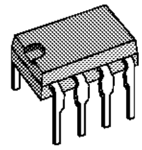
LM101A - LM201A LM301A

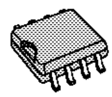
SGS-THOMSON MICROELECTRONICS

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)

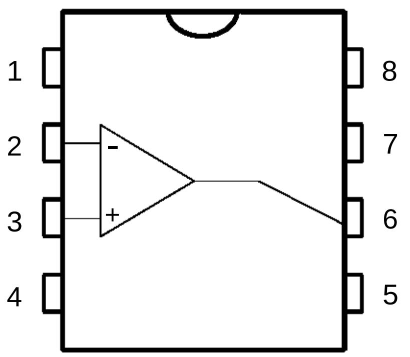
DESCRIPTION

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

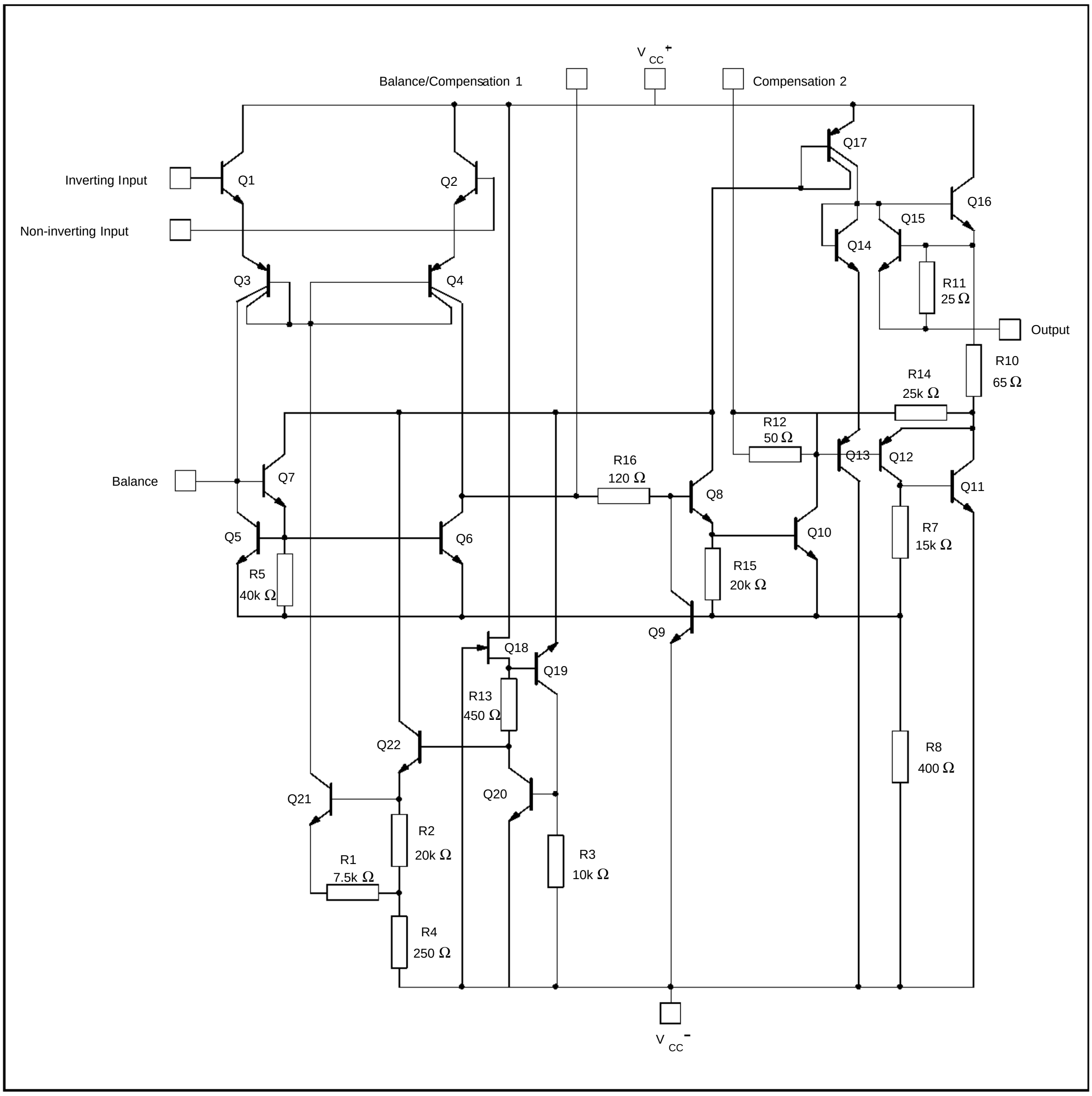
Part Number	Temperature Range	Package	
		N	D
LM101A	–55, +125°C	•	•
LM201A	–40, +105°C	•	•
LM301A	0, +70°C	•	•
Example : LM201AN			

