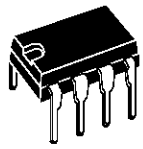
SGS-THOMSON MICROELECTRONICS

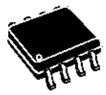
LM101A - LM201A LM301A

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



N
DIP8
(Plastic Package)



D
SO8
(Plastic Micropackage)

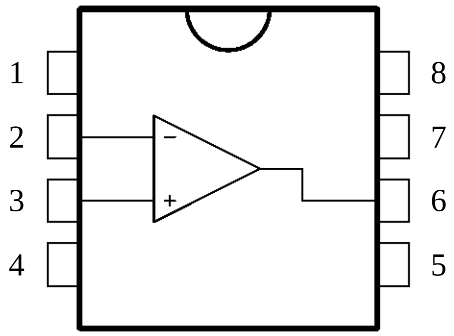
DESCRIPTION

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 CODES

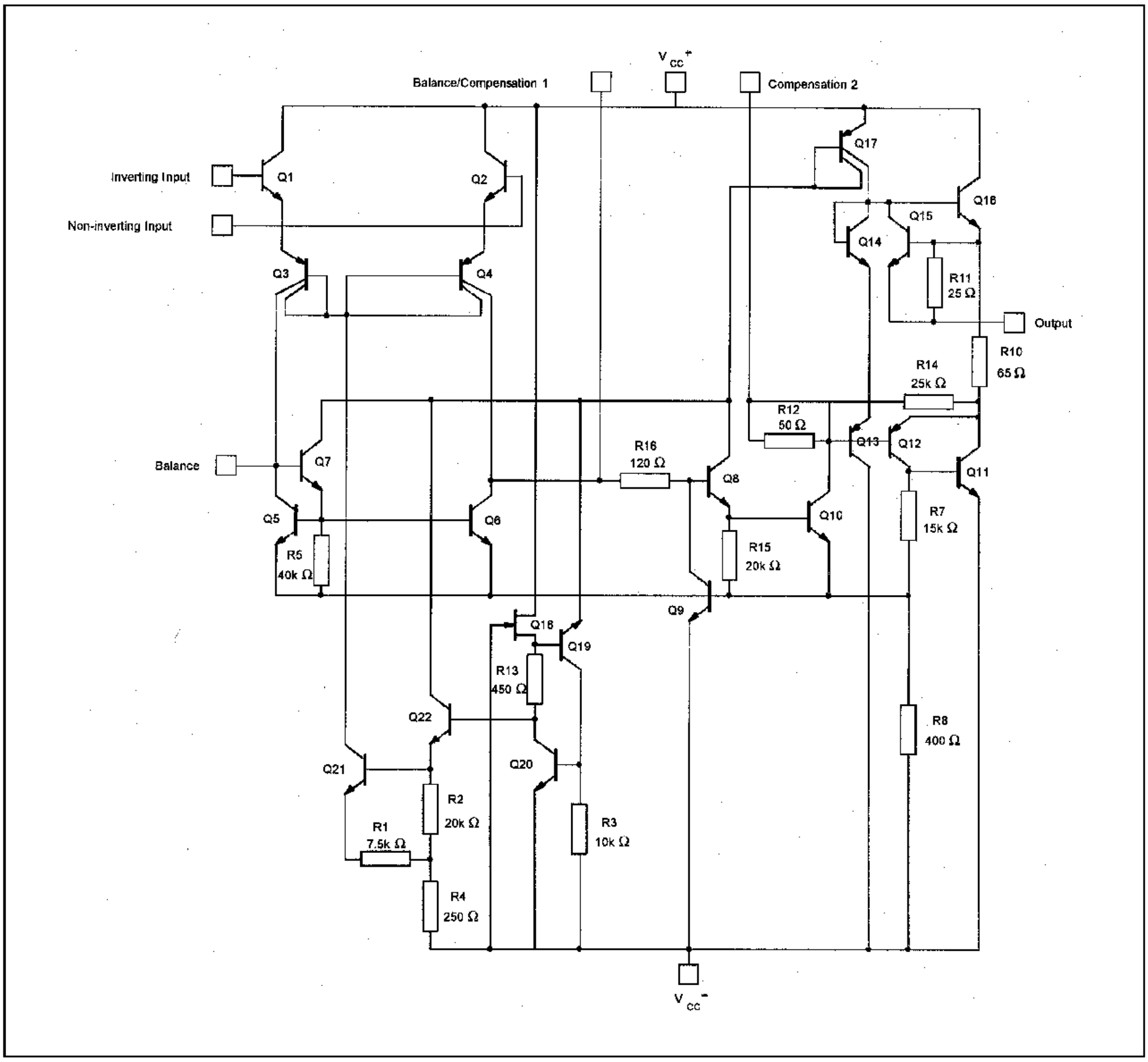
Part Number	Temperature Range	Package	
		N	D
LM101A	-55°C, +125°C	•	•
LM201A	-40°C, +105°C	•	•
LM301A	0°C, +70°C	•	•
Example : LM201AN			

