OBSOLETE

ECONOMY DIFFERENTIAL OPERATIONAL AMPLIFIER FEATURING FAST RESPONSE (10 MC) AND LOW CURRENT DRIFT (200 PA/°C). SELECTION OF THREE MODELS WITH 5, 10 OR 20 μV/°C VOLTAGE DRIFT. OUTPUT IS ±11 V AT 5 MA. GAIN — 100,000.

DESCRIPTION

Model 101 combines the features of high gain, low drift and fast response — not previously available in a single low cost, differential operational amplifier. This amplifier can be used in virtually all instrumentation, computing or control applications where the ultimate drift stability of chopper amplifiers is not required. The output of the 101, which is completely protected against short circuits, is rated at ±11 V and 5 ma. The rugged compact encapsulated package may be permanently soldered on printed circuit cards or plugged into an optional mounting socket.

GAIN-BANDWIDTH

One of the exceptional features of the 101 is its high open loop gain over a wide frequency range. In the inverting mode unity gain response for small signals is 10 mc, while full output voltage can be obtained to 30 KC. For closed loop gains less than 60, frequency response in the non-inverting mode is reduced. For example, at a gain of 10, small signal bandwidth is 250 KC and full output response is 5 KC, while at unity gain small bandwidth is typically 500 KC and full output response is 500 cps. A small feedback capacitor may be required in some applications due to the high frequency response characteristics of the 101. Application notes are available describing techniques to use this amplifier to best advantage. Overload recovery time is much better than most differential amplifiers — only 200 μsec.

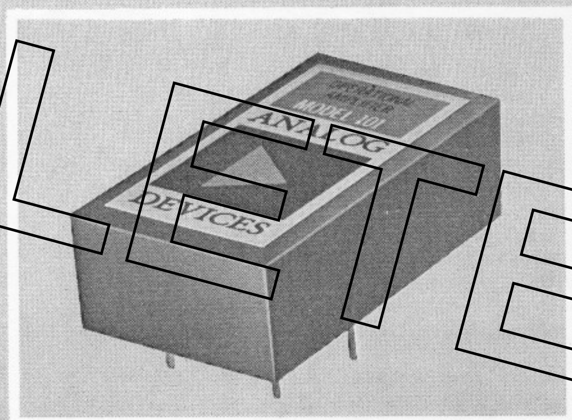
LOW DRIFT

Through unique circuit design, Analog Devices has achieved exceptionally low current and voltage drift without the usual sacrifice in bandwidth. Current drift is only 0.2 na/°C. Three models of the 101 are available with maximum voltage drifts of 5, 10 or 20 μV/°C. Long term stability is better than 10 μV/day.

Initial offset is guaranteed to be less than 1 mV and 2 na. Voltage and current offset due to supply voltage change, respectively less than 15 μV/% and .15 na/%, are an order of magnitude lower than for most differential amplifiers.

SUPPLY VOLTAGE

Rated specifications are given for supply voltages of ±15 to 16 VDC. However, the 101 operates perfectly well with supply voltages down to ±8 VDC. The only degradation is that output voltage and open loop gain are reduced and initial offset voltage and current are increased at the rates of 15 μV/% and 0.15 na/%.



FEATURES

High Open Loop Gain — 100,000
Inverting Bandwidth — 10 mc
Low Drift — 0.2 na/°C and 5 μV/°C
Output Rating — ±11V at 5 ma
Power Supply Voltage — ±8 to 16 VDC
Long Term Drift — 10 μV/day
Low Supply Voltage Coupling — 15 μV/% and .15 na/%

APPLICATIONS

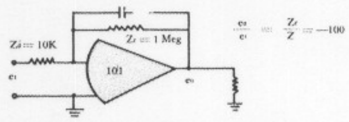
Analog Computer Functions
High Gain DC Servo Preamps
Voltage Comparators and Null Detectors
A to D and D to A Convertors
Stable AC Amplifiers
Instrumentation Amplifiers

ANALOG DEVICES, INC.

