LM101A-LM201A
LM301A

SINGLE OPERATIONAL AMPLIFIERS

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

DESCRIPTION

The LM101A is a general purpose operational amplifier which offers many features: supply voltages from ±5V to ±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 CODE

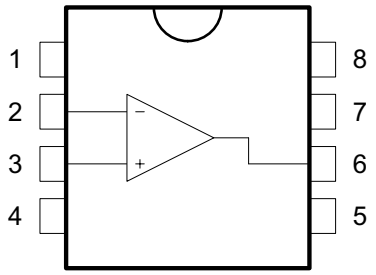
Part Number	Temperature Range	Package	
		N	D
LM101A	-55°C, +125°C	•	•
LM201A	-40°C, +105°C	•	•
LM301A	0°C, +70°C	•	•
Example : LM201AN			

N = Dual in Line Package (DIP)
D = Small Outline Package (SO) - also available in Tape & Reel (DT)

N
DIP8
(Plastic Package)

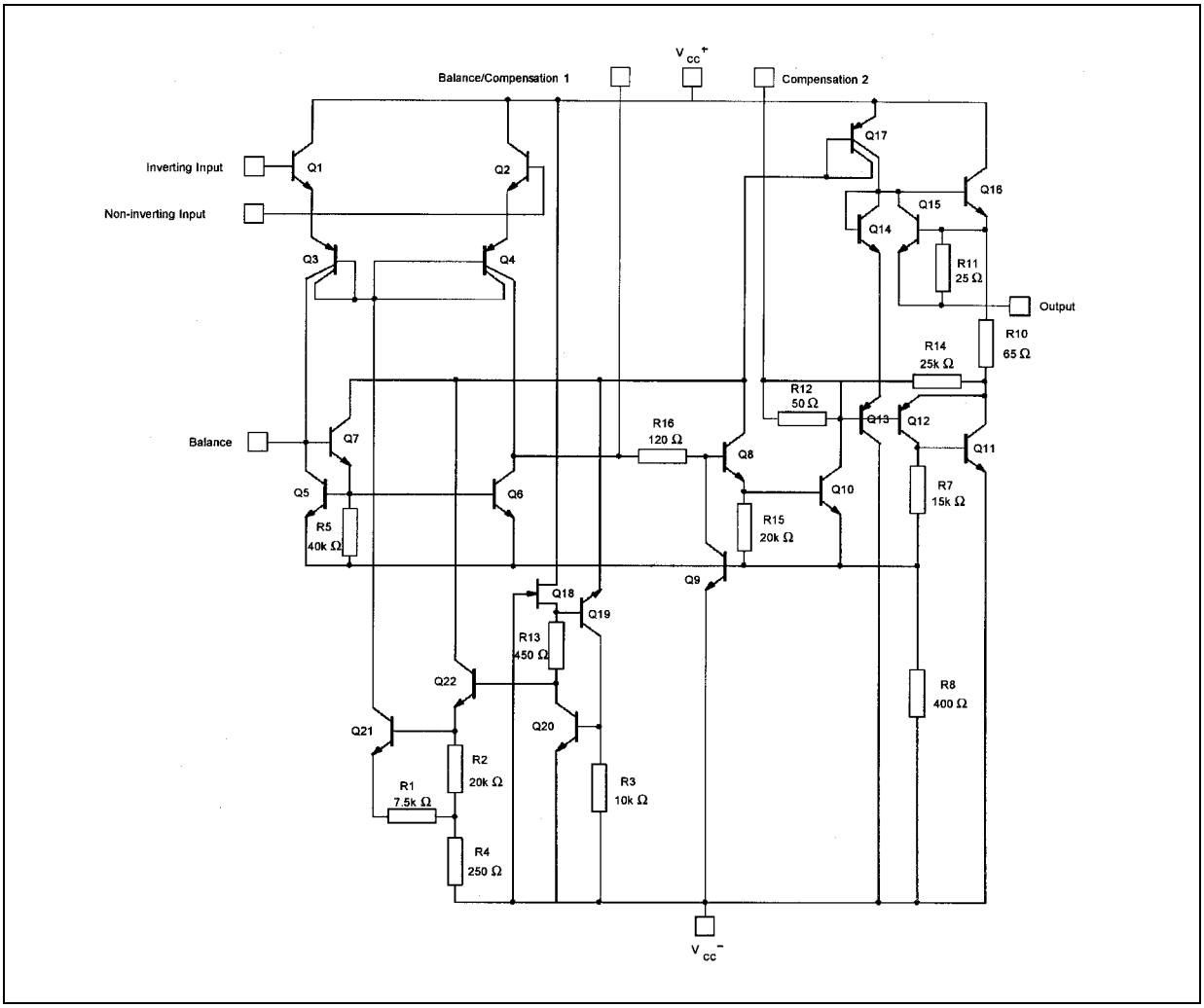
D
SO8
(Plastic Micropackage)

