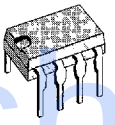
LM101A - LM201A LM301A

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 INVERTING AMPLIFIER	10V/µs	10V/µs



N
DIP8
(Plastic Package)

D
SO8
(Plastic Micropackage)

J
CERDIP8
(Cerdip Package)

H
TO99
(Metal Can)

DESCRIPTION

The LM101A is a general-purpose operational amplifier. This amplifier offers many features : supply voltages from ±5 V to ±22 V, low current drain, overload protection on the input and output, no latch-up when the common-mode range is exceeded, freedom 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 rates of 10 V/µs and bandwidths of 3.5MHz can be easily achieved.

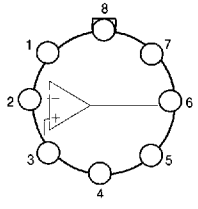
ORDER CODES

Part Number	Temperature Range	Package			
		H	N	J	D
LM101A	–55, +125°C	•	•	•	•
LM201A	–40, +105°C	•	•	•	•
LM301A	0, +70°C	•	•	•	•
Examples : LM101AH, LM201AN					

101-01.TBL

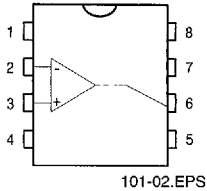
PIN CONNECTIONS (top views)