221 FIFTH STREET, CAMBRIDGE, MASS. 02142 ■ 617/491-1650
TWX 710/320-0326

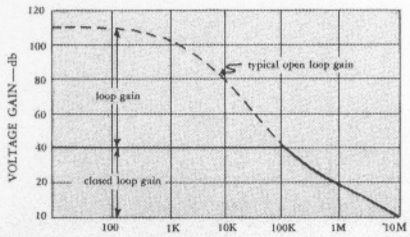
ANALOG DEVICES

TYPICAL ATION

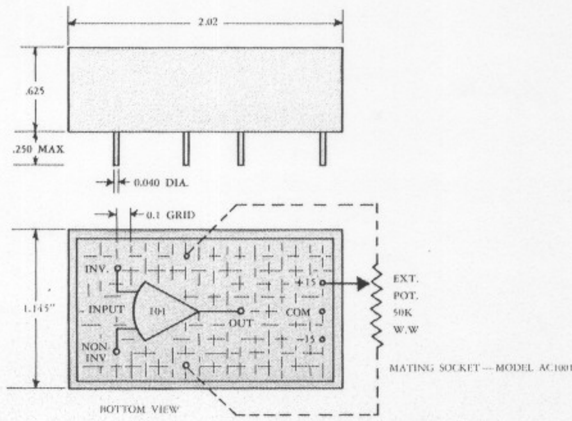


FAST RESPONSE INVERTING AMPLIFIER

NOTE: Small Cf improves stability and reduces overshoot and ringing. See application notes for optimum choice of Cf.



OUTLINE D ONS



OBSOLETE

SPECIFICATIONS (At 25° C, closed loop gain of 100, Z_f = 10K unless otherwise specified)

OPEN LOOP GAIN				
@ DC	100,000 min.			R_L — 2000 ohms
@ 10,000 cps	6,000 min.			R_L — 2000 ohms
RATED OUTPUT				
Voltage	±11 Volts			peak to peak
Current	5 ma.			short circuit protected
FREQUENCY RESPONSE				
Inverting	10 mc			unity gain, small signal
	30 KC			full output voltage
Non-Inverting	500 KC			unity gain, small signal
	500 cps			full output voltage
Overload Recovery	200 μ sec.			
Slewing Rate	2V/μ sec.			inverting mode
INPUT VOLTAGE OFFSET				
Maximum Offset		±1 mV		adj. to zero externally
Avg. Drift vs. temp.	*Model A*	*Model B*	*Model C*	
(−25 to 85°C)	20 μV/°C	10 μV/°C	5 μV/°C	max. limits
Drift vs. supply voltage		15 μV/%		
Drift vs. time		10 μV/day		
Noise		4 μV rms		DC to 50 KC
INPUT CURRENT OFFSET				
Maximum Offset	2 na			max. limits
Avg. Drift vs. temp. (—25 to 85°C)	0.2 na/°C			max. limits
Drift vs. supply voltage	0.15 na/%			
COMMON MODE				
Input Voltage	±10 volts			maximum
Rejection Ratio	20,000:1			typical at dc
INPUT IMPEDANCE				
Differential	4 megohms			typical at dc
Common Mode	500 megohms			
TEMPERATURE RANGE				
Operating	—25 to 85° C			
Storage	—55 to 85° C			
POWER SUPPLY				
Voltage	±15 to 16 VDC*			for rated specs.
Current	+15V	—15V		
Quiescent	12 ma	12 ma		
Full load	19 ma	12 ma		
Short Circuit	42 ma	12 ma		

*OPERATES FROM ±8 TO 16 VDC WITH REDUCED OUTPUT RATINGS.