PIN CONNECTIONS (top view)



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			V
V_{id}	Differential Input Voltage	±30			V
V_i	Input Voltage	±15			V
P_{tot}	Power Dissipation N Suffix D Suffix	500 300			mW
	Output Short-circuit Duration	Infinite			
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

ELECTRICAL CHARACTERISTICS

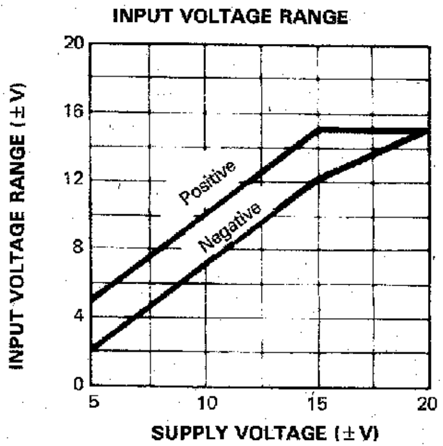
LM301A	$0^oC < T_{amb} < +70^oC$	$\pm 5V \le V_{CC} \le \pm 20V$	C1 = 30pF
LM201A	$-40^oC < T_{amb} < +105^oC$	$\pm 5V \le V_{CC} \le \pm 20V$	C1 = 30pF
LM101A	$-55^oC < T_{amb} < +125^oC$	$\pm 5V \le V_{CC} \le \pm 20V$	C1 = 30pF

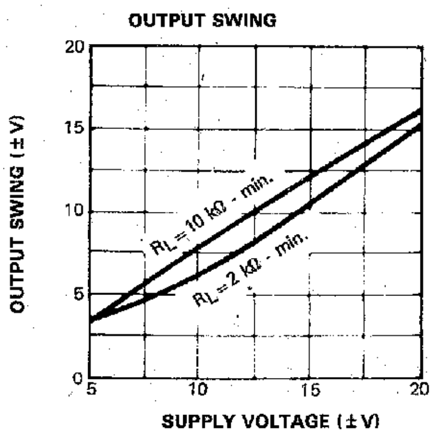
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S \le 10k\Omega$) $T_{amb} = +25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$		 0.7	 2 3		 2	 7.5 10	mV
DV_{io}	Input Offset Voltage Drift $T_{min.} \le T_{amb} \le T_{max.}$		3	15		6	30	$\mu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

ELECTRICAL CHARACTERISTICS (continued)

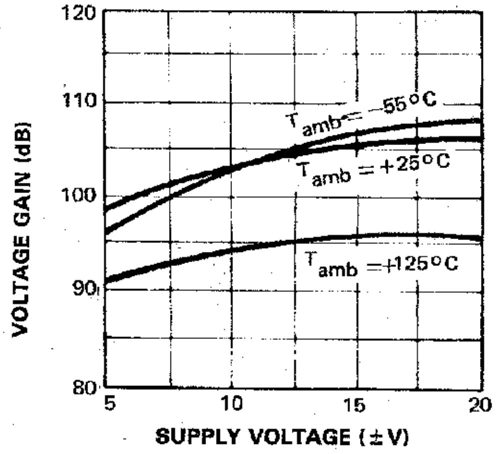
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
SR	Slew Rate ($V_i = \pm10V$, R_L =2kΩ, C_L= 100pF, $T_{amb} = 25^oC$, unity gain) - (note 1) *	0.25	0.5		0.25	0.5		V/µs
t_r	Rise Time ($V_i = \pm20\mu V$, R_L = 2kΩ, C_L = 100pF, $T_{amb} = 25^oC$, unity gain) *		0.3			0.3		µs
K_{OV}	Overshoot (V_i = 20mV, R_L = 2kΩ, CL = 100pF, $T_{amb} = 25^oC$, 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, $T_{amb} = 25^oC$)	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, $T_{amb} = 25^oC$)		0.015			0.015		%
e_n	Equivalent Input Noise Voltage (f = 1kHz, R_s = 100Ω)		25			25		$\frac{nV}{\sqrt{Hz}}$