TO99



101-01 EPS

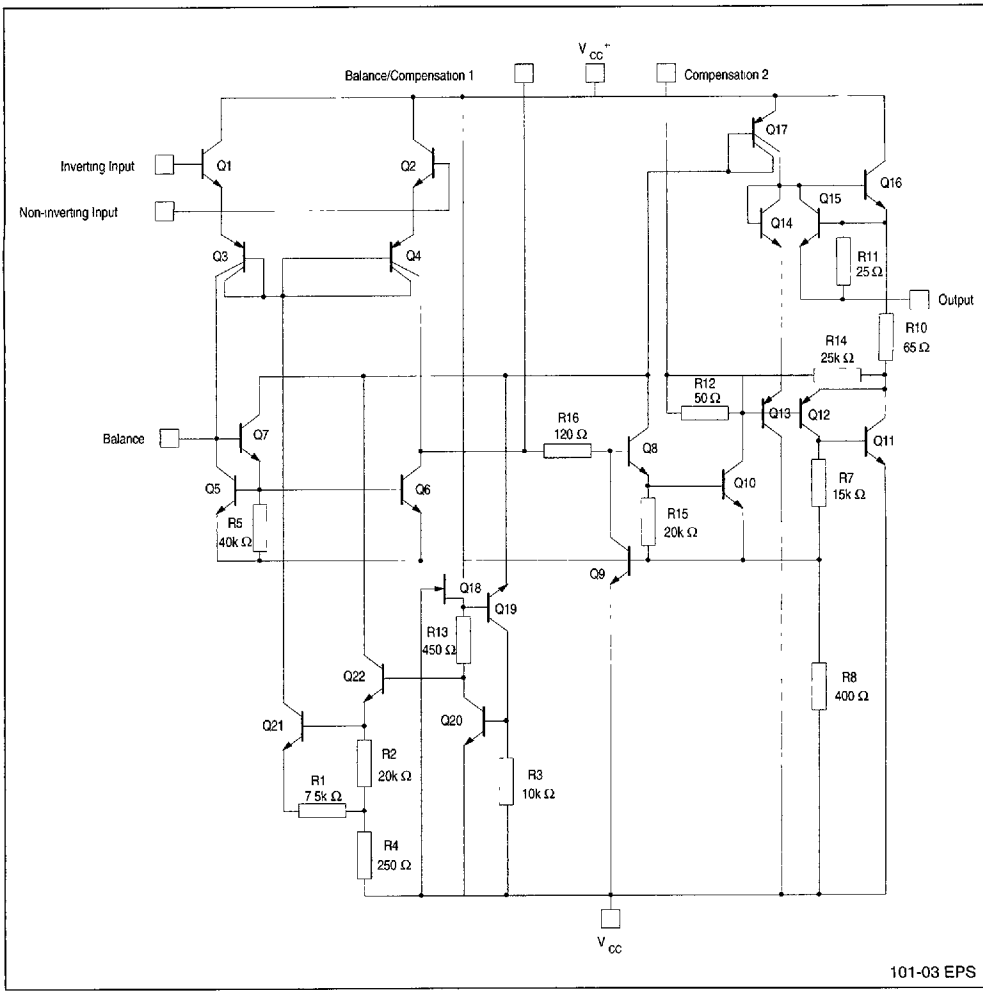
DIP8/CERDIP8
SO8



101-02.EPS

1 - Balance compensation 1
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	±22	±22	V
V_{id}	Differential Input Voltage	±30	±30	±30	V
V_i	Input Voltage	±15	±15	±15	V
	Output Short-circuit Duration	Infinite			
P_{tot}	Power Dissipation N.J.H. Suffix D Suffix	500 300			mW
T_{oper}	Operating Free-air Temperature Range	−55 to +125	−40 to +105	0 to +70	°C
T_{stg}	Storage Temperature Range	−65 to +150	−65 to +150	−65 to +150	°C

101-02.TBL

ELECTRICAL CHARACTERISTICS

LM301A	0°C < Tamb < +70°C	±5V ≤ V_{CC} ≤ ±20V	C1 = 30pF
LM201A	−40°C < Tamb < +105°C	±5V ≤ V_{CC} ≤ ±20V	C1 = 30pF
LM101A	−55°C < Tamb < +125°C	±5V ≤ V_{CC} ≤ ±20V	C1 = 30pF

* => V_{CC} = ±15V, 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 ≤ 10kΩ) T_{amb} = 25°C T_{min} ≤ T_{amb} ≤ T_{max}		0.7	2 3		2	7.5 10	mV
I_{ib}	Input Bias Current T_{amb} = 25°C $T_{min.}$ ≤ T_{amb} ≤ $T_{max.}$		25	75 100		70	250 300	nA
I_{io}	Input Offset Current T_{amb} = 25°C $T_{min.}$ ≤ T_{amb} ≤ T_{max}		1.5	10 20		2	50 70	nA
A_{vd}	Large Signal Voltage Gain * (V_O = ±10V, R_L = 2kΩ) T_{amb} = 25°C T_{min} ≤ T_{amb} ≤ T_{max}	50 25	100		25 15	100		V/mV
SVR	Supply Voltage Rejection Ratio (R_S ≤ 10kΩ) T_{amb} = 25°C $T_{min.}$ ≤ T_{amb} ≤ T_{max}	80 80	96		70 70	96		dB
I_{CC}	Supply Current no Load T_{amb} = 25°C $T_{min.}$ ≤ T_{amb} ≤ T_{max}		1.8	3 3		1.8	3 3	mA
V_{icm}	Input Common Mode Voltage Range (V_{CC} = ±20V) T_{amb} = 25°C T_{min} ≤ T_{amb} ≤ T_{max}	±15 ±15			±15 ±15			V
CMR	Common Mode Rejection Ratio (R_S ≤ 10kΩ) T_{amb} = 25°C T_{min} ≤ T_{amb} ≤ $T_{max.}$	80 80	96		70 70	96		dB
I_{OS}	Output Short-circuit Current * T_{amb} = 25°C	10	30	50	10	30	50	mA
± V_{OPP}	Output Voltage Swing * T_{amb} = 25°C R_L = 10kΩ R_L = 2kΩ T_{min} ≤ T_{amb} ≤ T_{max} R_L = 10kΩ R_L = 2kΩ	12 10 12 10	14 13		12 10 12 10	14 13		V

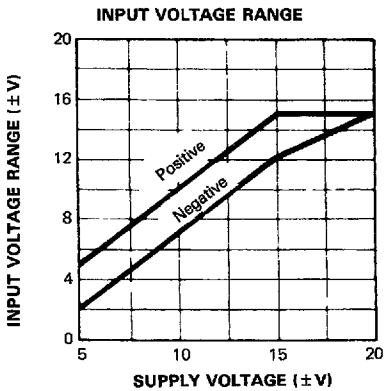
101-03 TBL

ELECTRICAL CHARACTERISTICS (continued)