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	±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 Suffix D Suffix	500 300			mW
T_{oper}	Operating Free-air Temperature Range	–55 to +125	–40 to +105	0 to +70	^oC
T_{stg}	Storage Temperature Range	–65 to +150	–65 to +150	–65 to +150	^oC

ELECTRICAL CHARACTERISTICS

LM301A	$0^oC < Tamb < +70^oC$	$\pm5V \le V_{CC} \le \pm20V$	C1 = 30pF
LM201A	$-40^oC < Tamb < +105^oC$	$\pm5V \le V_{CC} \le \pm20V$	C1 = 30pF
LM101A	$-55^oC < Tamb < +125^oC$	$\pm5V \le V_{CC} \le \pm20V$	C1 = 30pF

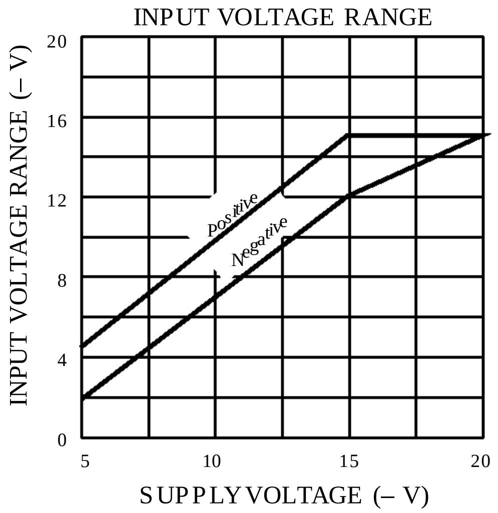
* => $V_{CC} = \pm15V$, $T_{amb} = 25^oC$(unless otherwise specified)

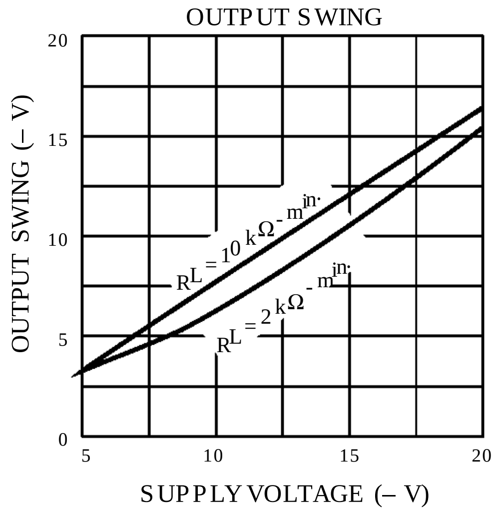
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S \le 10k\Omega$) $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$		0.7	2 3		2	7.5 10	mV
I_{ib}	Input Bias Current $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$		25	75 100		70	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
A_{vd}	Large Signal Voltage Gain * ($V_O = \pm10V$, $R_L = 2k\Omega$) $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$	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 ($V_{CC} = \pm20V$) $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$	±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)

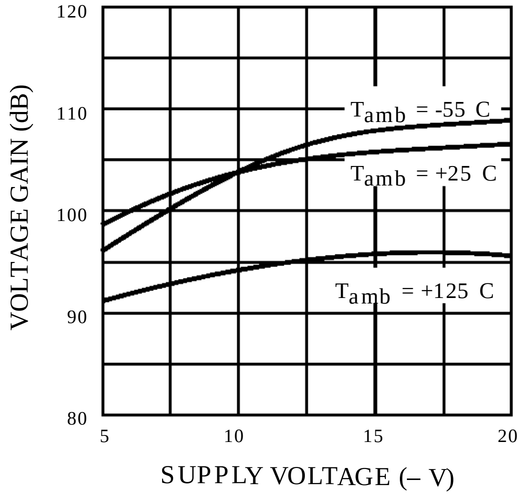
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
SR	Slew Rate ($V_I = \pm10V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, unity gain) - (note 1) *	0.25	0.5		0.25	0.5		V/µs
t_r	Rise Time ($V_I = \pm20\ \mu V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, unity gain) *		0.3			0.3		µs
K_{OV}	Overshoot ($V_I = 20\ mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, 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 * ($V_I = 10mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $f = 100kHz$, $T_{amb} = 25^oC$)	0.5	1		0.5	1		MHz
THD	Total Harmonic Distortion ($f = 1kHz$, $A_V = 20dB$, $R_L = 2k\Omega$, $V_O = 2V_{PP}$, $C_L = 100pF$, $T_{amb} = 25^oC$)		0.015			0.015		%
e_n	Equivalent Input Noise Voltage ($f = 1kHz$, $R_s = 100\Omega$)		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 $25^oC \leq T_{amb} \leq T_{max.}$		10	100		10	300	pA/°C
	$T_{min.} \leq T_{amb} \leq 25^oC$		20	200		20	600	