Notes : 1. May be improved up to 10V/µs in inverting amplifier configuration
*** => V_{CC}** = ±15V T_{amb} = +25°C (unless otherwise specified)

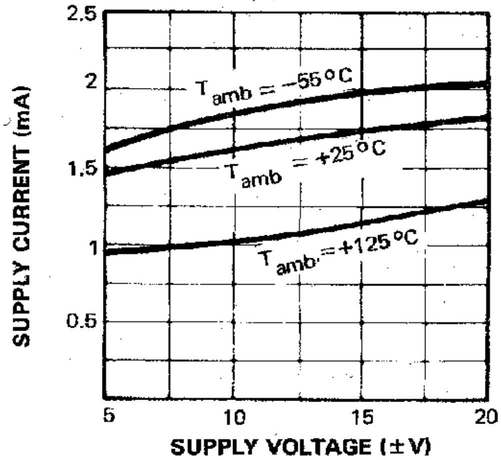




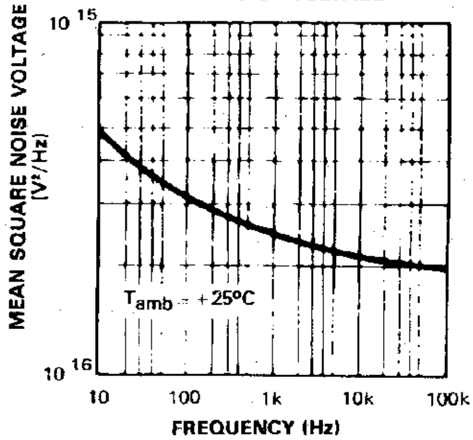
VOLTAGE GAIN



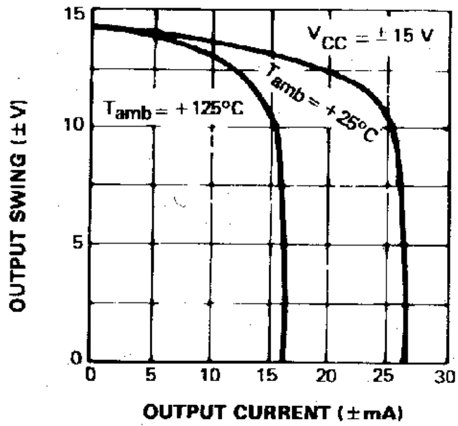
SUPPLY CURRENT



INPUT NOISE VOLTAGE

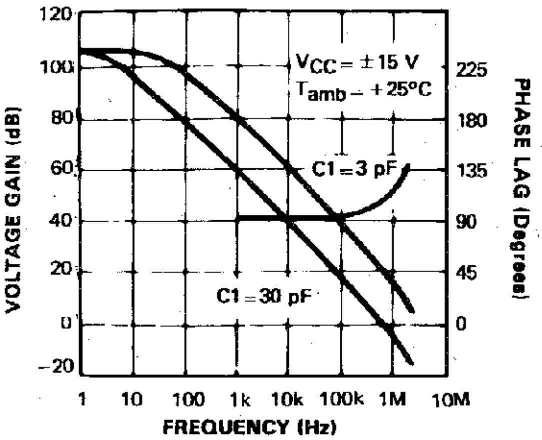


