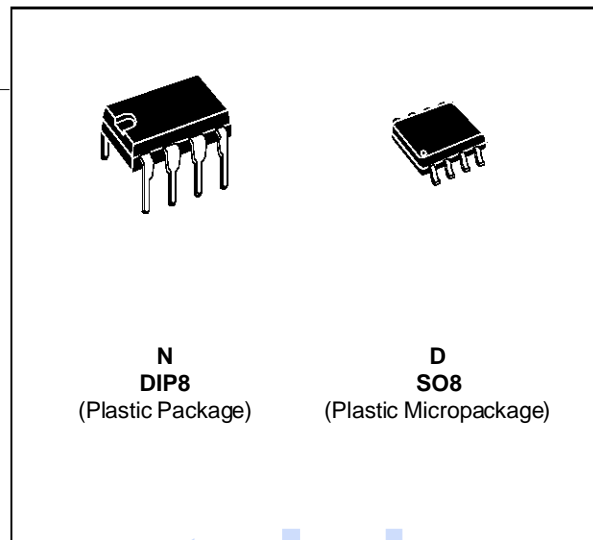


## SINGLE OPERATIONAL AMPLIFIER

	LM101A LM201A	LM301A
■ INPUT OFFSET VOLTAGE	0.7mV	2mV
■ INPUT BIAS CURRENT	25nA	70nA
■ INPUT OFFSET CURRENT	1.5nA	2nA
■ SLEW RATE AS INVERTING AMPLIFIER	10V/μs	10V/μs



### DESCRIPTION

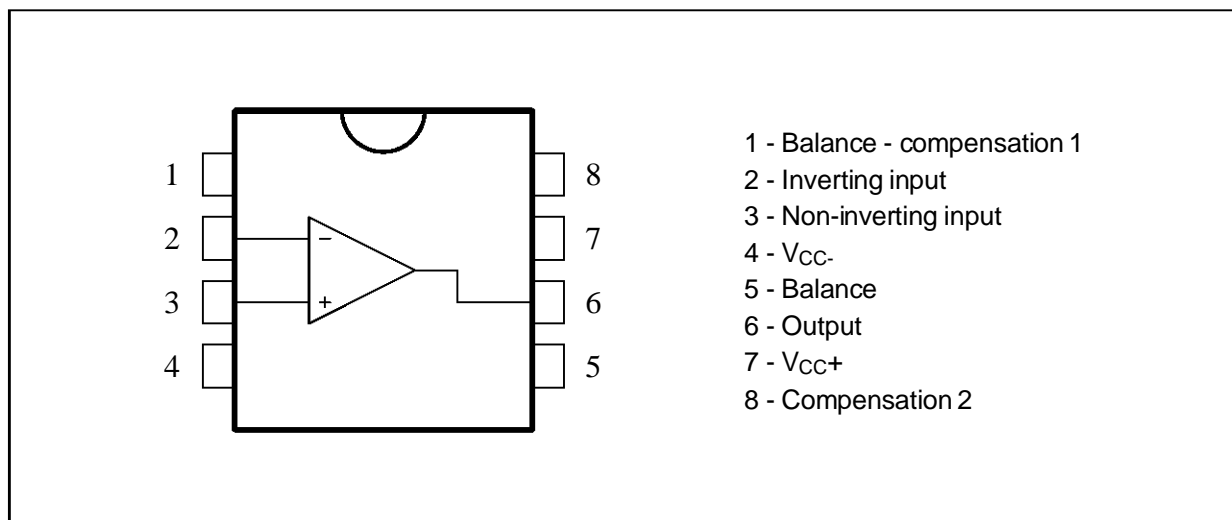
The LM101A is a general-purpose operational amplifier which offers many features : supply voltages from  $\pm 5V$  to  $\pm 22V$ , low current drain, overload protection on the input and output, no latch-up when the common-mode range is exceeded, free from oscillations and compensation with a single 30pF capacitor. It has advantages over internally compensated amplifiers in that the compensation can be tailored to the particular application : slew rate of 10V/μs and bandwidth of 3.5MHz can be easily achieved.

### ORDER CODES

Part Number	Temperature Range	Package	
		N	D
LM101A	-55°C, +125°C	•	•
LM201A	-40°C, +105°C	•	•
LM301A	0°C, +70°C	•	•