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

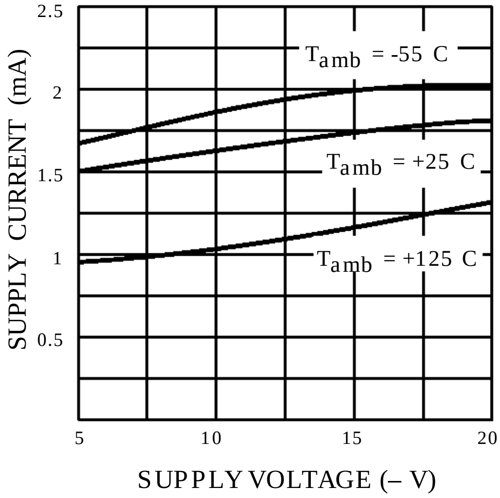




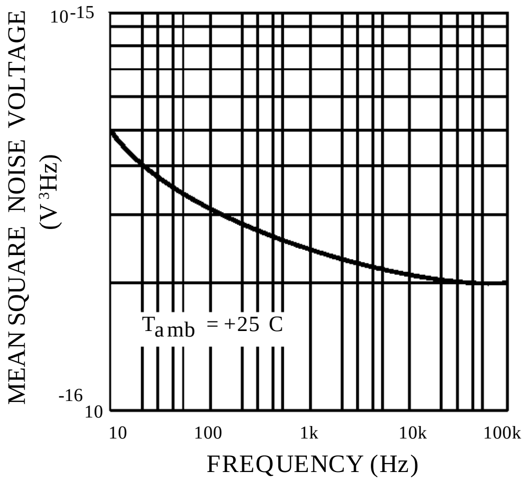
VOLTAGE GAIN



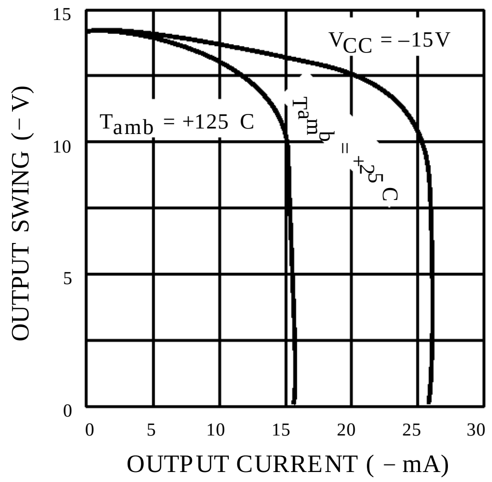
SUPPLY CURRENT



INPUT NOISE VOLTAGE

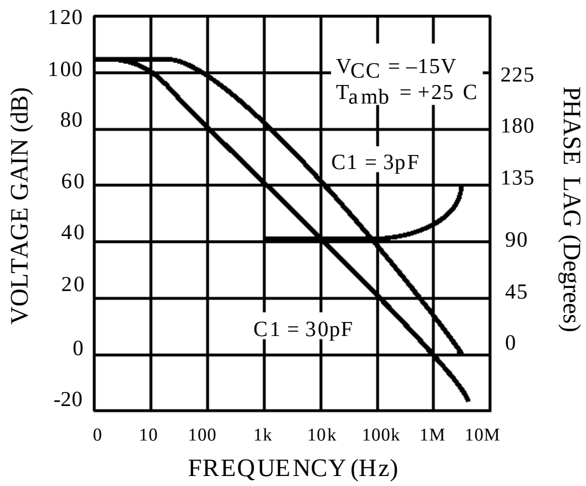


CURRENT LIMITING



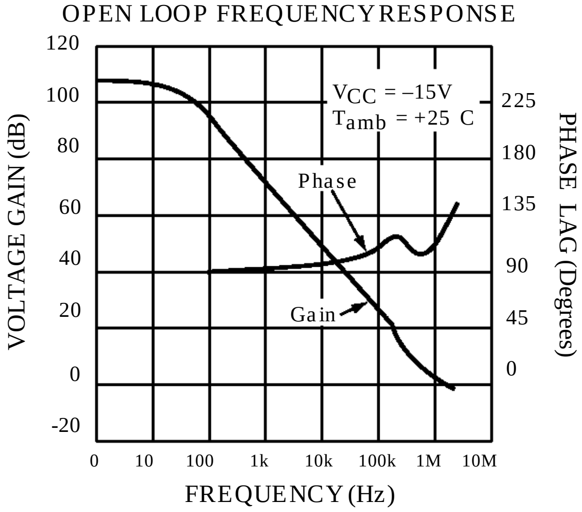
SINGLE POLE COMPENSATION

OPEN LOOP FREQUENCY RESPONSE