CURRENT LIMITING



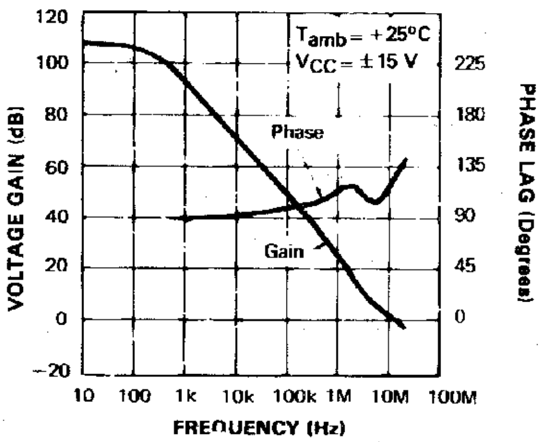
SINGLE POLE COMPENSATION

OPEN LOOP FREQUENCY RESPONSE

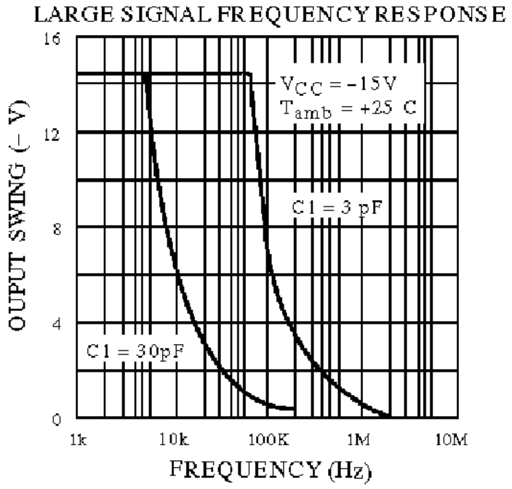


FEED FORWARD COMPENSATION

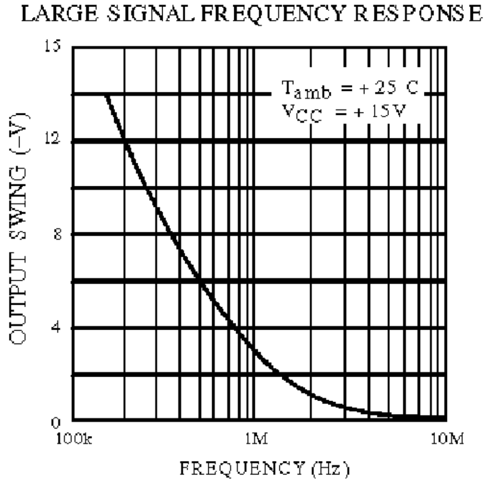
OPEN LOOP FREQUENCY RESPONSE

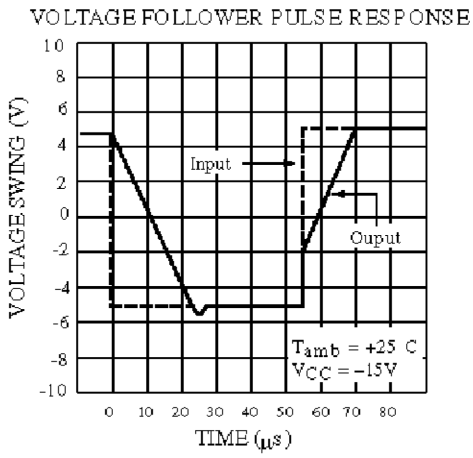


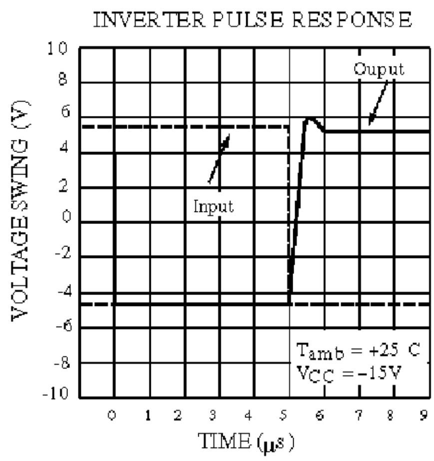
SINGLE POLE COMPENSATION

