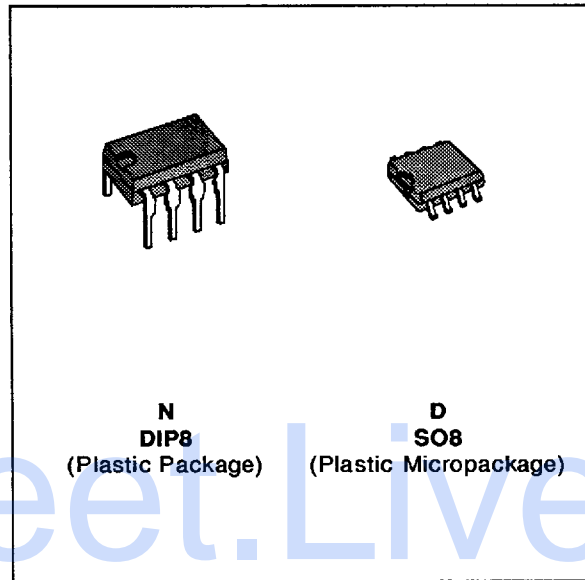


**SINGLE OPERATIONAL AMPLIFIERS**

	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

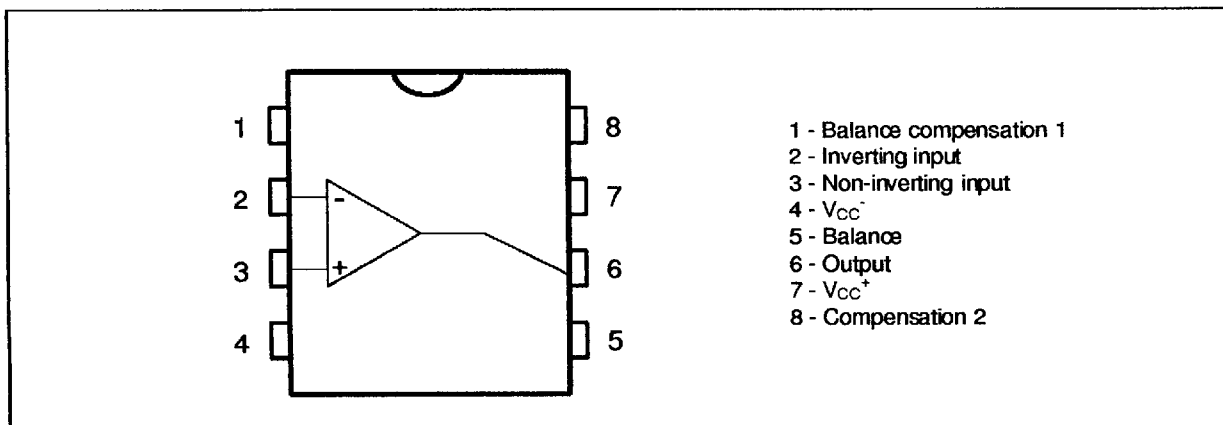

**DESCRIPTION**

The LM101A is a general-purpose operational amplifier. This amplifier offers many features : supply voltages from  $\pm 5$  V to  $\pm 22$  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**