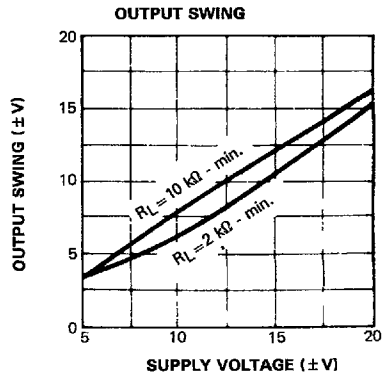
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
SR	Slew Rate (V_I = ±10V, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain) - (note 1) *	0.25	0.5		0.25	0.5		V/µs
t_r	Rise Time (V_I = ±20 µV, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain) *		0.3			0.3		µs
K_{OV}	Overshoot (V_I = 20 mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain)		5			5		%
Z_I	Input Impedance *	1.5	4		1.5	4		MΩ
R_o	Output Resistance *		75			75		Ω
GBP	Gain Bandwidth Product * (V_I = 10mV, R_L = 2kΩ, C_L = 100pF, f = 100kHz, T_{amb} = 25°C)	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, T_{amb} = 25°C)		0.015			0.015		%
e_n	Equivalent Input Noise Voltage (f = 1kHz, R_s = 100Ω)		25			25		$\frac{nV}{\sqrt{Hz}}$
DV_{io}	Input Offset Voltage Drift $T_{min} \leq T_{amb} \leq T_{max}$		3	15		6	30	µV/°C
DI_{io}	Input Offset Current Drift $25°C \leq T_{amb} \leq T_{max}$ $T_{min} \leq T_{amb} \leq 25°C$		10 20	100 200		10 20	300 600	pA/°C

101-04 TBL

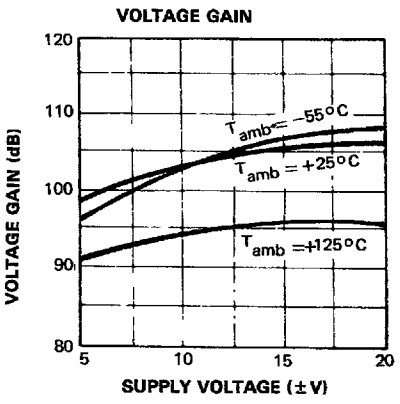
Note :1 May be improved up to 10V/µs in inverting amplifier configuration (see basic diagram)



101-04.EPS



101-05 EPS



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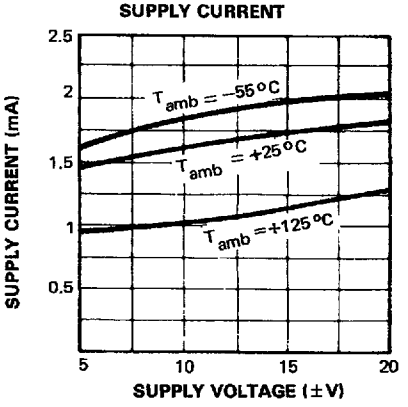
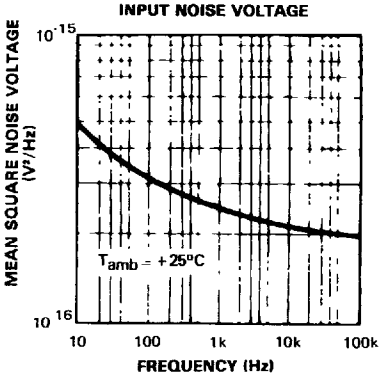