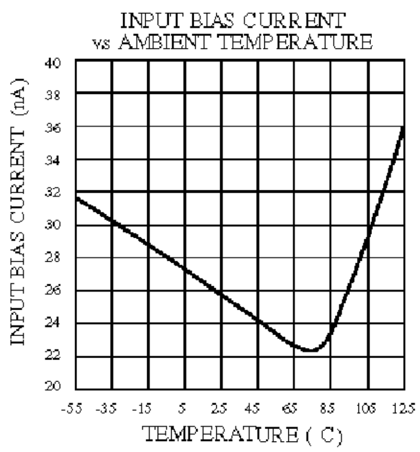


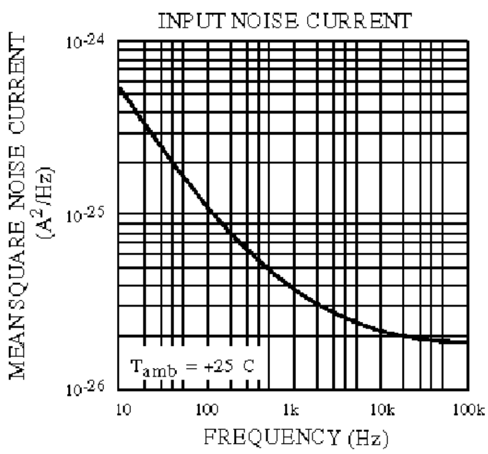
FEED FORWARD COMPENSATION





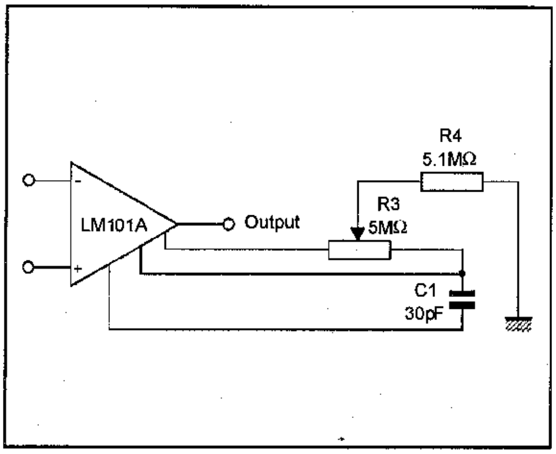




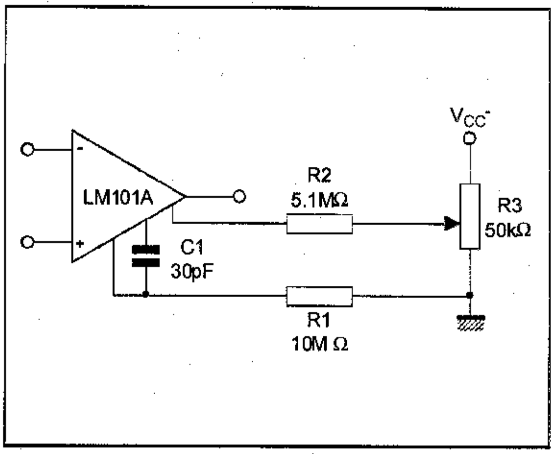


BASIC DIAGRAM

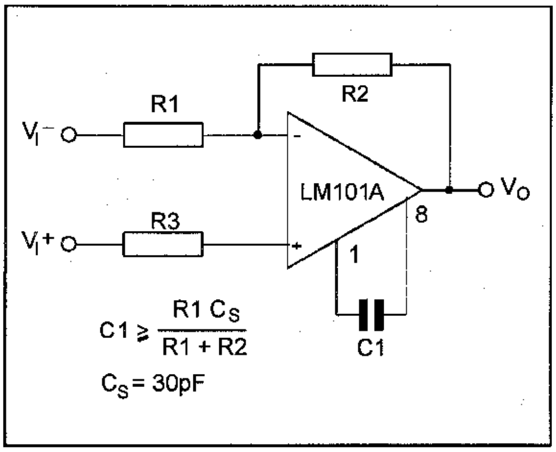
BALANCING CIRCUIT



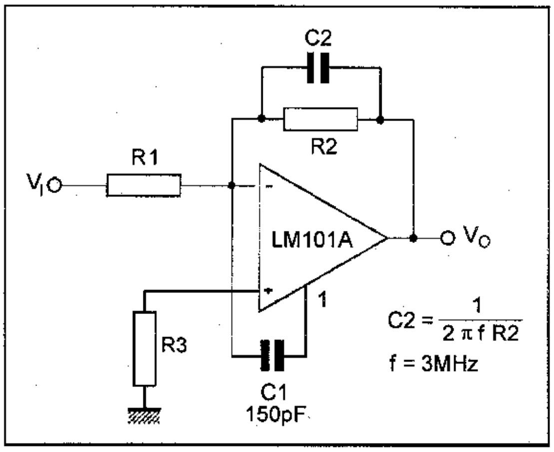
ALTERNATE BALANCING CIRCUIT