PIN CONNECTIONS (top view)



1 - Balance, compensation
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^-
5 - Balance
6 - Output
7 - V_{CC}^+
8 - Compensation 2

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LM101A	LM201A	LM301A	Unit
V_{CC}	Supply voltage	±22			V
V_i	Input Voltage	±15			V
V_{id}	Differential Input Voltage	±30			V
P_{tot}	Power Dissipation N Suffix D Suffix	500 300			mW
	Output Short-circuit Duration	Infinite			
T_{oper}	Opearting Free-air Temperature Range	-55 to +125	-40 to +105	0 to +70	°C
T_{stg}	Storage Temperature Range	-65 to +150			°C

ELECTRICAL CHARACTERISTICS

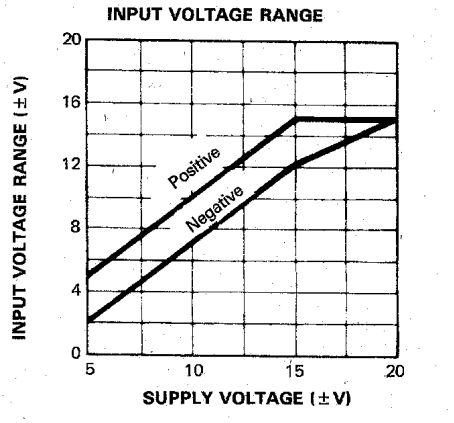
$\pm 5V \leq V_{CC} \leq \pm 20V$, C1 = 30pF, T_{amb} = 25°C (unless otherwise specified)

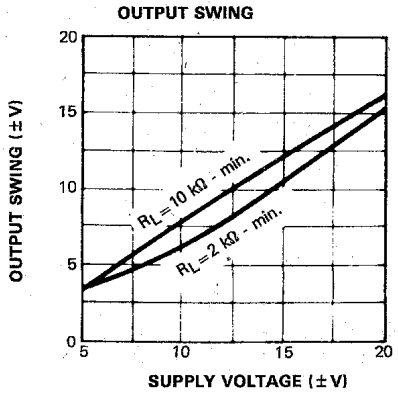
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S \leq 10k\Omega$) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$		0.7	2 3		2	7.5 10	mV
DV_{io}	Input Offset Voltage Drift $T_{min} \leq T_{amb} \leq T_{max}$		3	15		6	30	µV/°C
I_{ib}	Input Bias Current - note T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$		25	75 100		70	250 300	nA
I_{io}	Input Offset Current T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$		1.5	10 20		2	50 70	nA
DI_{Iio}	Input Offset Current Drift $T_{min} \leq T_{amb} \leq 25°C$ $T_{min} \leq T_{amb} \leq T_{max}$		10 20	100 200		10 20	300 600	pA/°C
A_{vd}	Large Signal Voltage Gain * $V_O \leq 10V$, R_L = 2kΩ) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$	50 25	100		25 15	100		V/mV
SVR	Supply Voltage Rejection Ratio ($R_S \leq 10k\Omega$) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$	80 80	96		70 70	96		dB
I_{CC}	Supply Current, no load T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$		1.8	3 3		1.8	3 3	mA
V_{icm}	Input Common Mode Voltage Range ($V_{CC} = \pm 20V$) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$	±15 ±15			±15 ±15			V
CMR	Common Mode Rejection Ratio ($R_S \leq 10k\Omega$) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$	80 80	96		70 70	96		dB
I_{OS}	Output Short-circuit Current * T_{amb} = +25°C	10	30	50	10	30	50	mA
$\pm V_{OPP}$	Output Voltage Swing * T_{amb} = +25°C R_L = 10kΩ R_L = 2kΩ $T_{min} \leq T_{amb} \leq T_{max}$ R_L = 10kΩ R_L = 2kΩ	12 10 12 10	14 13		12 10 12 10	14 13		V
SR	Slew Rate (V_i = ±10V, R_L = 2kΩ,C_L = 100pF, unity gain) - 1)	0.25	0.5		0.25	0.5		V/µs

Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
t_r	Rise (V_i = ±20mV, R_L = 2kΩ,C_L = 100pF, unity gain)		0.3			0.3		µs
K_{OV}	Overshoot (V_i = 20mV, R_L = 2kΩ,C_L = 100pF, unity gain)		5			5		%
Z_i	Input Impedance *	1.5	4		1.5	4		MΩ
GBP	Gain Bandwidth Product * (V_i = 10mV, R_L = 2kΩ,C_L = 100pF, f = 100KHz)	0.5	1		0.5	1		MHz
THD	Total Harmonic Distortion (f = 1kHz, A_v = 20dB, R_L = 2kΩ, V_o = $2V_{pp}$, C_L = 100pF)		0.015			0.015		%
e_n	Equivalent Input Noise Voltage f = 1kHz, R_S = 100Ω		25			25		$\frac{nV}{\sqrt{Hz}}$

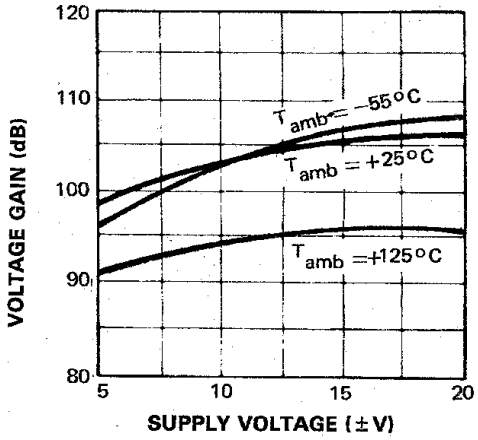
1. May be improved up to 10V/µs in inverting amplifier configuration

* ==> V_{CC} = ±15V, T_{amb} = +25°C (unless otherwise specified)