101-07.EPS



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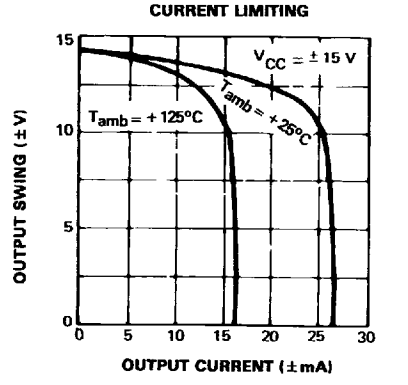
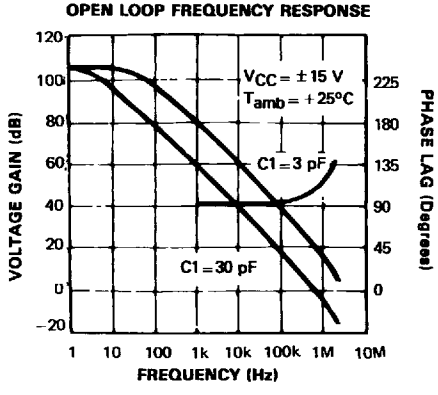


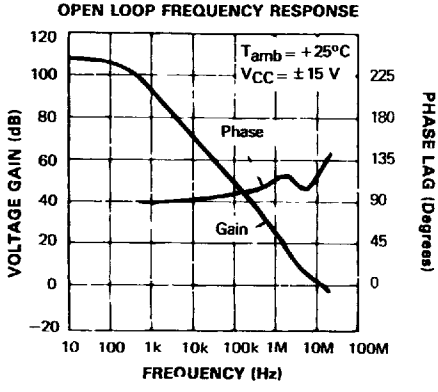
101-09.EPS

SINGLE POLE COMPENSATION



101-10.EPS

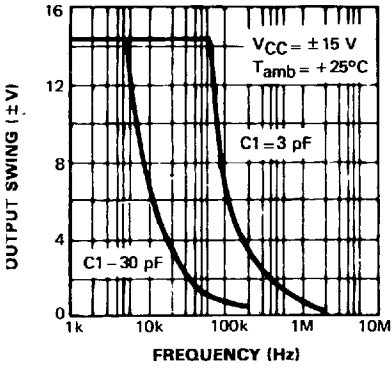
FEED FORWARD COMPENSATION



101-11.EPS

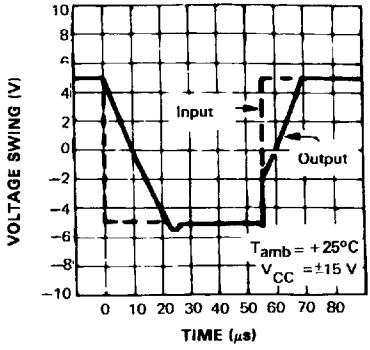
SINGLE POLE COMPENSATION

LARGE SIGNAL FREQUENCY RESPONSE



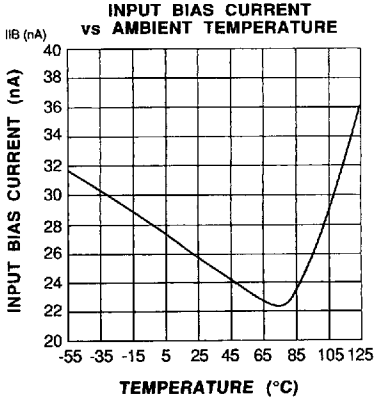
101-12.EPS

VOLTAGE FOLLOWER PULSE RESPONSE



101-14.EPS

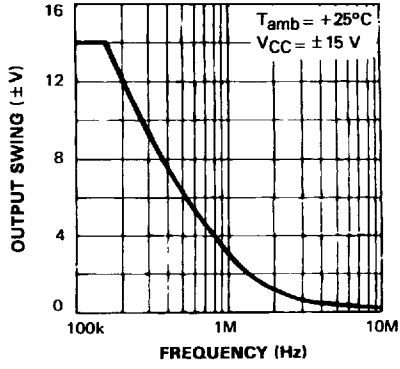
INPUT BIAS CURRENT vs AMBIENT TEMPERATURE