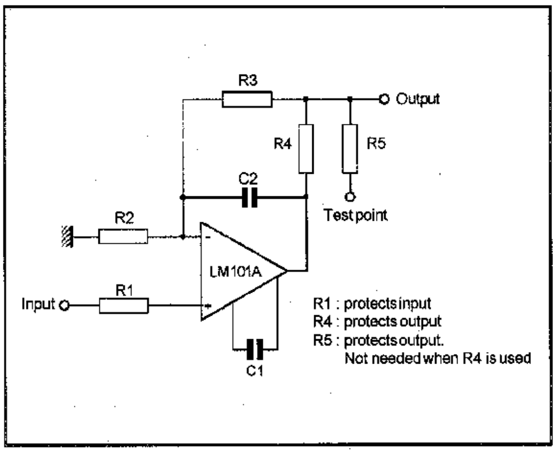
SINGLE POLE COMPENSATION



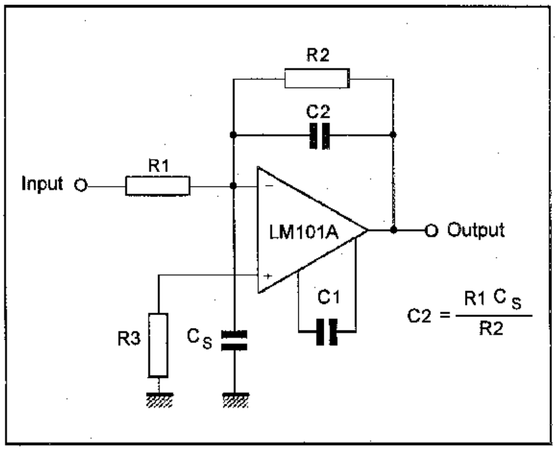
FEEDFORWARD COMPENSATION



PROTECTING AGAINST GROSS FAULT CONDITIONS

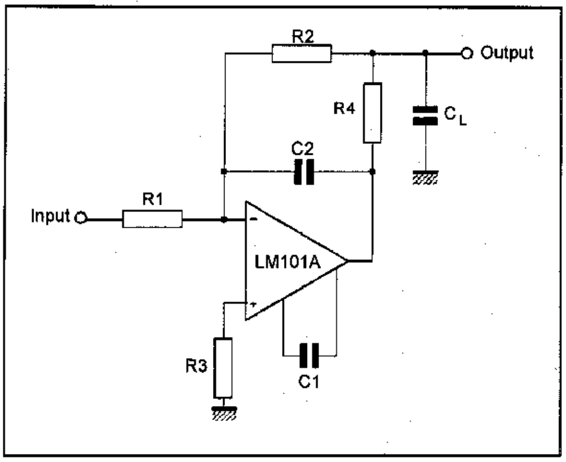


COMPENSATING FOR STRAY INPUT CAPACITANCES OR LARGE FEEDBACK RESISTOR

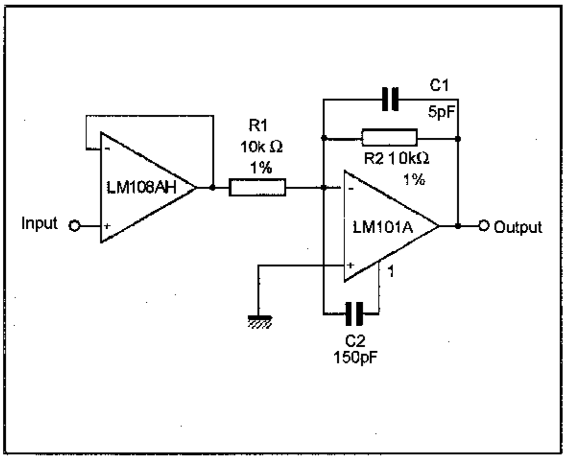


BASIC DIAGRAM (continued)