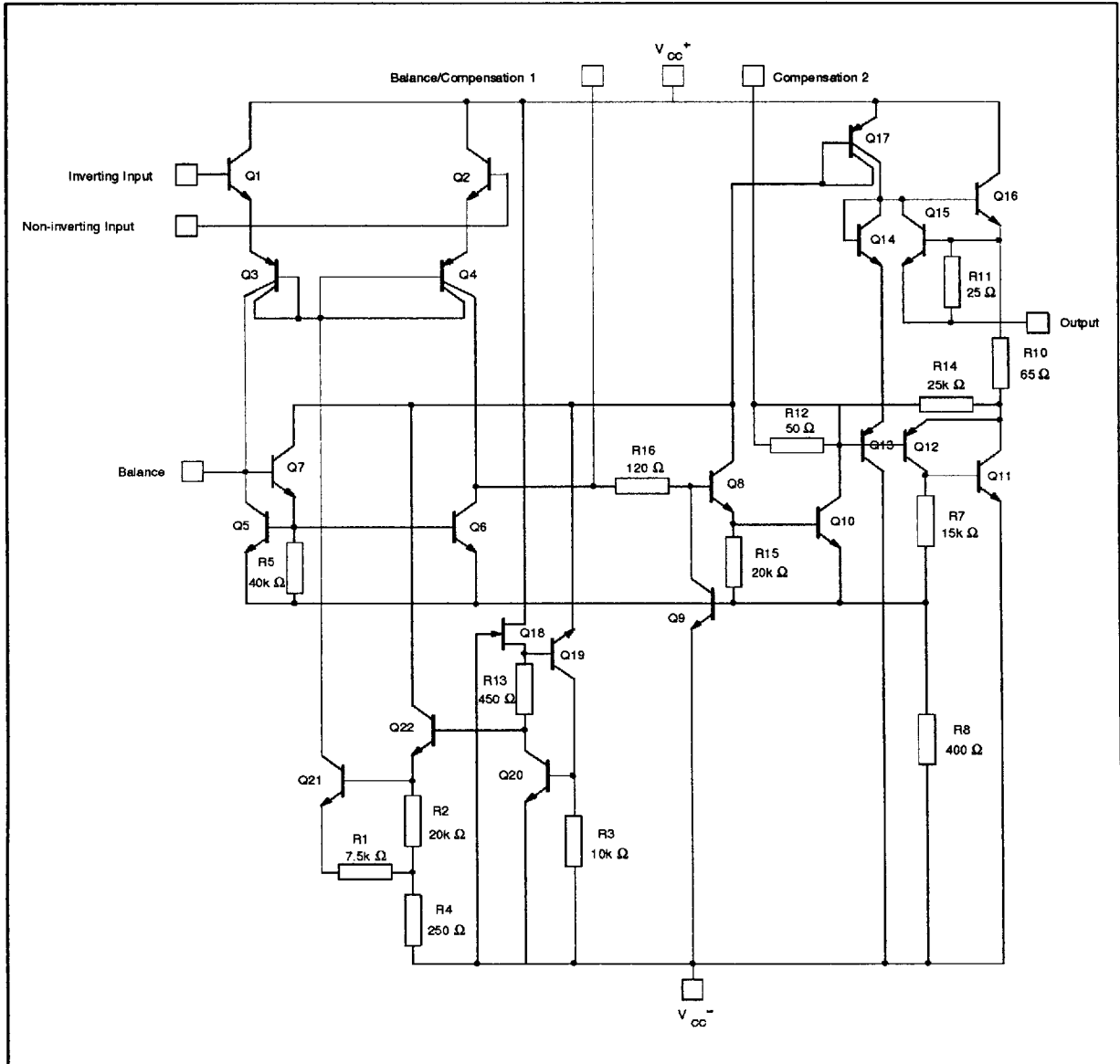
Part Number	Temperature Range	Package	
		N	D
LM101A	-55, +125°C	•	•
LM201A	-40, +105°C	•	•
LM301A	0, +70°C	•	•

**Example : LM201AN**

**PIN CONNECTIONS (top view)**


# LM101A - LM201A - LM301A

## SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

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

**ELECTRICAL CHARACTERISTICS**

**LM301A**                     $0^{\circ}\text{C} < T_{\text{amb}} < +70^{\circ}\text{C}$                      $\pm 5\text{V} \leq V_{\text{CC}} \leq \pm 20\text{V}$                      $C_1 = 30\text{pF}$   
**LM201A**                     $-40^{\circ}\text{C} < T_{\text{amb}} < +105^{\circ}\text{C}$                      $\pm 5\text{V} \leq V_{\text{CC}} \leq \pm 20\text{V}$                      $C_1 = 30\text{pF}$   
**LM101A**                     $-55^{\circ}\text{C} < T_{\text{amb}} < +125^{\circ}\text{C}$                      $\pm 5\text{V} \leq V_{\text{CC}} \leq \pm 20\text{V}$                      $C_1 = 30\text{pF}$   
 \* =>  $V_{\text{CC}} = \pm 15\text{V}$ ,  $T_{\text{amb}} = 25^{\circ}\text{C}$ (unless otherwise specified)