101-16.EPS

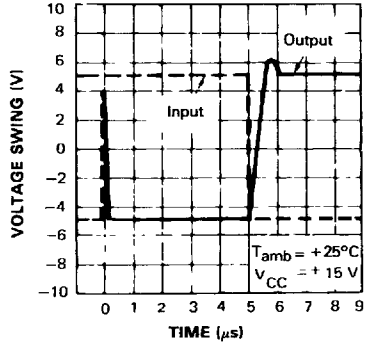
FEED FORWARD COMPENSATION

LARGE SIGNAL FREQUENCY RESPONSE



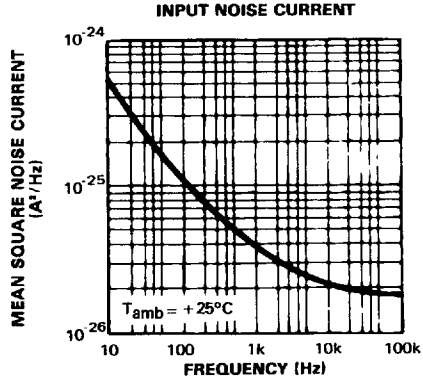
101-13.EPS

INVERTER PULSE RESPONSE



101-15 EPS

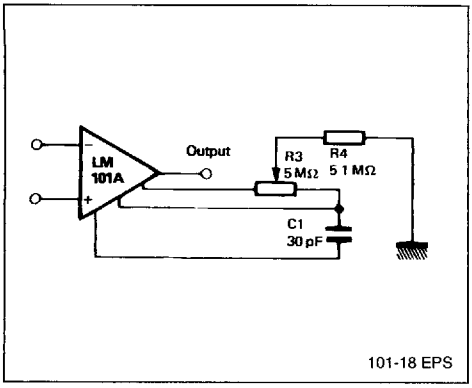
INPUT NOISE CURRENT



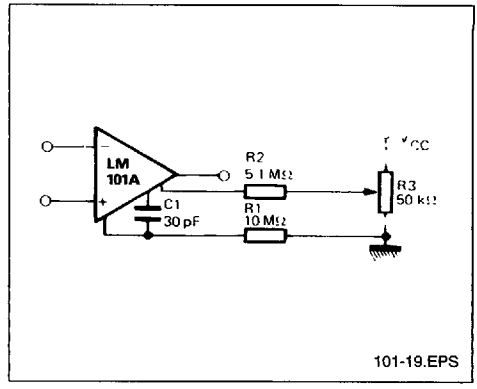
101-17.EPS

BASIC DIAGRAM

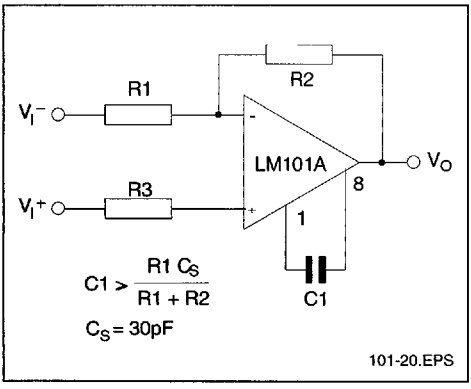