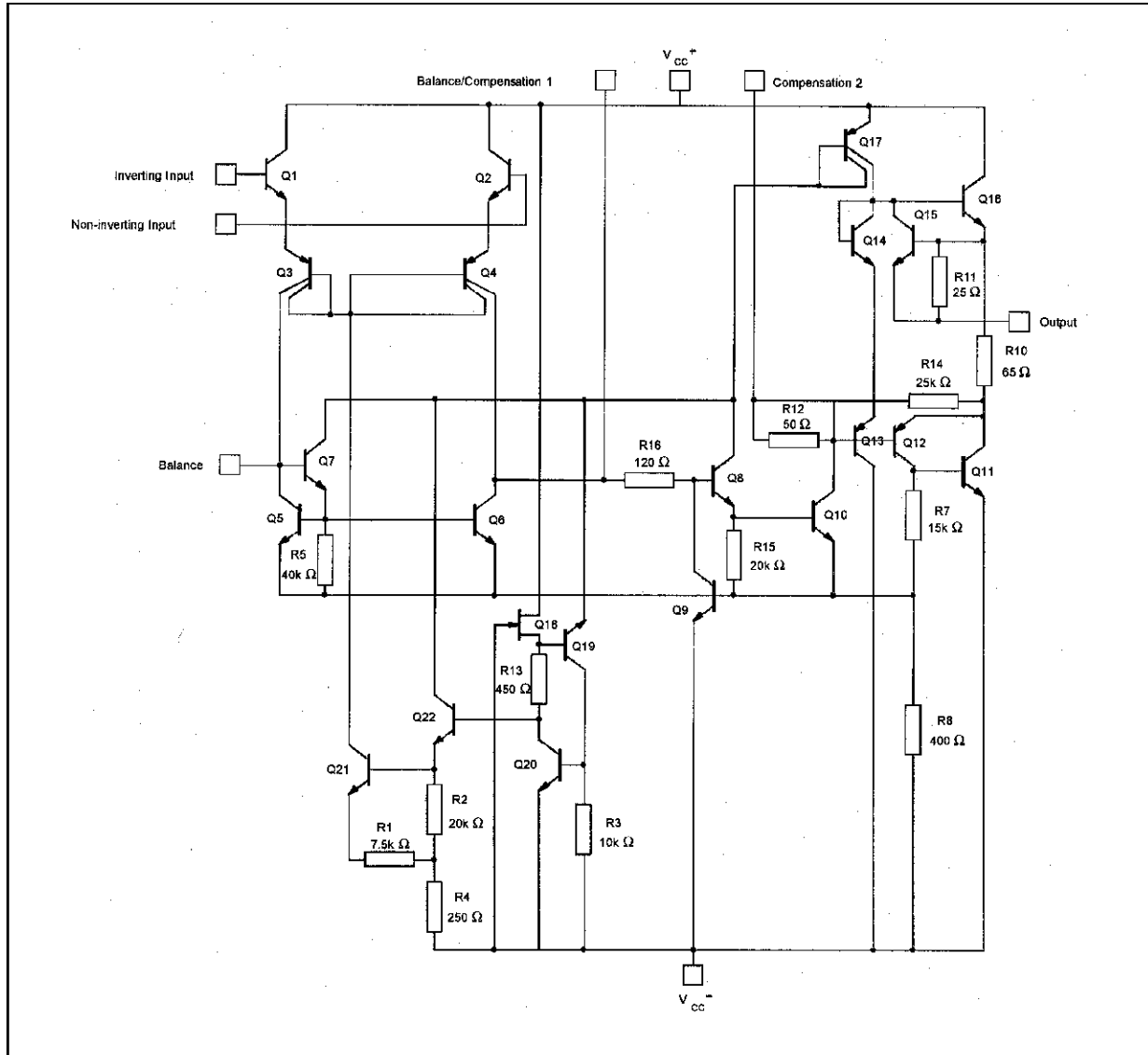
**Example :** LM201AN

### PIN CONNECTIONS (top view)



# LM101A - LM201A - LM301A

## SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LM101A	LM201A	LM301A	Unit
$V_{cc}$	Supply Voltage		$\pm 22$		V
$V_{id}$	Differential Input Voltage		$\pm 30$		V
$V_i$	Input Voltage		$\pm 15$		V
$P_{tot}$	Power Dissipation		500 300		mW
	Output Short-circuit Duration		Infinite		
$T_{oper}$	Operating Free Air Temperature Range	-55 to +125	-40 to +105	0 to +70	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature Range	-65 to +150	-65 to +150	-65 to +150	$^{\circ}\text{C}$

**ELECTRICAL CHARACTERISTICS**

**LM301A**     $0^{\circ}\text{C} < T_{\text{amb}} < +70^{\circ}\text{C}$      $\pm 5\text{V} \leq V_{\text{CC}} \leq \pm 20\text{V}$      $C1 = 30\text{pF}$   
**LM201A**     $-40^{\circ}\text{C} < T_{\text{amb}} < +105^{\circ}\text{C}$      $\pm 5\text{V} \leq V_{\text{CC}} \leq \pm 20\text{V}$      $C1 = 30\text{pF}$   
**LM101A**     $-55^{\circ}\text{C} < T_{\text{amb}} < +125^{\circ}\text{C}$      $\pm 5\text{V} \leq V_{\text{CC}} \leq \pm 20\text{V}$      $C1 = 30\text{pF}$