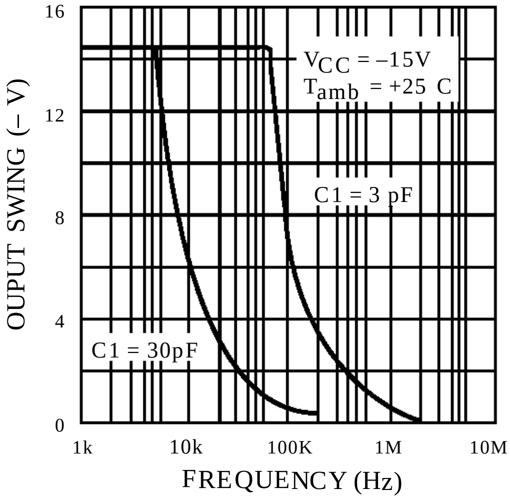
FEED FORWARD COMPENSATION

OPEN LOOP FREQUENCY RESPONSE



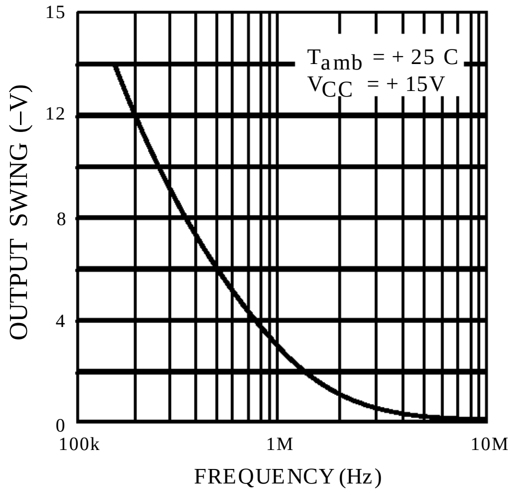
SINGLE POLE COMPENSATION

LARGE SIGNAL FREQUENCY RESPONSE

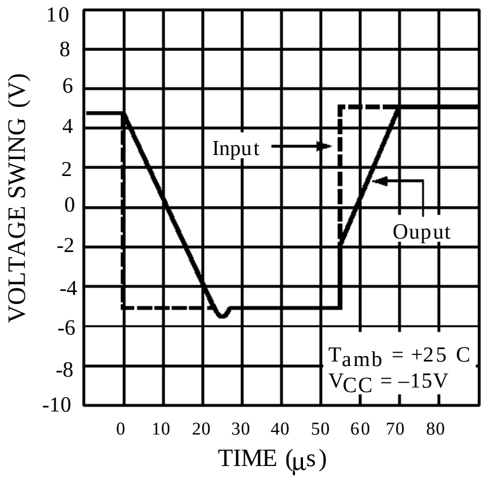


FEED FORWARD COMPENSATION

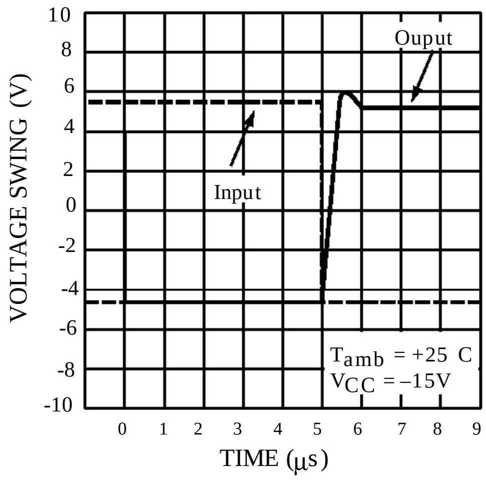
LARGE SIGNAL FREQUENCY RESPONSE



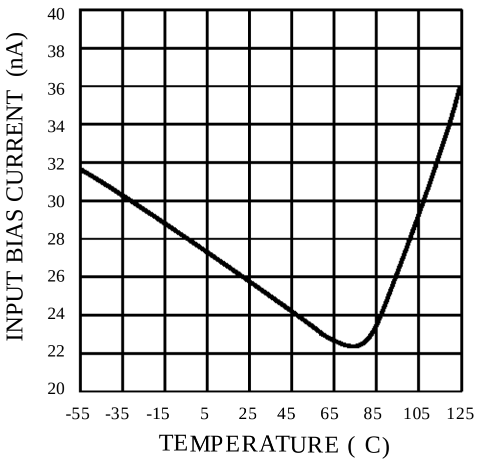