BALANCING CIRCUIT



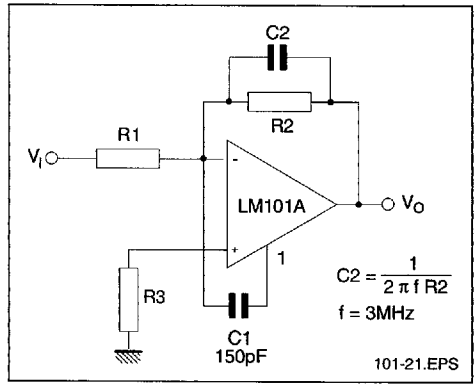
ALTERNATE BALANCING CIRCUIT



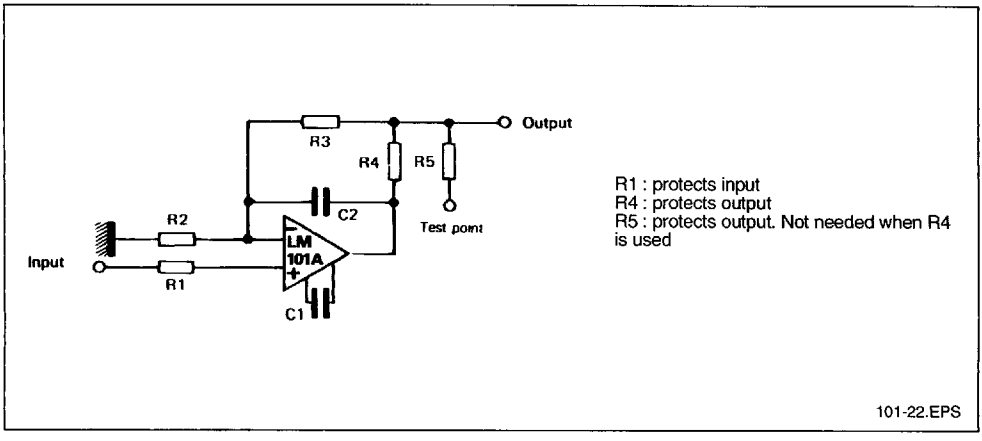
SINGLE POLE COMPENSATION



FEEDFORWARD COMPENSATION

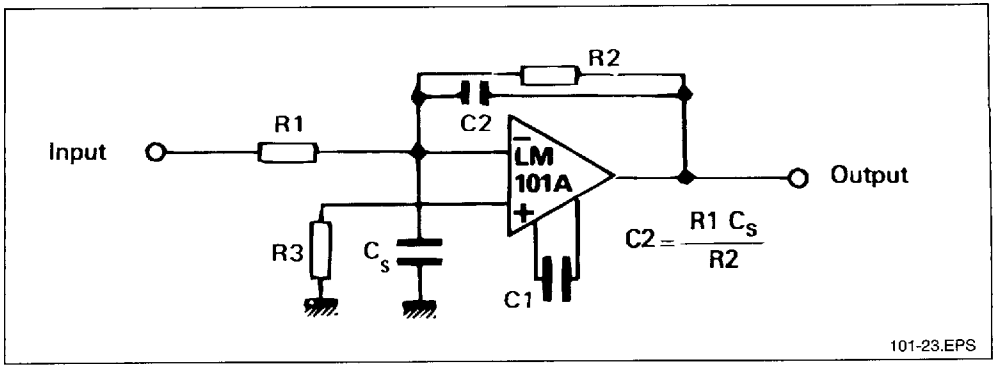


PROTECTING AGAINST GROSS FAULT CONDITIONS

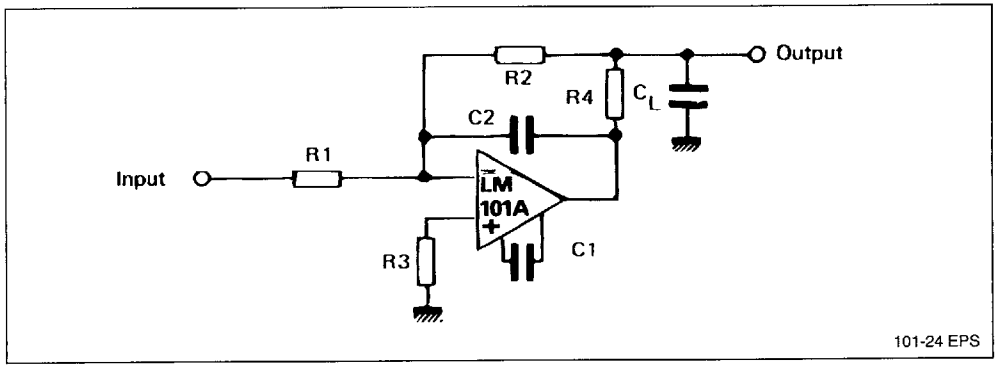


BASIC DIAGRAM (continued)