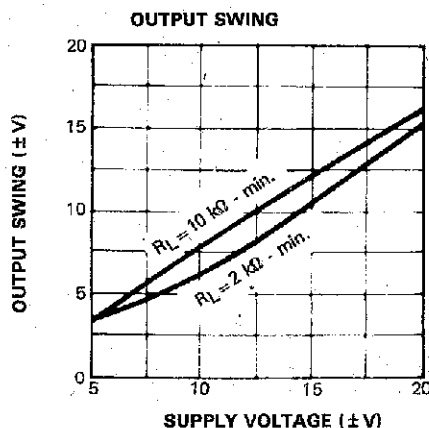
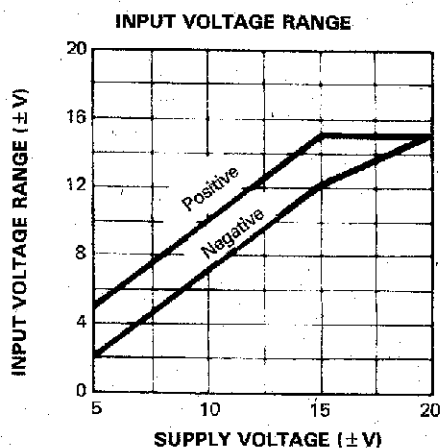
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
$V_{io}$	Input Offset Voltage ( $R_S \leq 10\text{k}\Omega$ ) $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		0.7	2 3		2	7.5 10	mV
$DV_{io}$	Input Offset Voltage Drift $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		3	15		6	30	$\mu\text{V}/^{\circ}\text{C}$
$I_{ib}$	Input Bias Current $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		25	75 100		70	250 300	nA
$I_{io}$	Input Offset Current $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		1.5	10 20		2	50 70	nA
$DI_{io}$	Input Offset Current Drift $25^{\circ}\text{C} \leq T_{\text{amb}} \leq T_{\text{max.}}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		10 20	100 200		10 20	300 600	$\text{pA}/^{\circ}\text{C}$
$A_{vd}$	Large Signal Voltage Gain * ( $V_O \leq 10\text{V}$ , $R_L = 2\text{k}\Omega$ ) $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$	50 25	100		25 15	100		V/mV
SVR	Supply Voltage Rejection Ratio ( $R_S \leq 10\text{k}\Omega$ ) $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$	80 80	96		70 70	96		dB
$I_{CC}$	Supply Current, no load $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		1.8	3 3		1.8	3 3	mA
$V_{icm}$	Input Common Mode Voltage Range ( $V_{CC} = \pm 20\text{V}$ ) $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$	$\pm 15$ $\pm 15$			$\pm 15$ $\pm 15$			V
CMR	Common-mode Rejection Ratio ( $R_S \leq 10\text{k}\Omega$ ) $T_{\text{amb}} = +25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$	80 80	96		70 70	96		dB
$I_{OS}$	Output Short-circuit Current * $T_{\text{amb}} = +25^{\circ}\text{C}$	10	30	50	10	30	50	mA
$\pm V_{OPP}$	Output Voltage Swing * $T_{\text{amb}} = +25^{\circ}\text{C}$ $R_L = 10\text{k}\Omega$ $R_L = 2\text{k}\Omega$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$ $R_L = 10\text{k}\Omega$ $R_L = 2\text{k}\Omega$	12 10 12 10	14 13		12 10 12 10	14 13		V

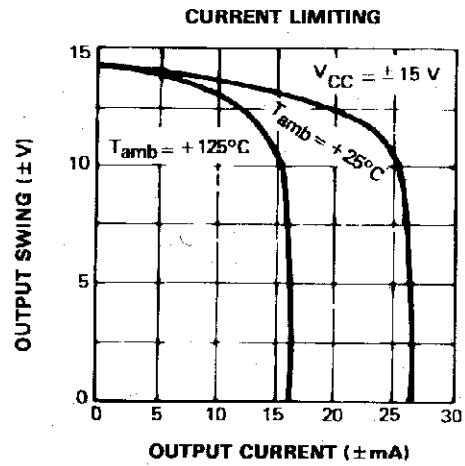
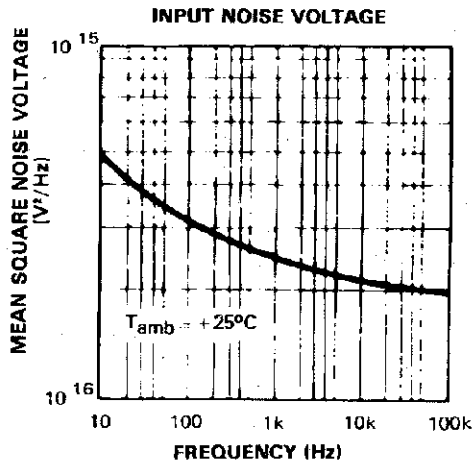
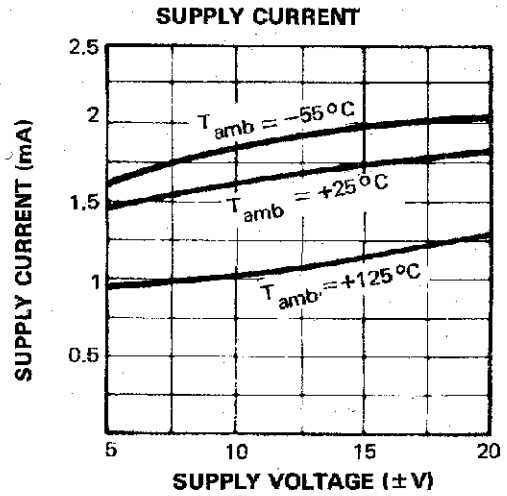
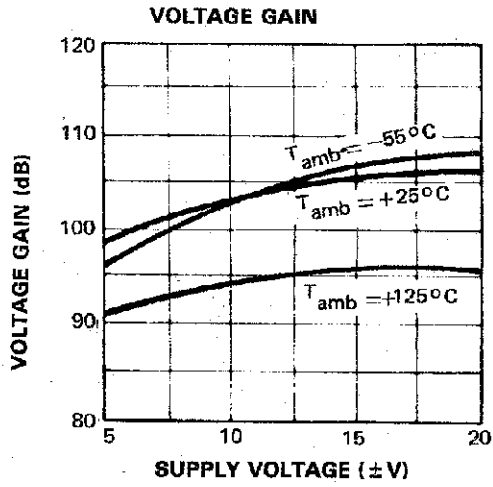
# LM101A - LM201A - LM301A