VOLTAGE FOLLOWER PULSE RESPONSE



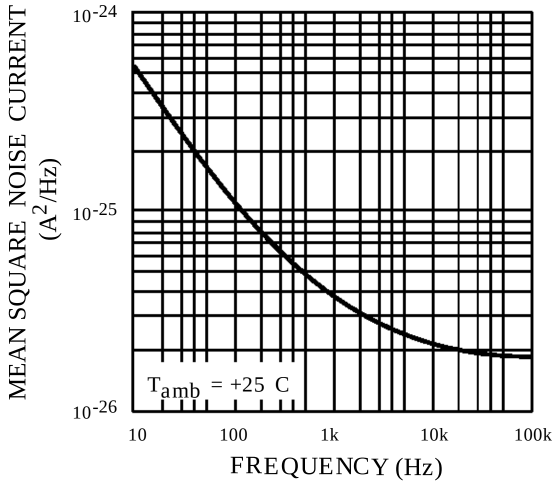
INVERTER PULSE RESPONSE



INPUT BIAS CURRENT
vs AMBIENT TEMPERATURE

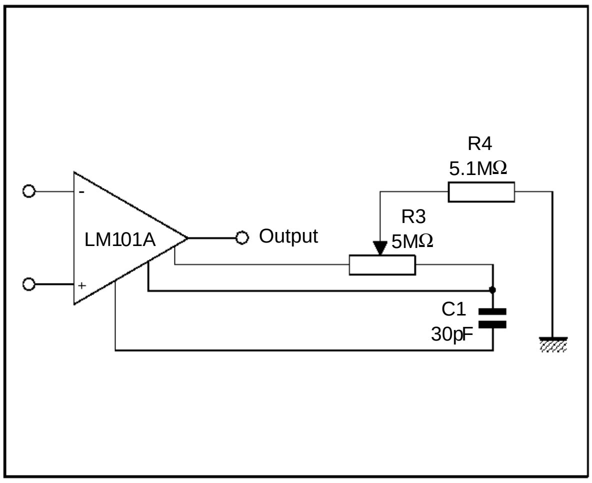


INPUT NOISE CURRENT

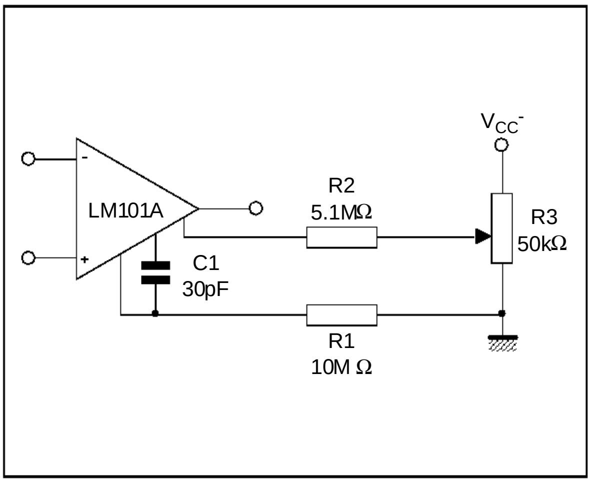


BASIC DIAGRAM

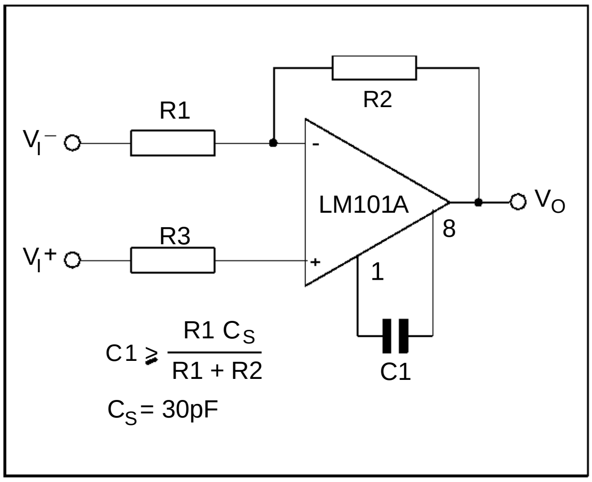
BALANCING CIRCUIT



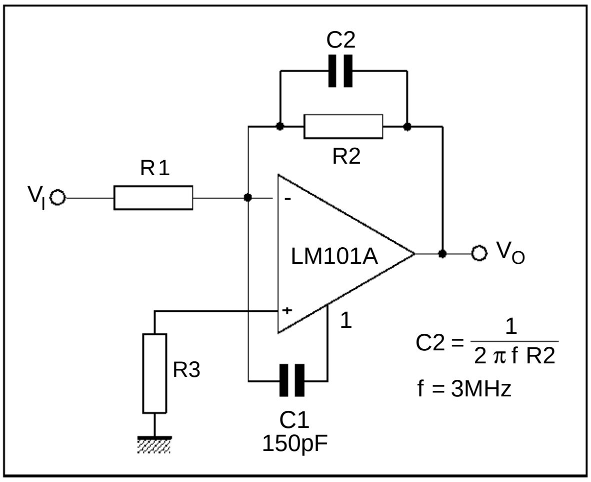