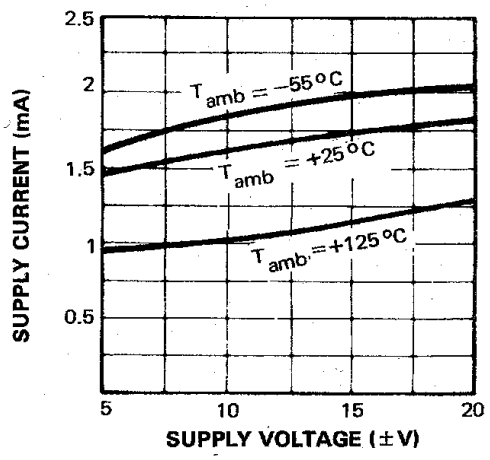




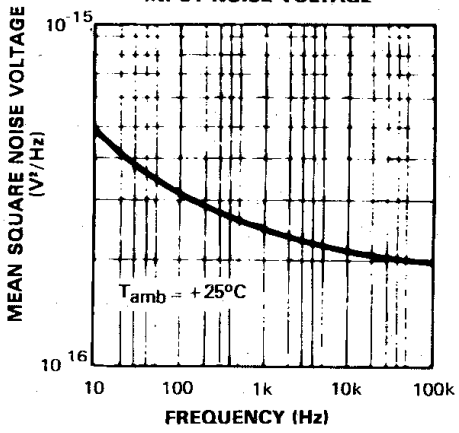
VOLTAGE GAIN



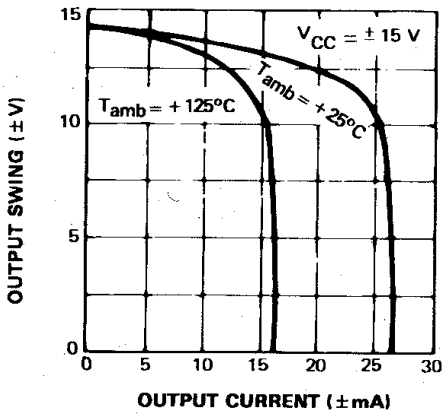
SUPPLY CURRENT



INPUT NOISE VOLTAGE

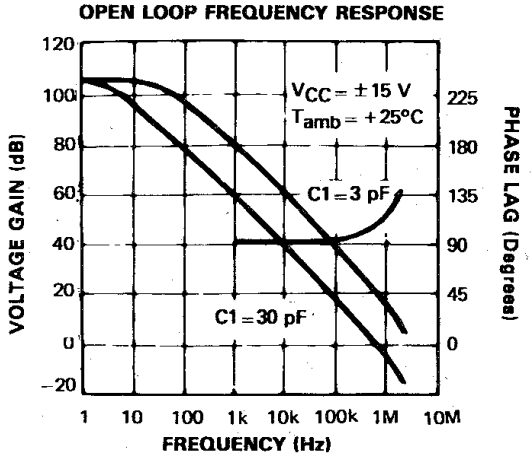


CURRENT LIMITING



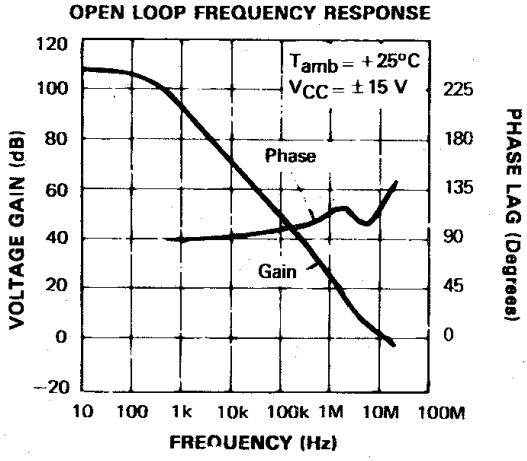
SINGLE POLE COMPENSATION

OPEN LOOP FREQUENCY RESPONSE



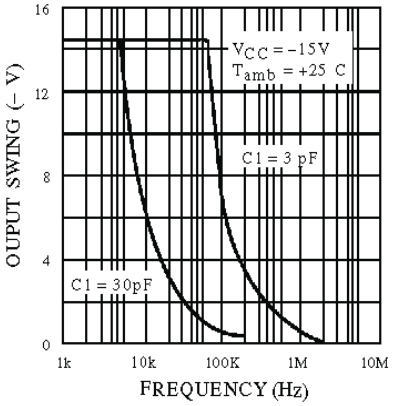
FEED FORWARD COMPENSATION

OPEN LOOP FREQUENCY RESPONSE

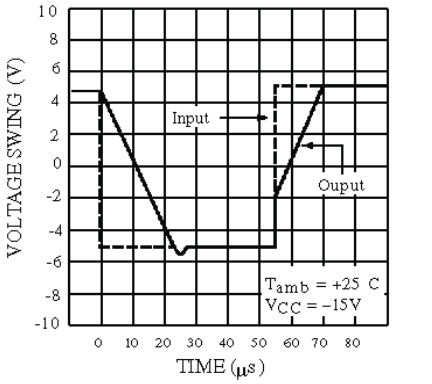


SINGLE POLE COMPENSATION