## ELECTRICAL CHARACTERISTICS (continued)

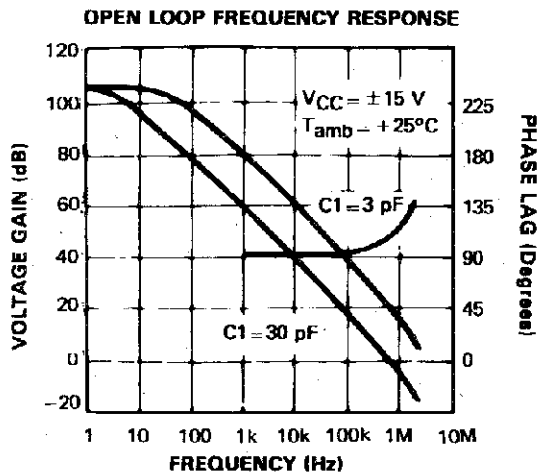
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
SR	Slew Rate ( $V_i = \pm 10V$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain) - (note 1) *	0.25	0.5		0.25	0.5		V/ $\mu s$
$t_r$	Rise Time ( $V_i = \pm 20\mu V$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain) *		0.3			0.3		$\mu s$
Kov	Overshoot ( $V_i = 20mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain)		5			5		%
$Z_i$	Input Impedance *	1.5	4		1.5	4		M $\Omega$
$R_o$	Output Resistance *		75			75		$\Omega$
GBP	Gain Bandwidth Product * ( $V_i = 10mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $f = 100kHz$ , $T_{amb} = 25^\circ C$ )	0.5	1		0.5	1		MHz
THD	Total Harmonic Distortion ( $f = 1kHz$ , $A_V = 20dB$ , $R_L = 2k\Omega$ , $V_O = 2V_{PP}$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ )		0.015			0.015		%
$e_n$	Equivalent Input Noise Voltage ( $f = 1kHz$ , $R_s = 100\Omega$ )		25			25		$\frac{nV}{\sqrt{Hz}}$

Notes : 1. May be improved up to 10V/ $\mu s$  in inverting amplifier configuration  
 \* =>  $V_{CC} = \pm 15V$   $T_{amb} = +25^\circ C$  (unless otherwise specified)

