  |  |
| Avg. vs. Temp, max                                   | $\pm 0.6$  | $\pm 0.5\text{nA}/^\circ\text{C}$  |
| Input Difference Current                             |  |  |
| Initial, $25^\circ\text{C}$ , max                    | $\pm 3\text{nA}$   |  |
| Avg. vs. Temp, max                                   | $\pm 0.1$  | $\pm 0.05\text{nA}/^\circ\text{C}$   |
| Input Impedance                                      |  |  |
| Differential   | $10^6 \Omega$  |  |
| Common Mode  | $10^9 \Omega$  |  |
| Input Noise  |  |  |
| Voltage, 0.01 to 1Hz, p-p                            | $1\mu\text{V}$   |  |
| 10Hz to 10kHz, rms                                   | $2\mu\text{V}$   |  |
| Current, 0.01 to 1Hz, p-p                            | 20pA   |  |
| Input Voltage Range                                  |  |  |
| Common Mode Voltage, min                             | $\pm 10\text{V}$   |  |
| Common Mode Rejection                                | 86dB   |  |
| Max Safe Differential Voltage                        | $\pm 15\text{V}$   |  |
| Power Supply Range (VDC)                             | $\pm (12 \text{ to } 18)\text{V}$                            |  |
| Rated Specification (VDC)                            | $\pm 15\text{V}@4\text{mA}$                                  |  |
| Temperature Range                                    |  |  |
| Operating, Rated Specification                       | $-25 \text{ to } +85^\circ\text{C}$ 0 to $+70^\circ\text{C}$ |  |
| Package Outline                                      | M-1  |  |
| Case Dimensions                                      | 1" x 1" x 0.5"   |  |
| Price  |  |  |
| 1-9  | \$14.00  | \$21.00  |
| 10-24  | \$13.00  | \$19.00  |

(1) 20kHz and  $1.2\text{V}/\mu\text{s}$  for non-inverting operation.

(2) With external  $24.9\text{k}\Omega$  trim resistor.

(3) Compensated gain of 20dB.