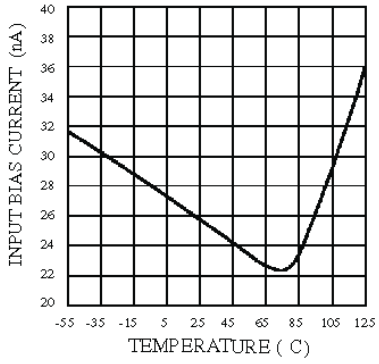
LARGE SIGNAL FREQUENCY RESPONSE



VOLTAGE FOLLOWER PULSE RESPONSE

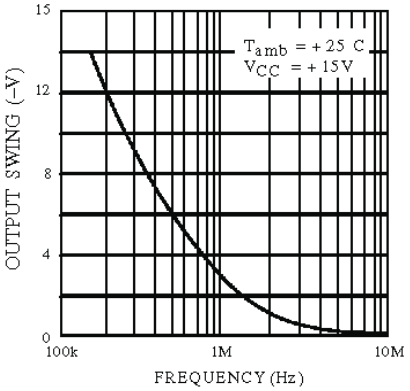


INPUT BIAS CURRENT
vs AMBIENT TEMPERATURE

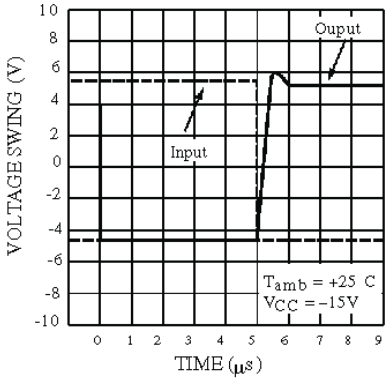


FEED FORWARD COMPENSATION

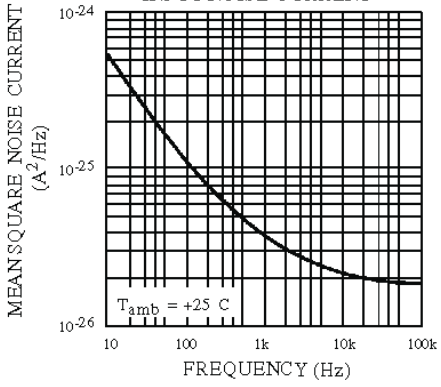
LARGE SIGNAL FREQUENCY RESPONSE



INVERTER PULSE RESPONSE

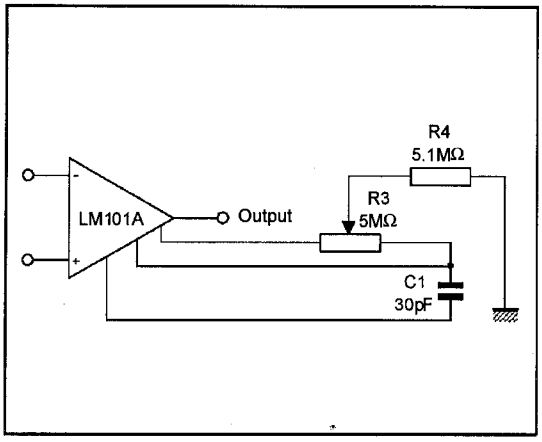


INPUT NOISE CURRENT

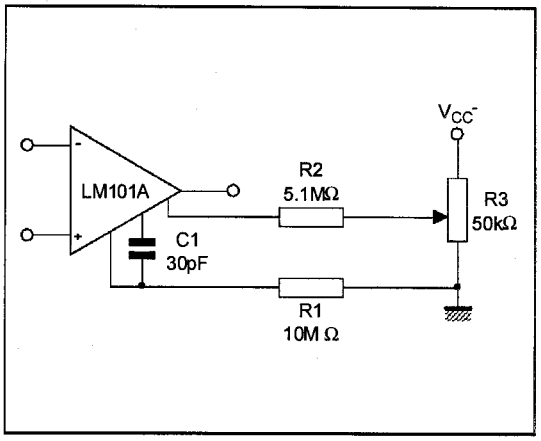


BASIC DIAGRAM