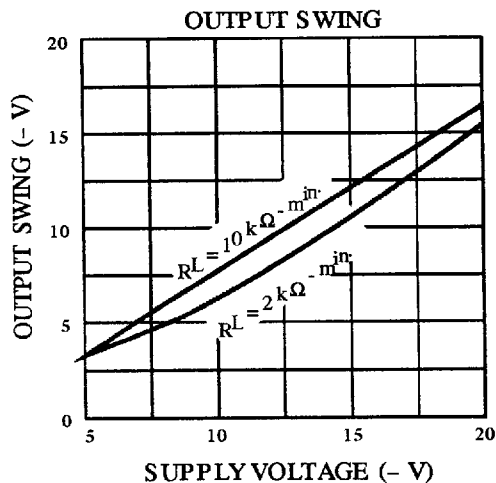
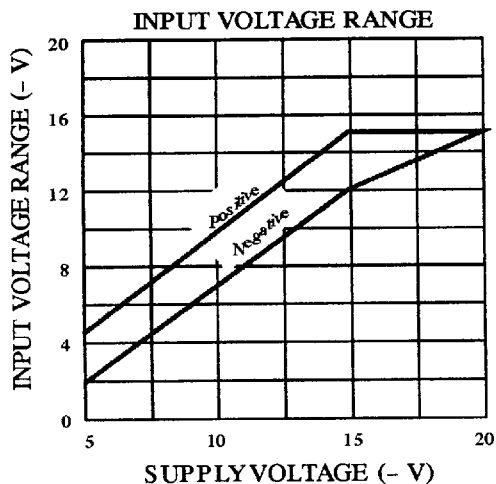
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
$V_{io}$	Input Offset Voltage ( $R_S \leq 10\text{k}\Omega$ ) $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		0.7	2 3		2	7.5 10	mV
$I_{ib}$	Input Bias Current $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$		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
$A_{vd}$	Large Signal Voltage Gain * ( $V_O = \pm 10\text{V}$ , $R_L = 2\text{k}\Omega$ ) $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$	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 ( $V_{\text{CC}} = \pm 20\text{V}$ ) $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$	$\pm 15$ $\pm 15$			$\pm 15$ $\pm 15$			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 * $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min.}} \leq T_{\text{amb}} \leq T_{\text{max.}}$							V
			$R_L = 10\text{k}\Omega$ 12	$R_L = 2\text{k}\Omega$ 14		$R_L = 10\text{k}\Omega$ 12	$R_L = 2\text{k}\Omega$ 13	
			$R_L = 10\text{k}\Omega$ 12	$R_L = 2\text{k}\Omega$ 10		$R_L = 10\text{k}\Omega$ 12	$R_L = 2\text{k}\Omega$ 10	

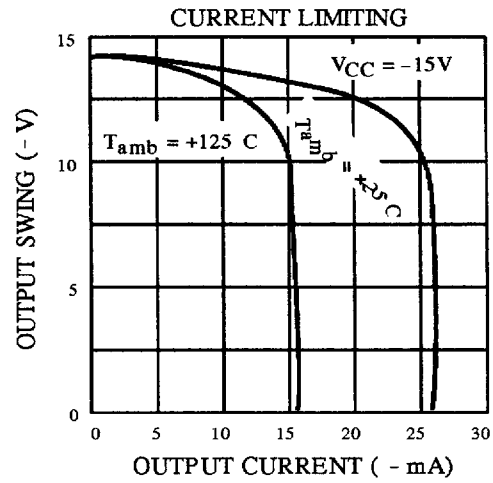
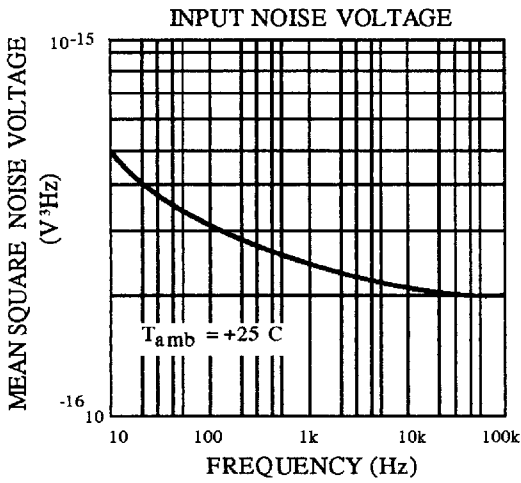
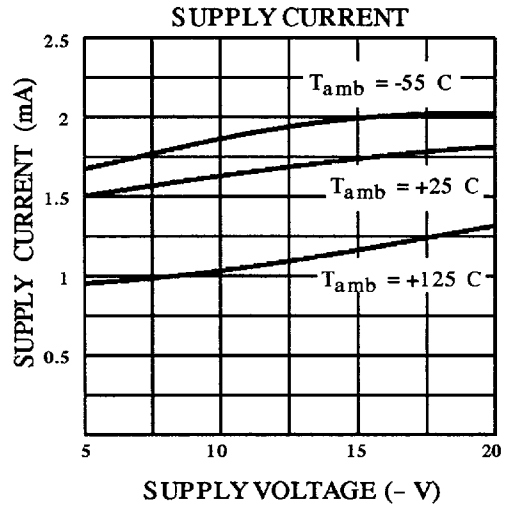
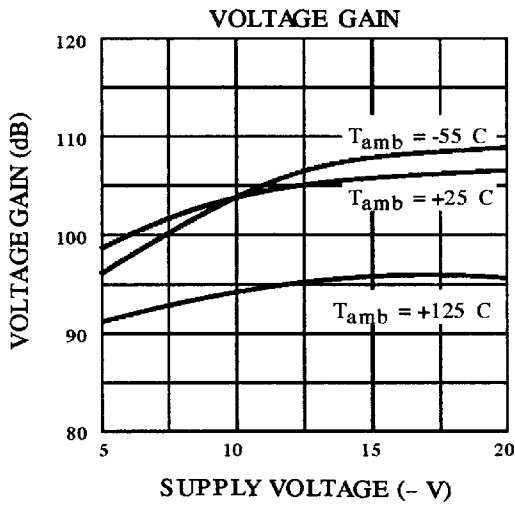
# LM101A - LM201A - LM301A