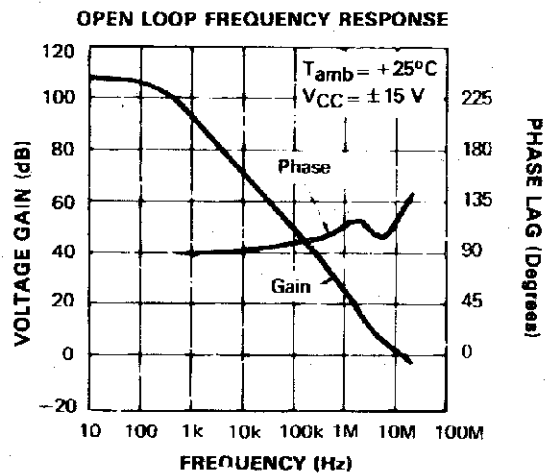




## SINGLE POLE COMPENSATION

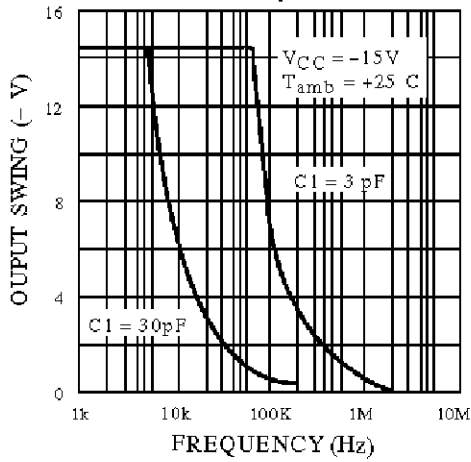


## FEED FORWARD COMPENSATION



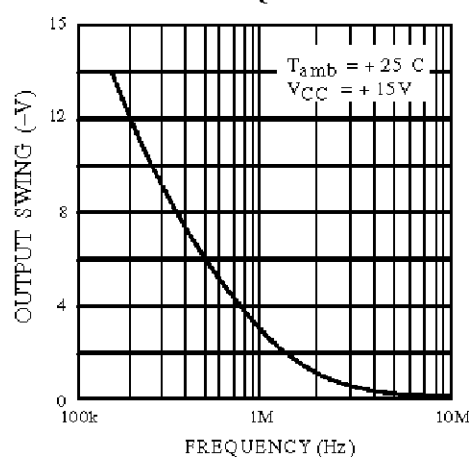
SINGLE POLE COMPENSATION

LARGE SIGNAL FREQUENCY RESPONSE

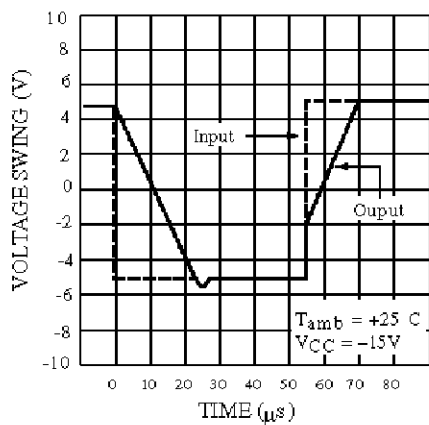


FEED FORWARD COMPENSATION

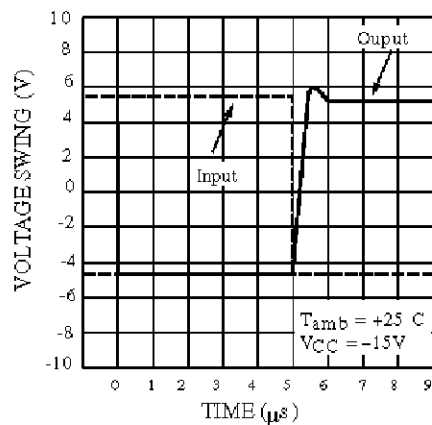
LARGE SIGNAL FREQUENCY RESPONSE



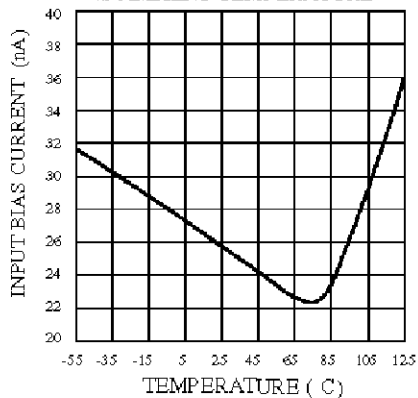
VOLTAGE FOLLOWER PULSE RESPONSE



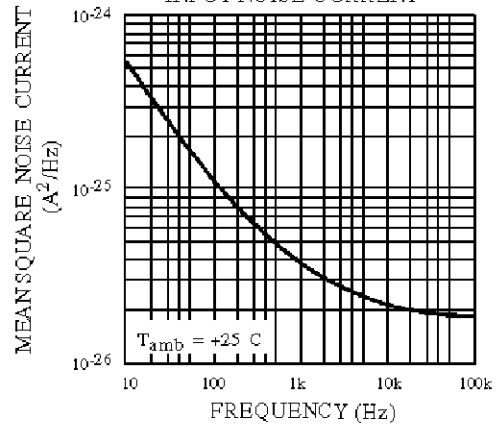