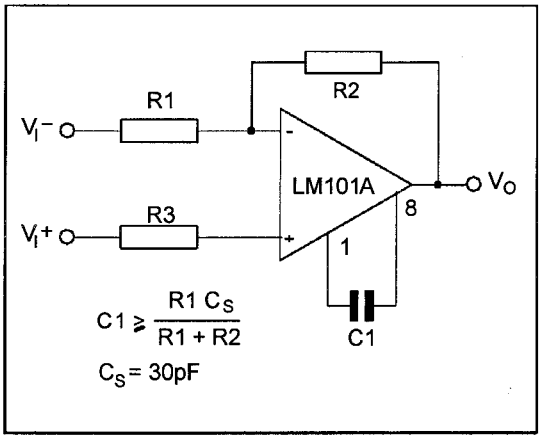
BALANCING CIRCUIT



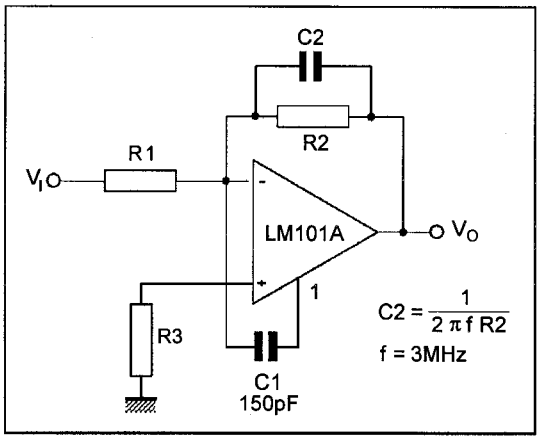
ALTERNATE BALANCING CIRCUIT



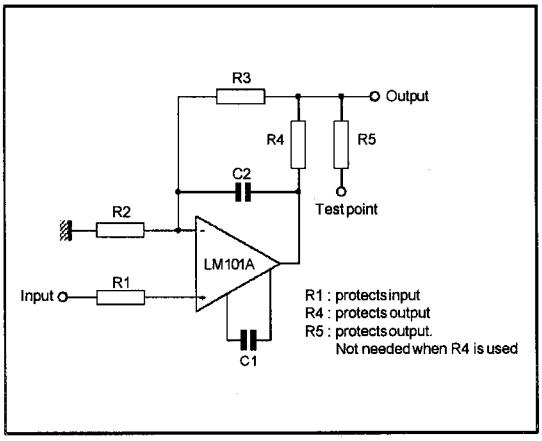
SINGLE POLE COMPENSATION



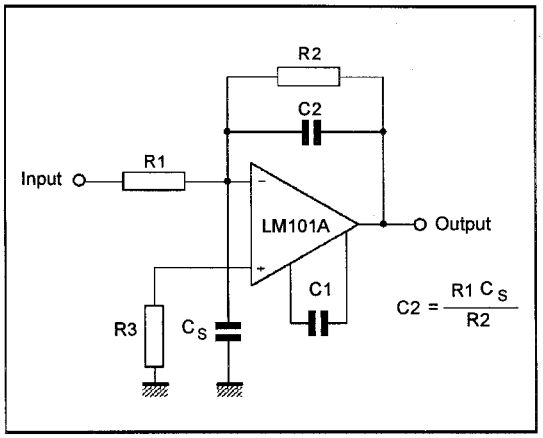
FEEDFORWARD COMPENSATION



PROTECTING AGAINST GROSS FAULT CONDITIONS

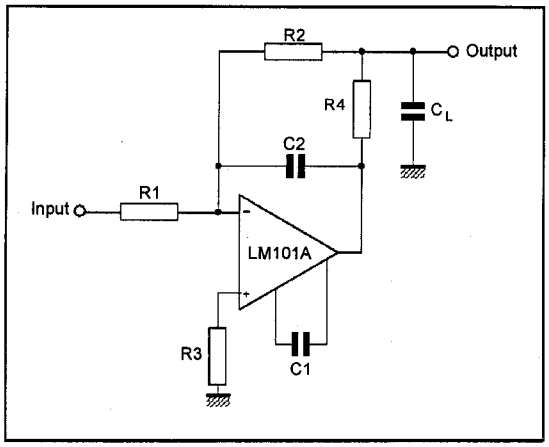


COMPENSATING FOR STRAY INPUT CAPA CITANCES OR LARGE FEEDBACK RESISTOR

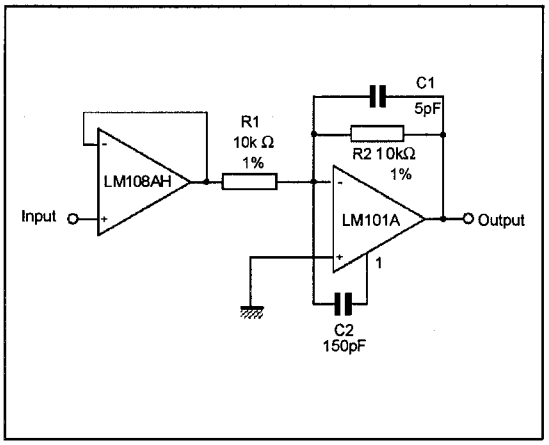


BASIC DIAGRAM (continued)