## ELECTRICAL CHARACTERISTICS (continued)

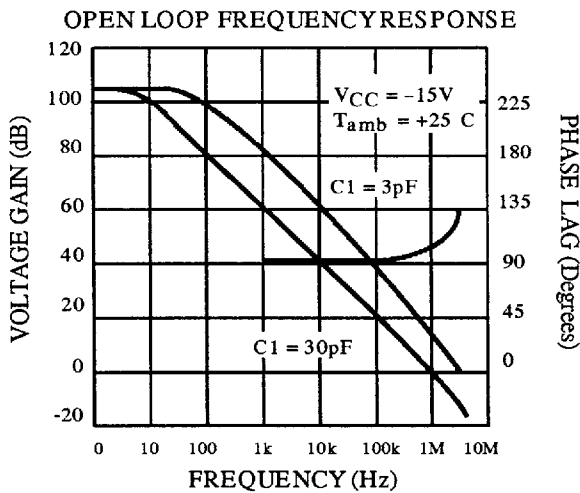
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
SR	Slew Rate ( $V_I = \pm 10V$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain) - (note 1) *	0.25	0.5		0.25	0.5		V/ $\mu s$
$t_r$	Rise Time ( $V_I = \pm 20 \mu V$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain) *		0.3			0.3		$\mu s$
$K_{OV}$	Overshoot ( $V_I = 20 mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , 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		$\frac{nV}{\sqrt{Hz}}$
$DV_{io}$	Input Offset Voltage Drift $T_{min.} \leq T_{amb} \leq T_{max.}$		3	15		6	30	$\mu V/^\circ C$
$DI_{io}$	Input Offset Current Drift $25^\circ C \leq T_{amb} \leq T_{max.}$ $T_{min.} \leq T_{amb} \leq 25^\circ C$		10 20	100 200		10 20	300 600	$pA/^\circ C$