COMPENSATING FOR STRAY INPUT CAPACITANCES OR LARGE FEEDBACK RESISTOR

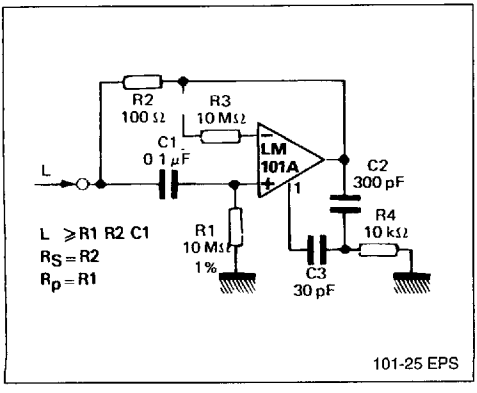


ISOLATING LARGE CAPACITIVE LOADS

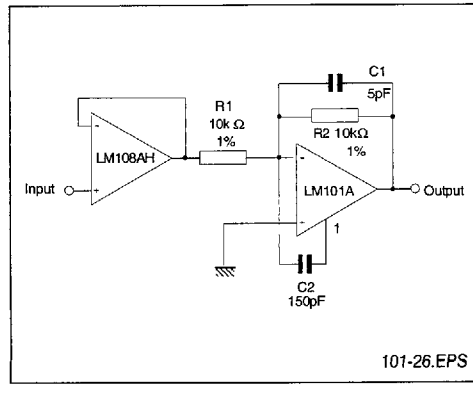


TYPICAL APPLICATIONS

SIMULATED INDUCTOR

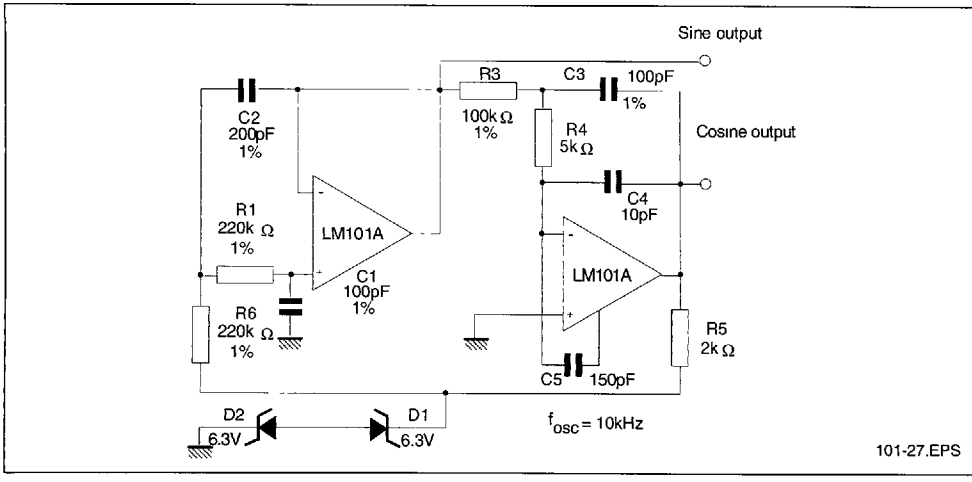


FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE

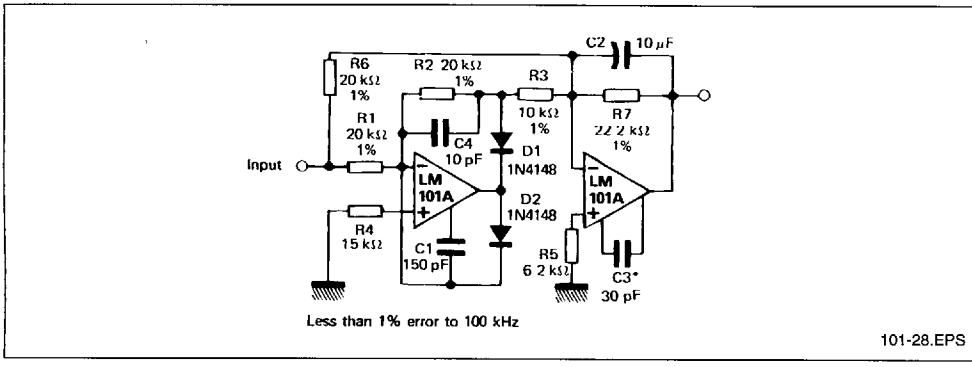


TYPICAL APPLICATIONS (continued)