INVERTER PULSE RESPONSE



INPUT BIAS CURRENT vs AMBIENT TEMPERATURE

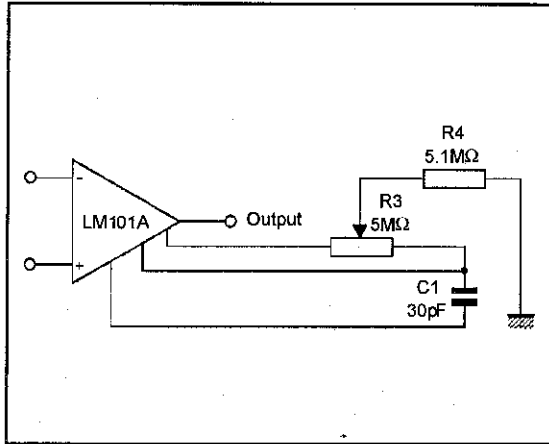


INPUT NOISE CURRENT

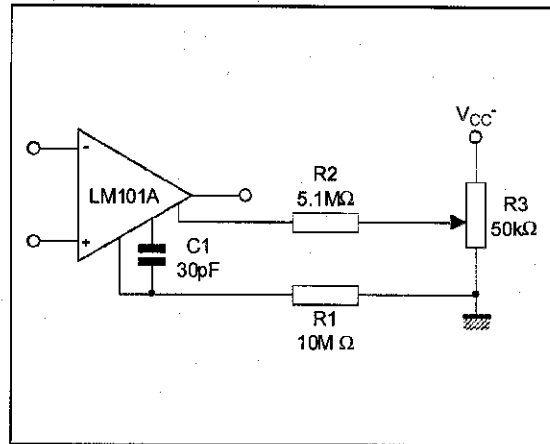


**BASIC DIAGRAM**

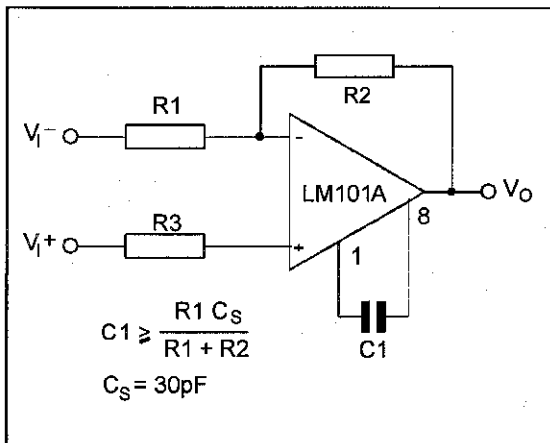
**BALANCING CIRCUIT**



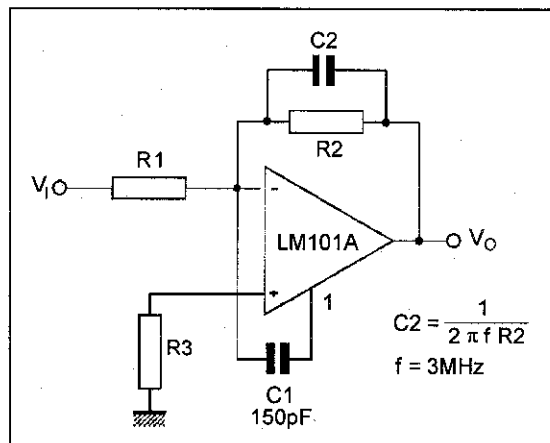
**ALTERNATE BALANCING CIRCUIT**



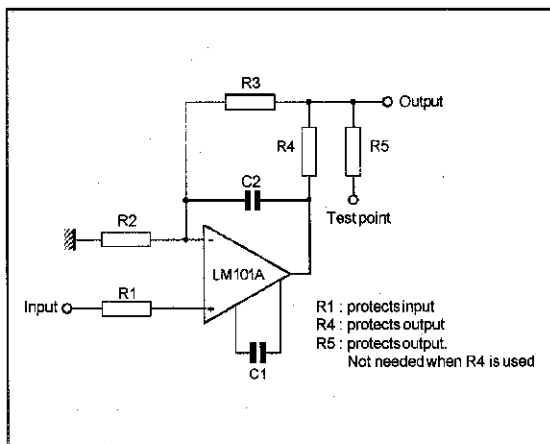
**SINGLE POLE COMPENSATION**



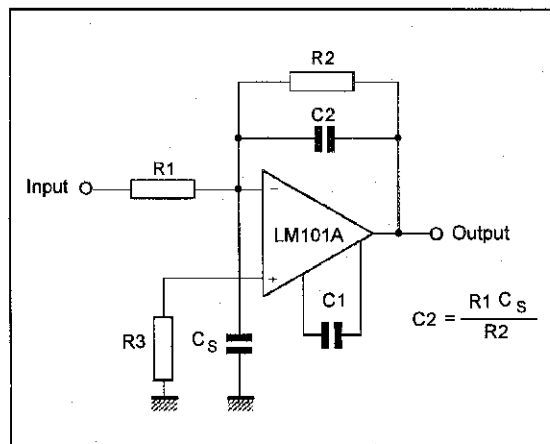