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

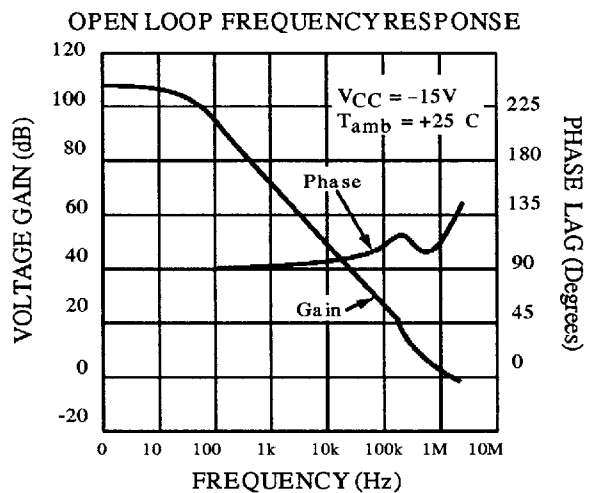




### SINGLE POLE COMPENSATION

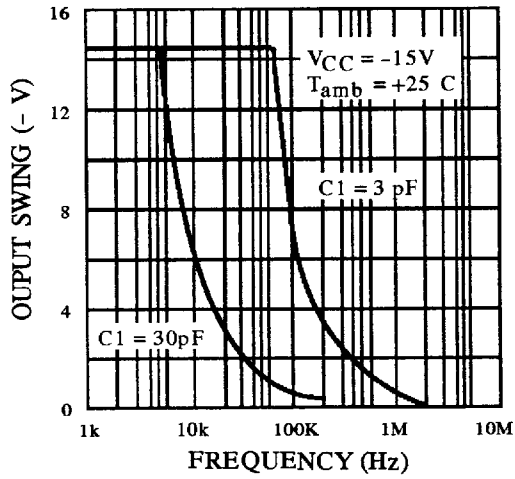


### FEED FORWARD COMPENSATION



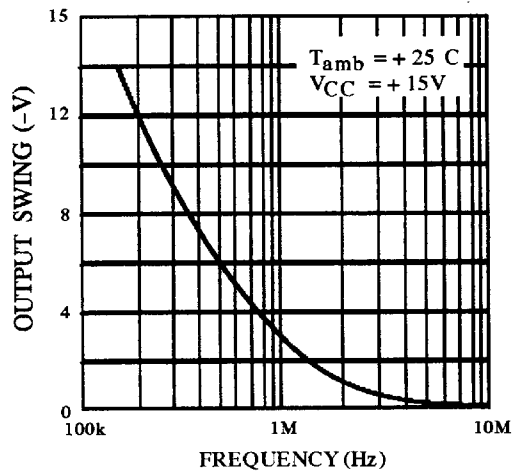
**SINGLE POLE COMPENSATION**

LARGE SIGNAL FREQUENCY RESPONSE

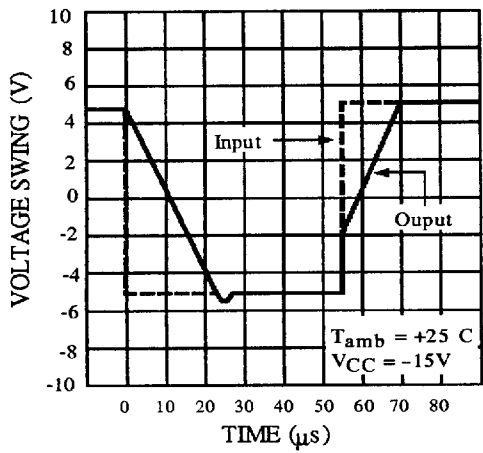


**FEED FORWARD COMPENSATION**

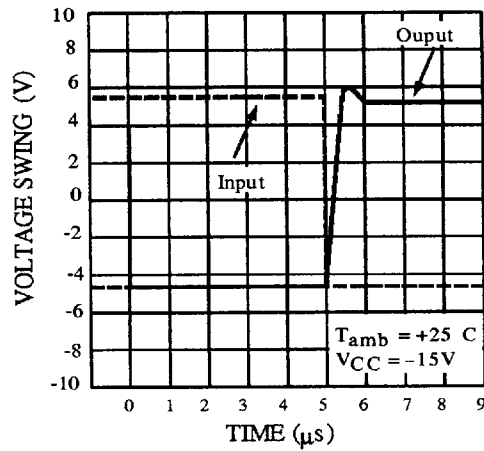