ALTERNATE BALANCING CIRCUIT



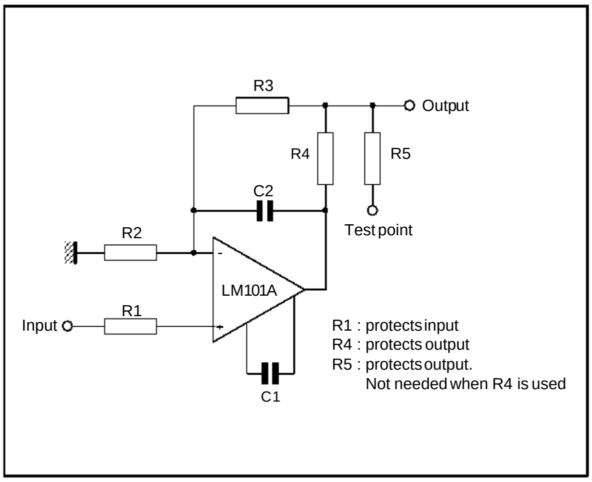
SINGLE POLE COMPENSATION



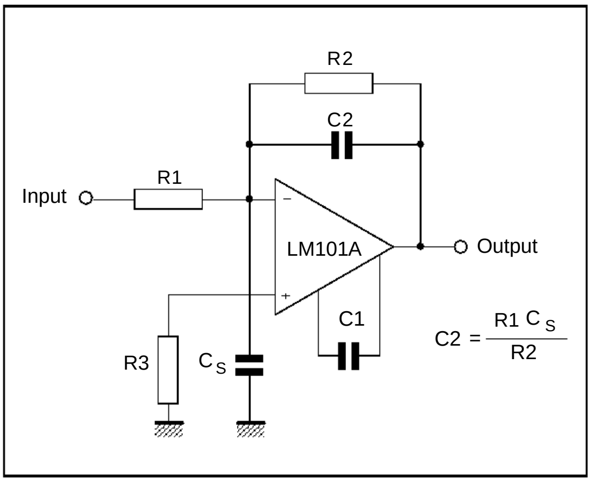
FEEDFORWARD COMPENSATION



PROTECTING AGAINST GROSS FAULT CONDITIONS

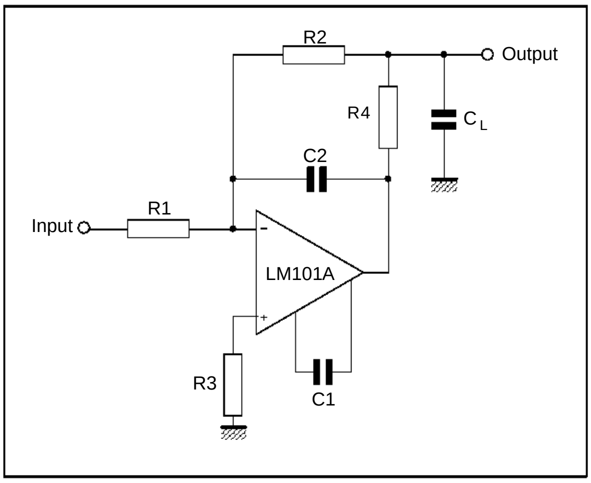


COMPENSATING FOR STRAY INPUT CAPACITANCES OR LARGE FEEDBACK RESISTOR

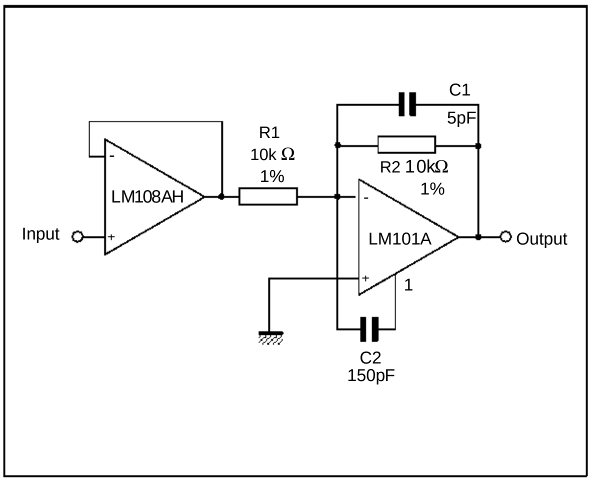


BASIC DIAGRAM (continued)