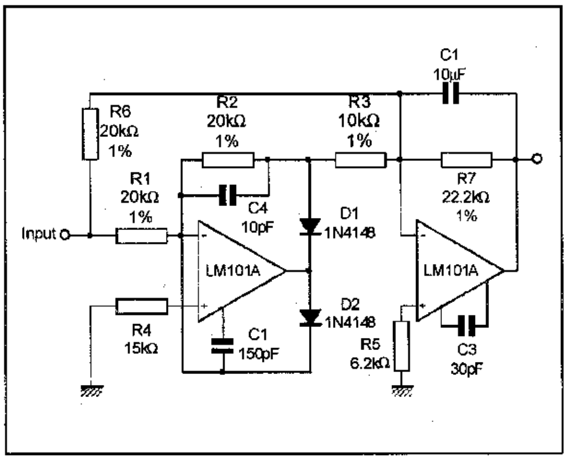
ISOLATING LARGE CAPACITIVE LOAD



FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE

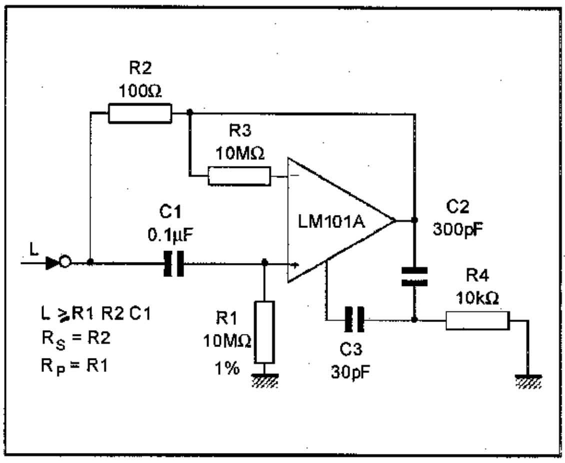


FAST AC/DC CONVERTER

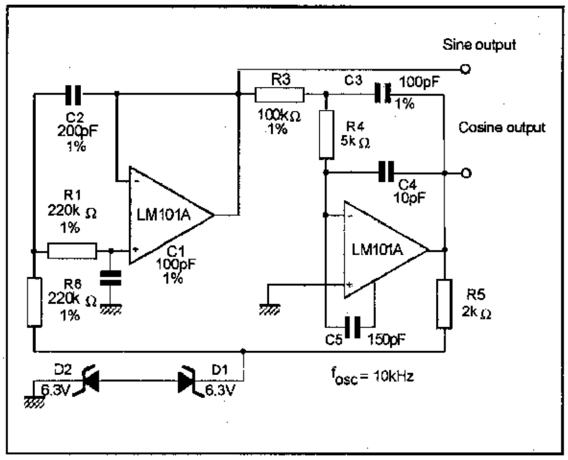


TYPICAL APPLICATIONS

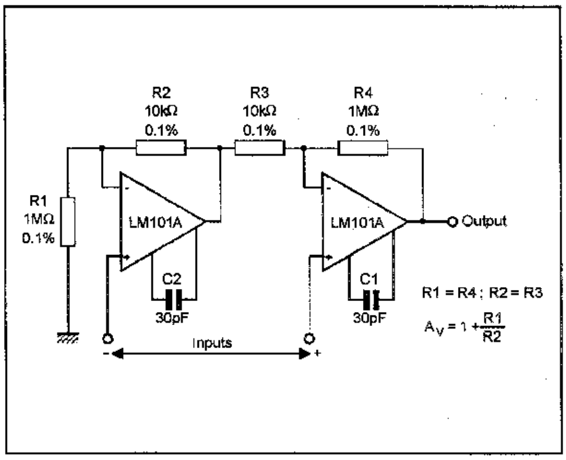
SIMULATED INDUCTOR



SINE WAVE OSCILLATOR

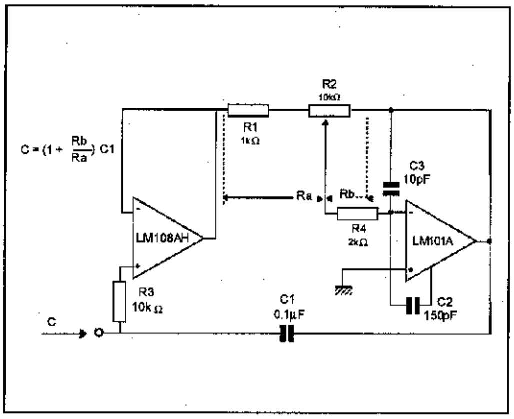


INSTRUMENTATION AMPLIFIER

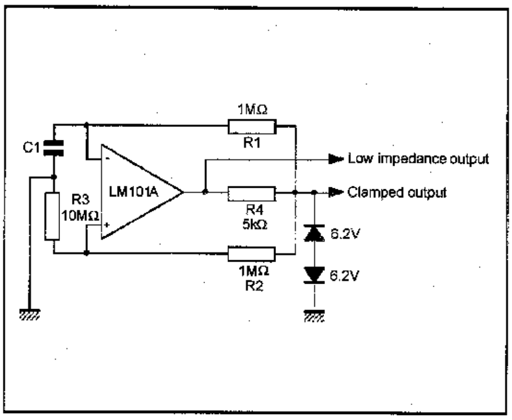


TYPICAL APPLICATIONS (continued)