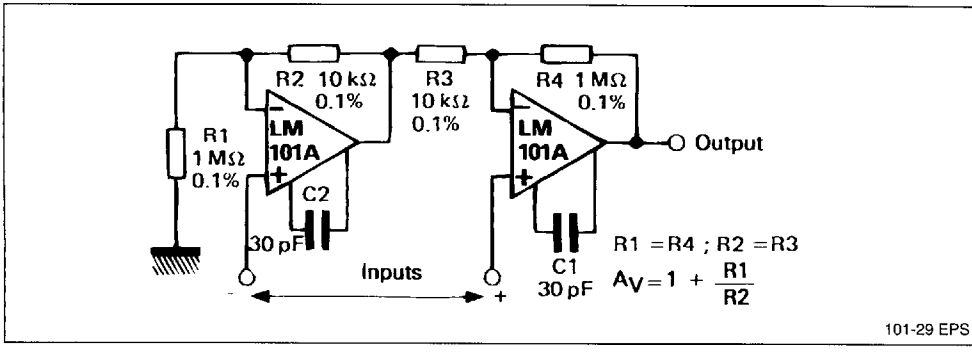
SINE WAVE OSCILLATOR



FAST AC/DC CONVERTER

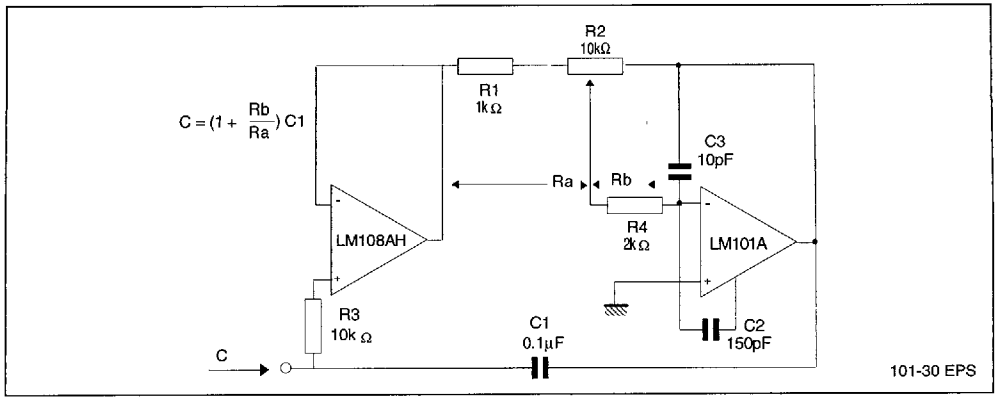


INSTRUMENTATION AMPLIFIER

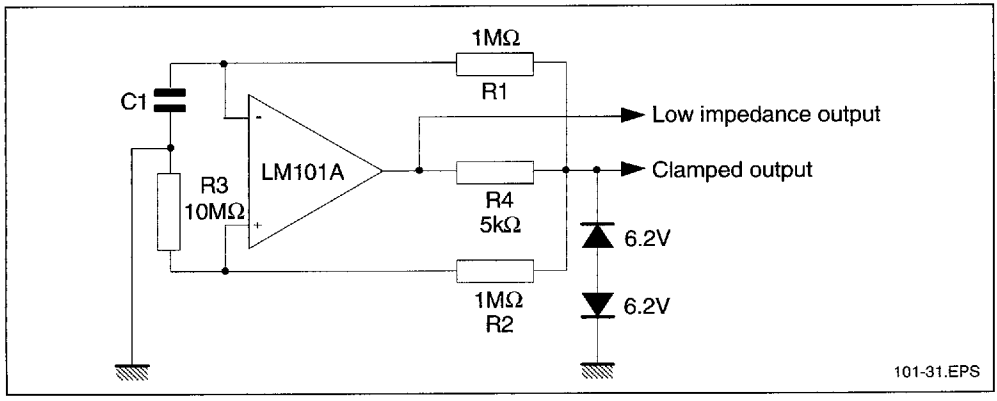


TYPICAL APPLICATIONS (continued)

VARIABLE CAPACITANCE MULTIPLIER



LOW FREQUENCY SQUARE WAVE GENERATOR



FAST HALF WAVE RECTIFIER