**FEEDFORWARD COMPENSATION**



**PROTECTING AGAINST GROSS FAULT CONDITIONS**

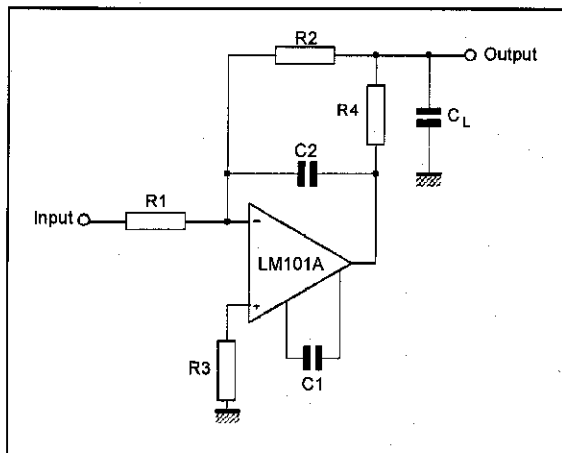


**COMPENSATING FOR STRAY INPUT CAPACITANCES OR LARGE FEEDBACK RESISTOR**



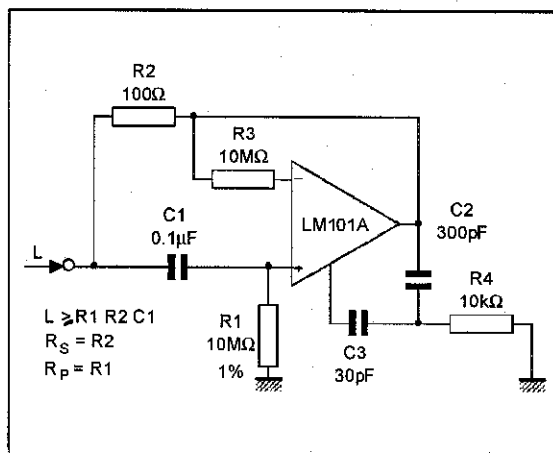
**BASIC DIAGRAM (continued)**

**ISOLATING LARGE CAPACITIVE LOAD**

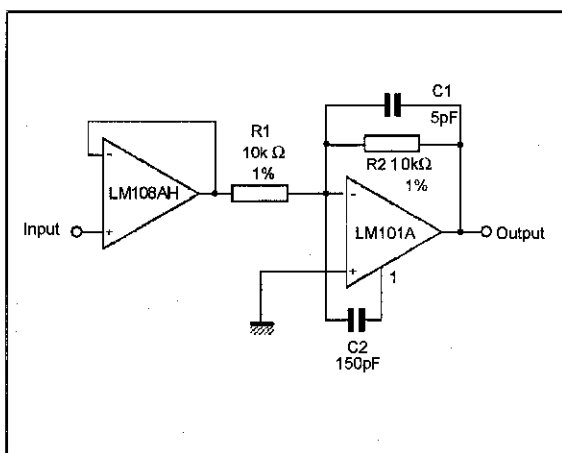


**TYPICAL APPLICATIONS**

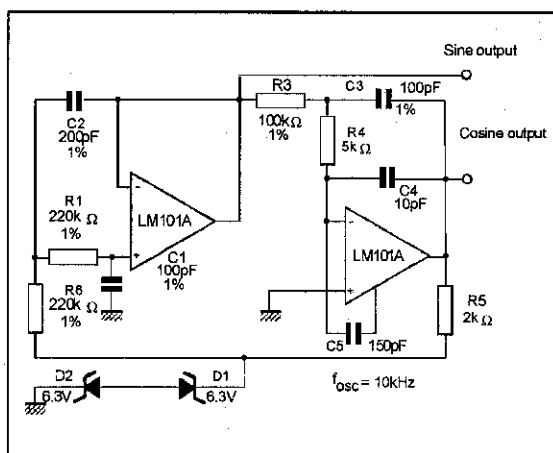
**SIMULATED INDUCTOR**



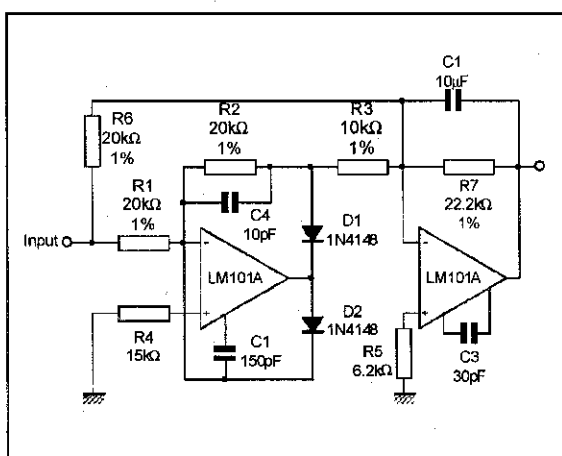
**FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE**