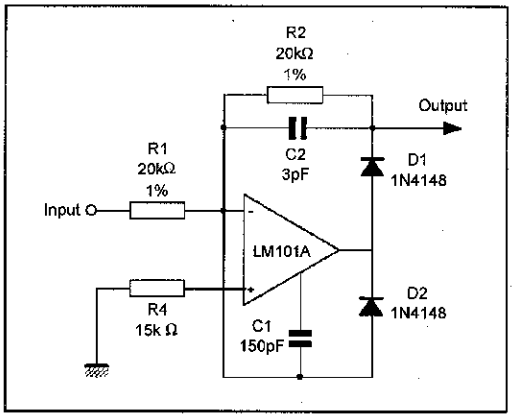
VARIABLE CAPACITANCE MULTIPLIER



LOW FREQUENCY SQUARE WAVE GENERATOR

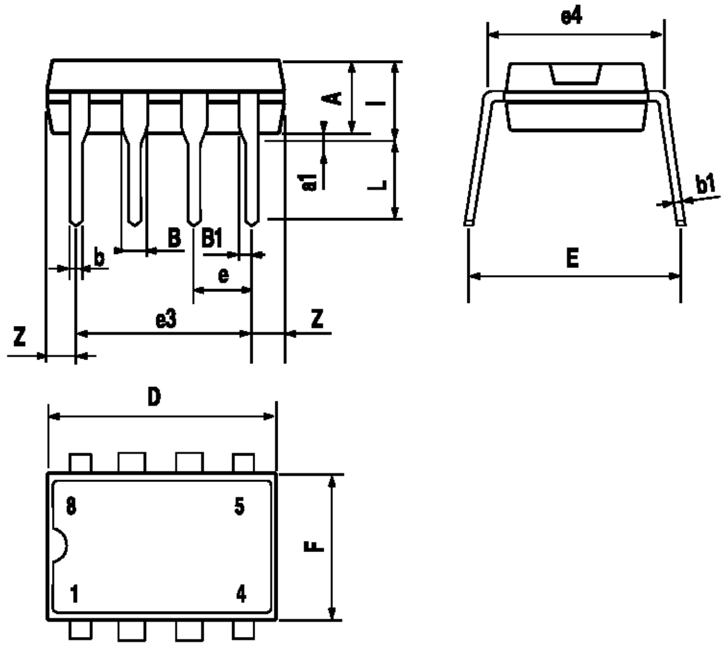


FAST HALF WAVE RECTIFIER



PACKAGE MECHANICAL DATA

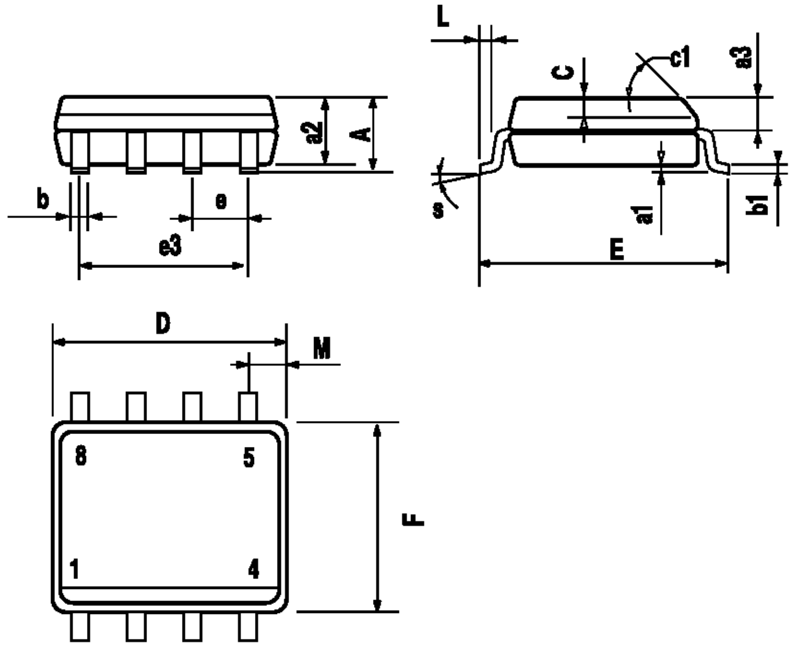
8 PINS - PLASTIC DIP



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^{o} (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^{o} (max.)					

ORDER CODE :