

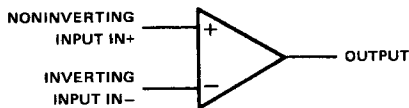
- Open-Loop Voltage Amplification  
... 3600 Typ
- CMRR ... 100 dB Typ
- Designed to be Interchangeable with  
Fairchild  $\mu$ A702

**description**

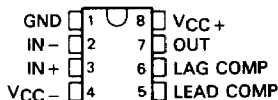
The  $\mu$ A702 is a high-gain, wideband operational amplifier having differential inputs and single-ended emitter-follower outputs. Provisions are incorporated within the circuit whereby external components may be used to compensate the amplifier for stable operation under various feedback or load conditions. Component matching, inherent in silicon monolithic circuit-fabrication techniques, produces an amplifier with low-drift and low-offset characteristics. The  $\mu$ A702 is particularly useful for applications requiring transfer or generation of linear and nonlinear functions up to a frequency of 30 MHz.

The  $\mu$ A702 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ .

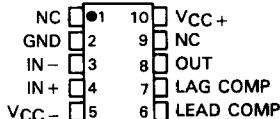
**symbol**



**JG DUAL-IN-LINE PACKAGE  
(TOP VIEW)**

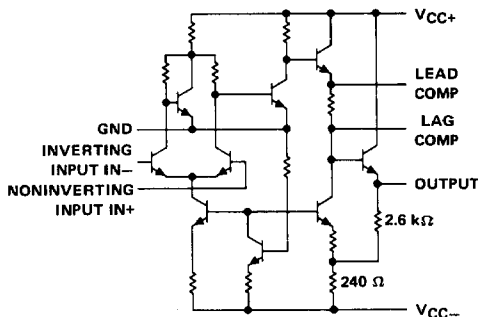


**U FLAT PACKAGE  
(TOP VIEW)**



NC—No internal connection

**schematic**



Component values shown are nominal

**3**

**Operational Amplifiers**

**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)**

Supply voltage $V_{CC+}$ (see Note 1)	14 V
Supply voltage $V_{CC-}$ (see Note 1)	-7 V
Differential input voltage (see Note 2)	$\pm 5$ V
Input voltage (either input, see Notes 1 and 3)	-6 V to 1.5 V
Peak output current ( $t_w \leq 1$ s)	50 mA
Continuous total dissipation at (or below) $70^{\circ}\text{C}$ free-air temperature (see Note 4)	300 mW
Operating free-air temperature	$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$
Storage temperature range	$-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	$300^{\circ}\text{C}$

- NOTES: 1. All voltage values, unless otherwise noted, are with respect to the network ground terminal.  
 2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.  
 3. The magnitude of the input voltage must never exceed the magnitude of the lesser of the two supply voltages.  
 4. For operation above  $70^{\circ}\text{C}$  free-air temperature, refer to Dissipation Derating Curves, Section 2. In the JG packages,  $\mu$ A702M chips are alloy-mounted.

# TYPE $\mu$ A702M GENERAL-PURPOSE OPERATIONAL AMPLIFIER

## electrical characteristics at specified free-air temperature

PARAMETER	TEST CONDITIONS†		$V_{CC+} = 12\text{ V}$ $V_{CC-} = -6\text{ V}$			$V_{CC+} = 6\text{ V}$ $V_{CC-} = -3\text{ V}$			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
$V_{IO}$ Input offset voltage	$R_S \leq 2\text{ k}\Omega$	25°C	0.5		2		0.7		3	
		Full range			3				4	
$\alpha_{VIO}$ Average temperature coefficient of input offset voltage	$R_S = 50\ \Omega$	-55°C to 25°C	2		10		3		15	
		25°C to 125°C	2.5		10		3.5		15	
$I_{IO}$ Input offset current		25°C	0.2	0.5			0.12	0.5	$\mu\text{A}$	
		-55°C	0.4	1.5			0.3	1.5		
		125°C	0.08	0.5			0.05	0.5		
$\alpha_{IIO}$ Average temperature coefficient of input offset current		-55°C to 25°C	3		16		2		13	
		25°C to 125°C	1		5		0.7		4	
$I_{IB}$ Input bias current		25°C	2		5		1.2		3.5	
		-55°C	4.3		10		2.6		7.5	
$V_{ICR}$ Common-mode input voltage range	Positive swing	25°C	0.5	1			0.5	1	V	
	Negative swing		-4	-6			-1.5	-2		
$V_{OM}$ Maximum peak output voltage swing	$R_L \geq 100\text{ k}\Omega$	25°C	$\pm 5$	$\pm 6.3$			$\pm 2.5$	$\pm 2.7$	V	
		Full range	$\pm 5$				$\pm 2.5$			
	$R_L = 10\text{ k}\Omega$	25°C	$\pm 3.5$	$\pm 4$			$\pm 1.5$	$\pm 2$		
		Full range	$\pm 3.5$				$\pm 1.5$			
$A_{VD}$ Large-signal differential voltage amplification	$R_L \geq 100\text{ k}\Omega$	$V_O = \pm 5\text{ V}$	25°C	2500	3600	6000				
			Full range	2000		7000				
	$V_O = \pm 2.5\text{ V}$	25°C			600	900	1500			
		Full range			500		1750			
$r_i$ Input resistance		25°C	16	40			22	67	k $\Omega$	
		Full range	6				8			
$r_o$ Output resistance	$V_O = 0$ , See Note 5	25°C	200		500		300		700	
CMRR Common-mode rejection ratio	$R_S \leq 2\text{ k}\Omega$	25°C	80	100			80	100	dB	
		Full range	70				70			
$k_{SVS}$ Supply voltage sensitivity ( $\Delta V_{IO}/\Delta V_{CC}$ )	$R_S \leq 2\text{ k}\Omega$	25°C	75				75		$\mu\text{V/V}$	
		Full range			200		200			
$I_{CC}$ Supply current	No load, No signal	25°C	5		6.7		2.1		3.3	
		-55°C	5		7.5		2.1		3.9	
		125°C	4.4		6.7		1.7		3.3	
		25°C	90		120		19		30	
$P_D$ Total power dissipation	No load, No signal	-55°C	90		135		19		35	
		125°C	80		120		15		30	
		25°C								

† All characteristics are specified under open-loop operation. Full range is -55°C to 125°C.