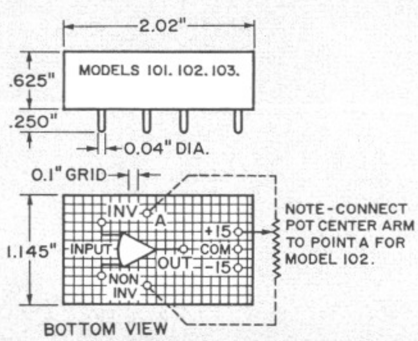
CONTACT YOUR LOCAL REPRESENTATIVE

SPECIFICATIONS (typical @ 25°C unless otherwise noted.)	101 A/B/C Wideband Inverting ±8 to 16V Power Supply 5ma Output Current	102 A/B/C Wideband NonInverting Very High Gain—20ma Fast Slewing Rate	103 A/B/C Low Frequency 20ma Output Current ±8 to 16V Power Supply	106A/B/C 5ma Output Current High Gain Excellent AC ampl.	107A/B/C 5ma Output Current High Gain Reduced Input Current	108A/B/C Low Frequency Lowest Input Current High Input Impedance
	HIGH PERFORMANCE DIFFERENTIAL — Excellent time drift, low initial voltage offset, high input impedance, low input current, high gain and selection of voltage drifts to 5uV/°C			**LOW COST DIFFERENTIAL** — For greatest economy without the usual sacrifice in gain, drift and output current. AC gain of 94db to 1KC on 106/107.		
OPEN LOOP GAIN @ DC, rated load, min.	10^5	2×10^6	10^5	2.5×10^5	2.5×10^5	10^5
RATED OUTPUT						
Voltage, min.	±11V	±11V	±11V	±10V	±10V	±10V
Current, min.	5ma.	20ma.	20ma.	5ma.	5ma.	2.5ma
FREQUENCY RESPONSE						
Unity gain, small signal	10mc	10mc	500KC	2 mc	2 mc	500KC
Full Output Voltage	30KC	300KC	2KC	20KC	20KC	2KC
Slewing Rate	2V/μsec	30V/μsec	0.13V/μsec	1.2V/μsec	1.2V/μsec	0.12V/μsec.
Overload Recovery	200μsec	—	5msec.	1msec	1msec	5msec
INPUT VOLTAGE OFFSET						
Initial Offset, @ 25°C, max.[1]	±1mV	±1mV	±1mV	—	—	—
Avg. vs. temp., max.[5]	Models A — 20μV/°C, B — 10μV/°C, C — 5μV/°C			Models A — 20μV/°C, B — 10μV/°C, C — 5μV/°C		
vs. supply voltage, max.	15μV/%	10μV/%	15μV/%	20μV/%	20μV/%	20μV/%
vs. time	10μV/day	10μV/day	10μV/day	50μV/day	50μV/day	50μV/day
INPUT CURRENT OFFSET						
Initial Offset, @ 25°C, max.	±2na	±2na	±2na	(0,±)50na	± 5 na.	±2na
Avg. vs. temp., max.[5]	0.2na/°C	0.4na/°C	0.2na/°C	±0.7na/°C	±0.9na/°C	±0.2na/°C[7]
vs. supply voltage, max.	0.15na/%	0.15na/%	0.15na/%	±0.5na/%	±0.5na/%	0.3na/%
INPUT IMPEDANCE						
Between Inputs	4MΩ	6MΩ	4MΩ	1MΩ	1MΩ	4MΩ
Common Mode	500MΩ	500MΩ	500MΩ	100MΩ	100MΩ	500MΩ
INPUT VOLTAGE						
Max. Between Inputs	±15V	±15V	±15V	±15V	±15V	±15V
Max. Common Mode	±10V	±10V	±10V	±10V	±10V	±10V
Common Mode Rejection	20,000	20,000	20,000	10,000	10,000	10,000
INPUT NOISE						
Voltage, DC to 1CPS, P to P	—	—	—	—	—	—
5 to 50KC, RMS	4μV	8μV	4μV	4μV	4μV	4μV
Current, DC to 1CPS, P to P	—	—	—	—	—	—
POWER SUPPLY						
Voltage	±(8 to 16) VDC[2]	±(15 to 16) VDC	±(8 to 16) VDC[2]	±(15 to 16) VDC	±(15 to 16) VDC	±(15 to 16) VDC
Current, rated load	20ma.	35ma.	30ma.	13 ma.	13ma.	8.5ma.
CASE SIZE	Fig. 1	Fig. 1	Fig. 1	Fig. 2	Fig. 2	Fig. 2

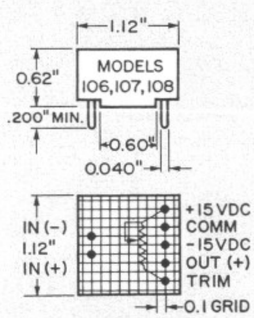
PRICE	101 A	101 B	101 C	102 A	102 B	102 C	103 A	103 B	103 C	106 A	106 B	106 C	107 A	107 B	107 C	108 A	108 B	108 C
1-9	$68	78	98	95	105	120	74	84	104	21	26	31	24	29	34	28	33	38
10-24	$66	75	95	92	102	116	71	81	101	20	25	30	23	28	33	26	31	36

OBSOLETE

ANALOG DEVICES



BOTTOM VIEW
FIGURE I



BOTTOM VIEW
FIGURE 2

Note 1 — Offset within specified limits with no external adjustment. All units adjustable to zero external pot.

Note 2 — Specifications given for ±15VDC.

Note 3 — Maximum operating and storage temperature is 75°C.