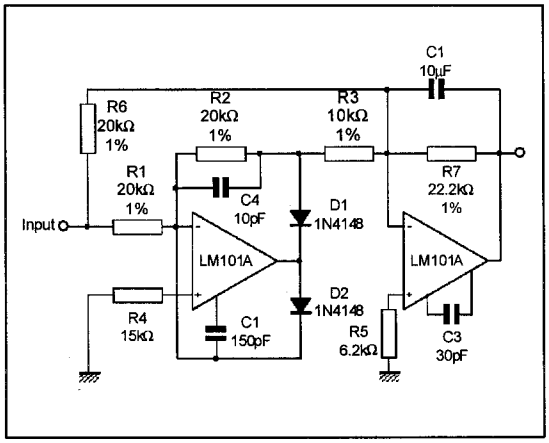
ISOLATING LARGE CAPACITIVE LOAD



FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE

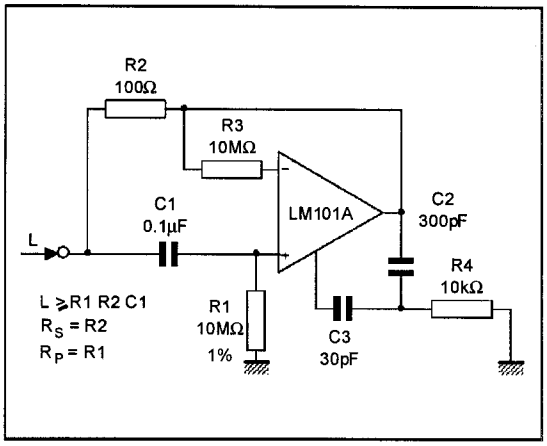


FAST AC/DC CONVERTER

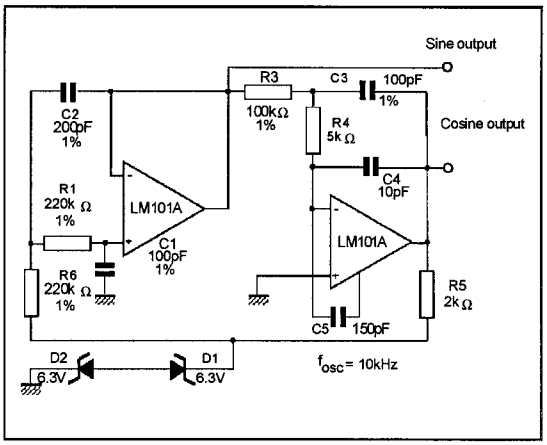


TYPICAL APPLICATIONS

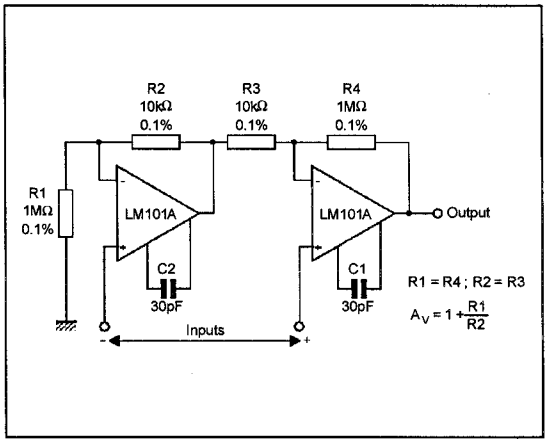
SIMULATED INDUCTOR



SINE WAVE OSCILLATOR

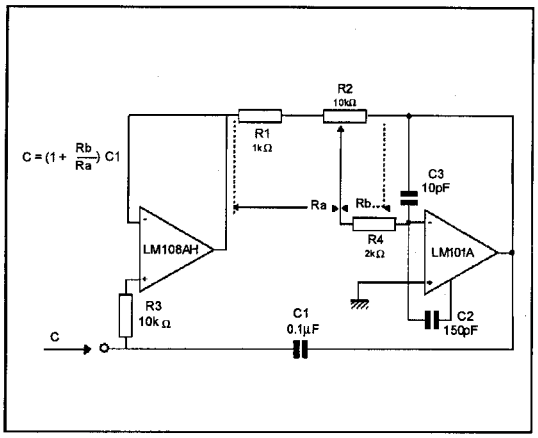


INSTRUMENTATION AMPLIFIER

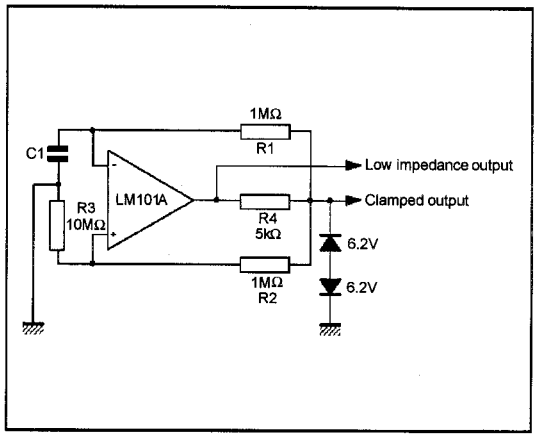


TYPICAL APPLICATIONS (continued)