NOTE 5: This typical value applies only at frequencies above a few hundred hertz because of the effects of drift and thermal feedback.

3

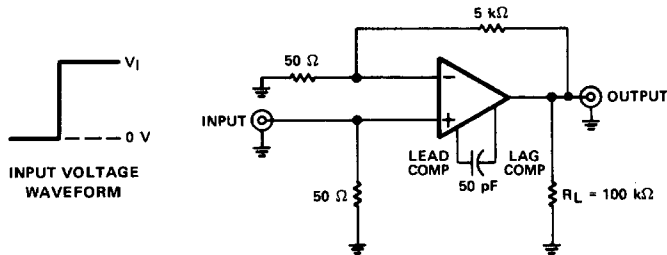
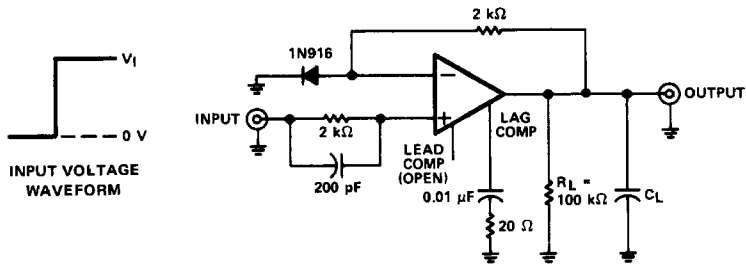
Operational Amplifiers

# TYPE $\mu$ A702M GENERAL-PURPOSE OPERATIONAL AMPLIFIER

operating characteristics  $V_{CC+} = 12\text{ V}$ ,  $V_{CC-} = -6\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST FIGURE	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_r$ Rise time	1	$V_i = 10\text{ mV}$ , $C_L = 0$		25	120	ns
	2	$V_i = 1\text{ mV}$		10	30	ns
Overshoot factor	1	$V_i = 10\text{ mV}$ , $C_L = 100\text{ pF}$		10%	50%	
	2	$V_i = 1\text{ mV}$		20%	40%	
SR Slew rate	1	$V_i = 6\text{ V}$ , $C_L = 100\text{ pF}$		1.7		$\text{V}/\mu\text{s}$
	2	$V_i = 100\text{ mV}$		11		

## PARAMETER MEASUREMENT INFORMATION

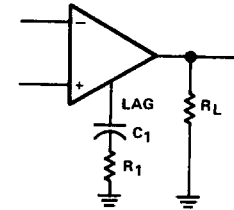
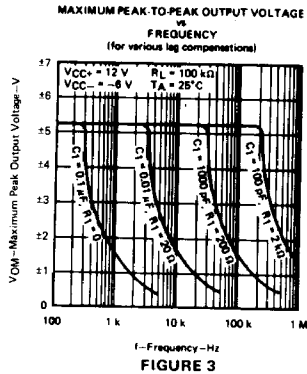


3

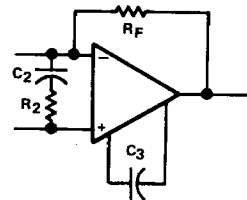
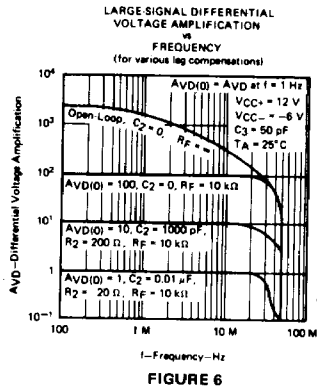
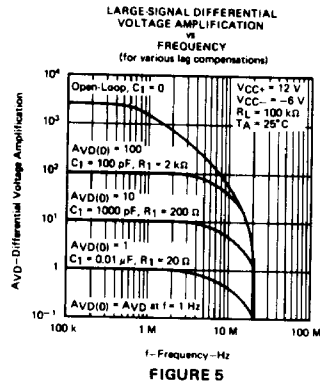
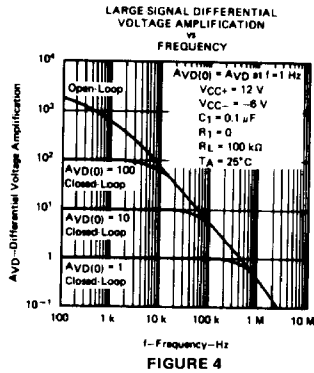
Operational Amplifiers

# TYPE $\mu$ A702M GENERAL-PURPOSE OPERATIONAL AMPLIFIER

## TYPICAL CHARACTERISTICS



LAG COMPENSATION CIRCUIT  
FOR FIGURES 3, 4, AND 5



LEAD-LAG COMPENSATION CIRCUIT  
FOR FIGURE 6

3

Operational Amplifiers