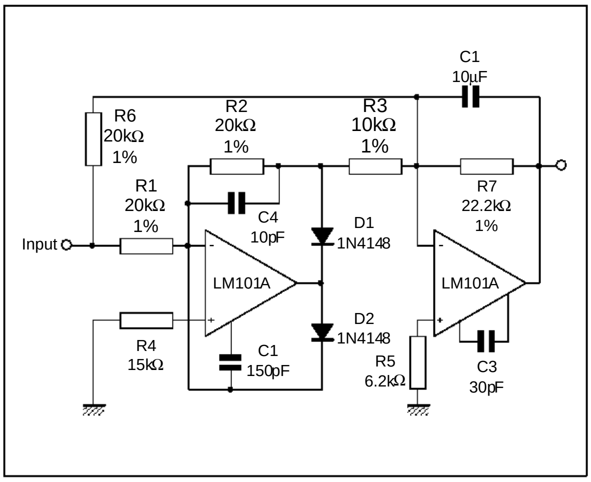
ISOLATING LARGE CAPACITIVE LOAD



FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE

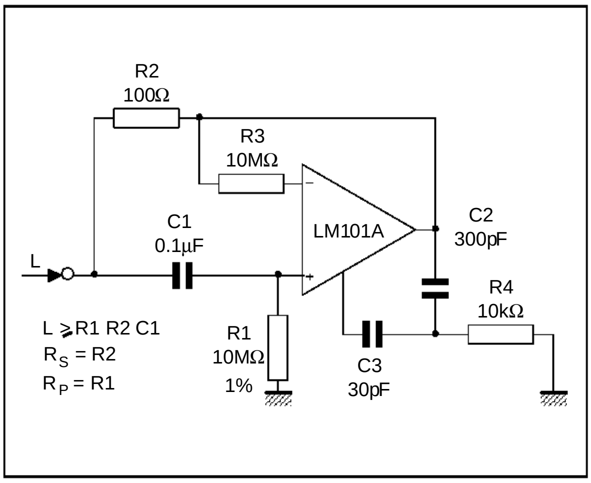


FAST AC/DC CONVERTER

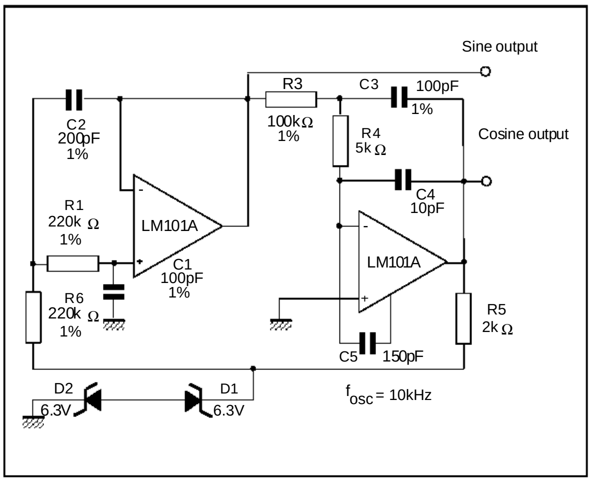


TYPICAL APPLICATIONS

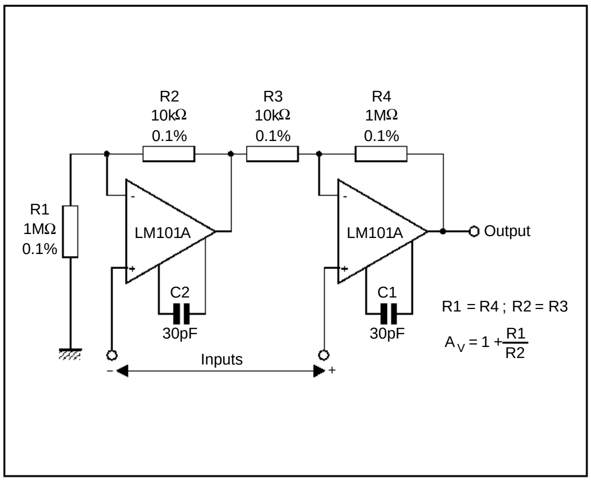
SIMULATED INDUCTOR



SINE WAVE OSCILLATOR

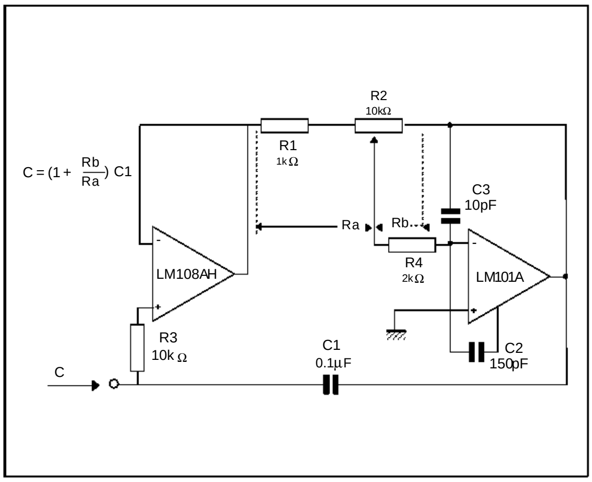


INSTRUMENTATION AMPLIFIER

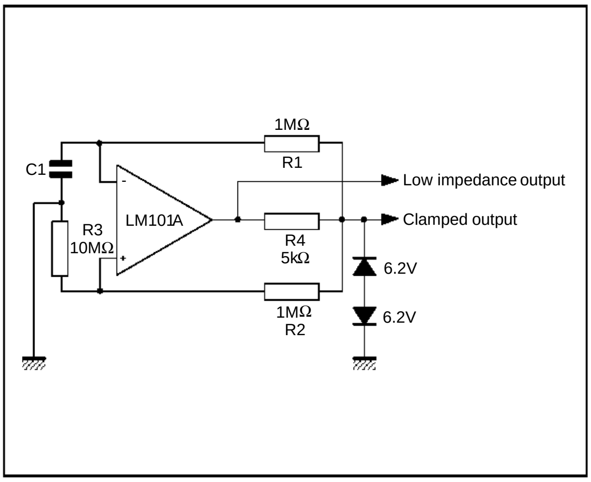


TYPICAL APPLICATIONS (continued)

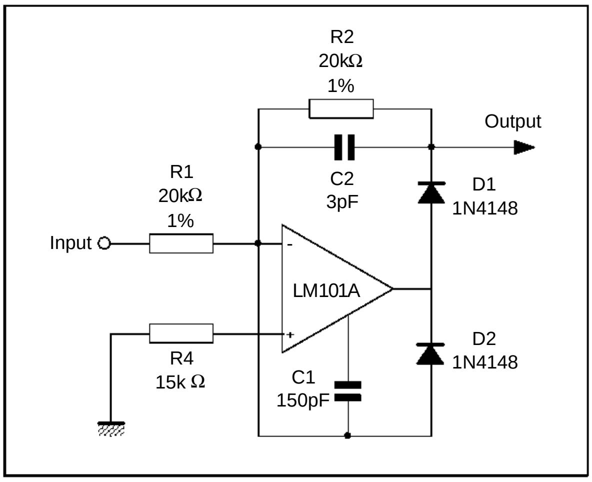