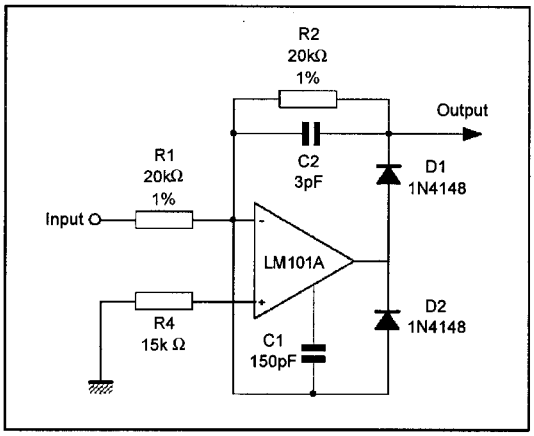
VARIABLE CAPACITANCE MULTIPLIER



LOW FREQUENCY SQUARE WAVE GENERATOR

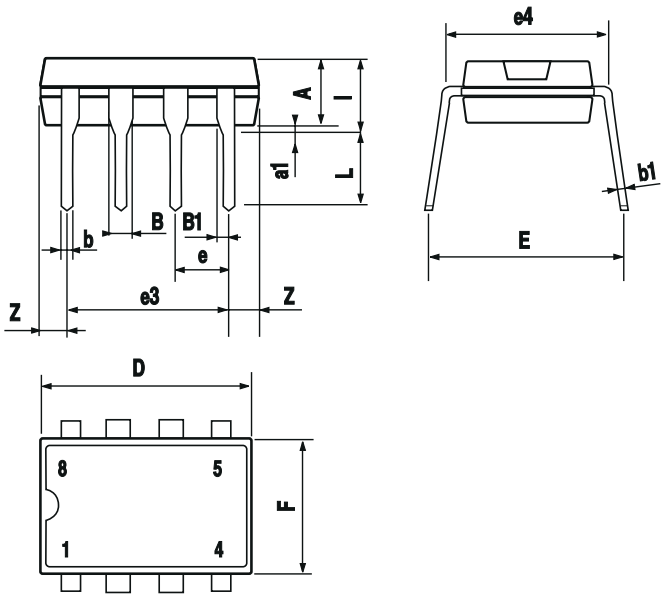


FAST HALF WAVE RECTIFIER



PACKAGE MECHANICAL DATA

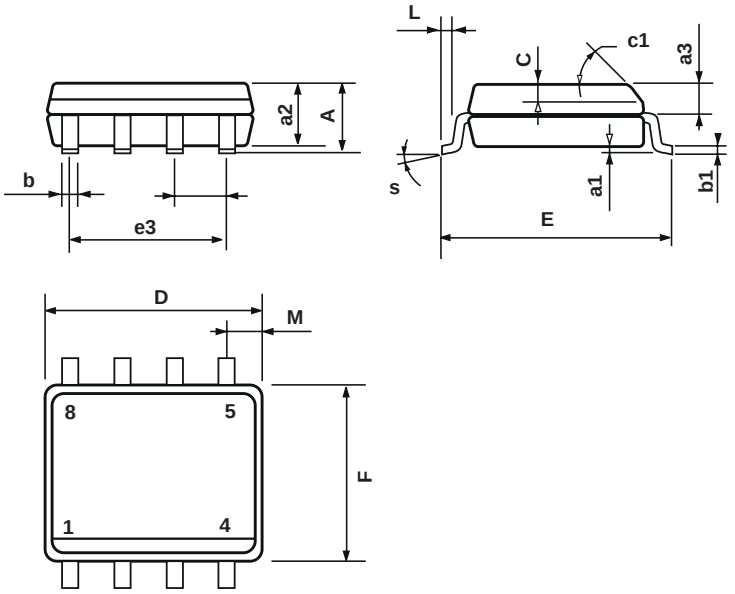
8 PINS - PLASTIC DIP



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			0260
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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