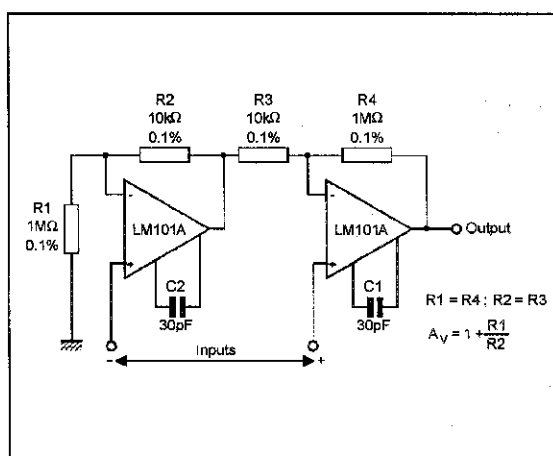
**SINE WAVE OSCILLATOR**



**FAST AC/DC CONVERTER**



**INSTRUMENTATION AMPLIFIER**

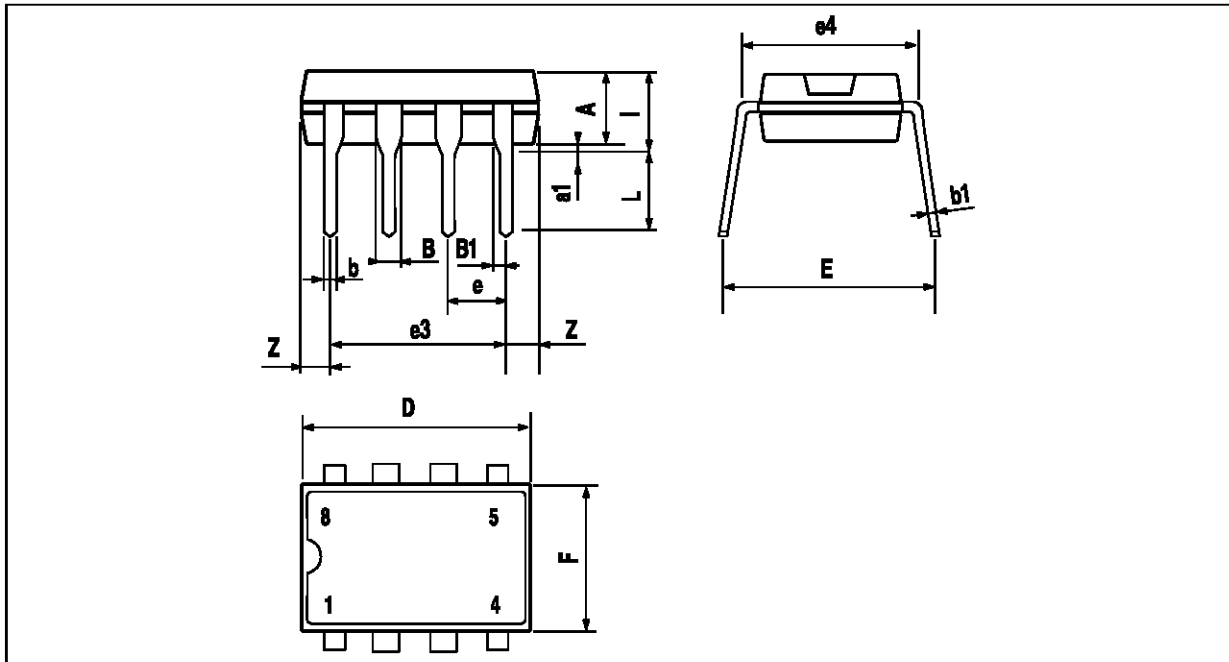






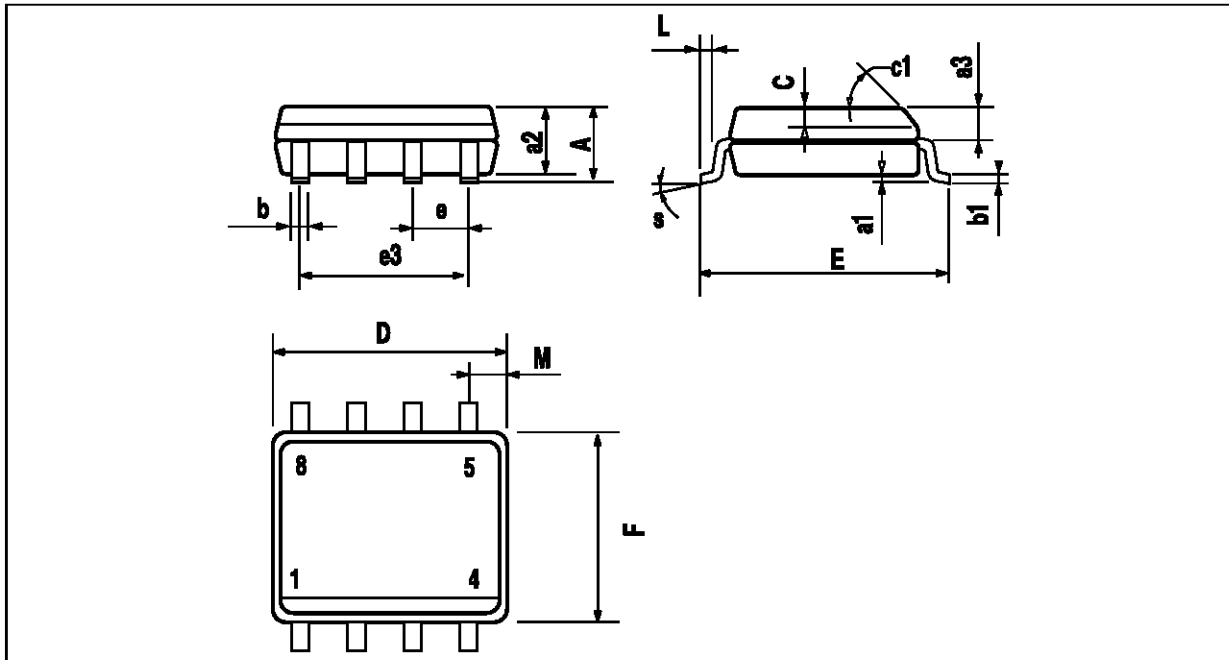
**LM101A - LM201A - LM301A**

**PACKAGE MECHANICAL DATA**  
8 PINS - PLASTIC DIP



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

**PACKAGE MECHANICAL DATA**  
8 PINS - PLASTIC MICROPACKAGE (SO)



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

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