VARIABLE CAPACITANCE MULTIPLIER



LOW FREQUENCY SQUARE WAVE GENERATOR

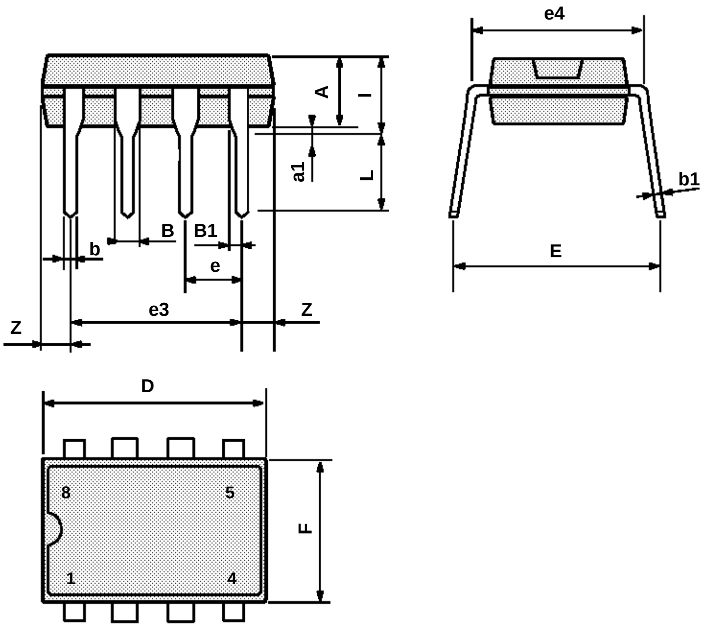


FAST HALF WAVE RECTIFIER



PACKAGE MECHANICAL DATA

8 PINS – PLASTIC DIP OR CERDIP



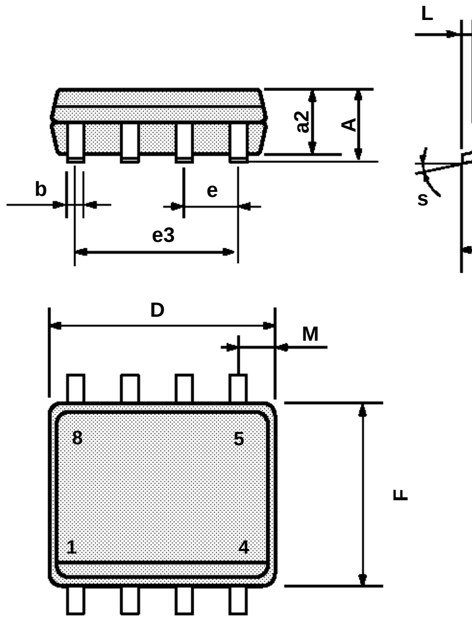
PM-DIP8.EPS

Dimensions	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

DIP8.TBL

PACKAGE MECHANICAL DATA

8 PINS – PLASTIC MICROPACKAGE (SO)



PM-SO14.EPS

Dimensions	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.)					

SO14.TBL

ORDER CODE :