LARGE SIGNAL FREQUENCY RESPONSE



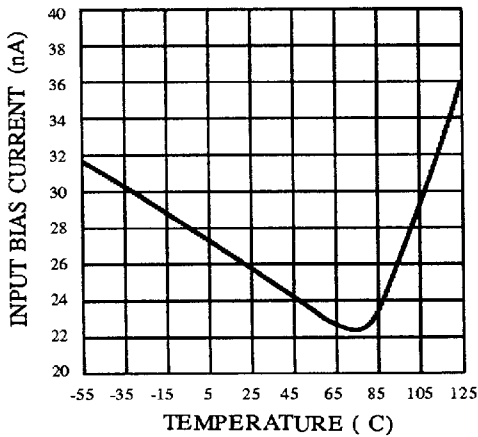
VOLTAGE FOLLOWER PULSE RESPONSE



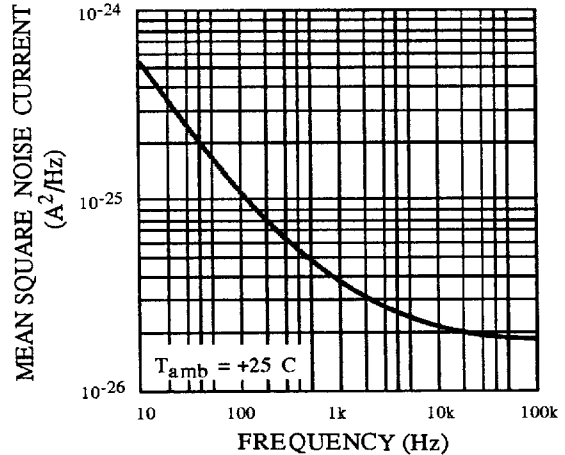
INVERTER PULSE RESPONSE



INPUT BIAS CURRENT vs AMBIENT TEMPERATURE

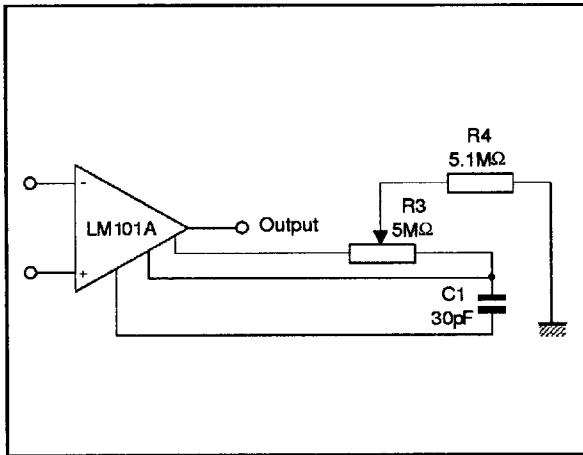


INPUT NOISE CURRENT

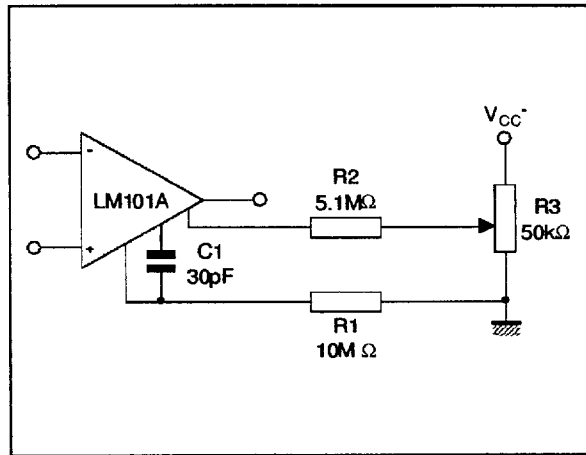


**BASIC DIAGRAM**

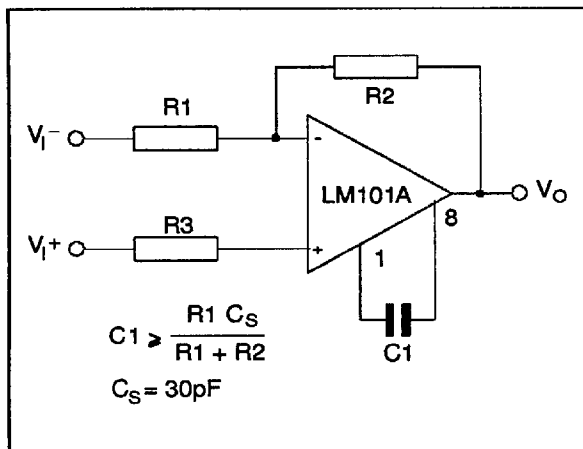
**BALANCING CIRCUIT**



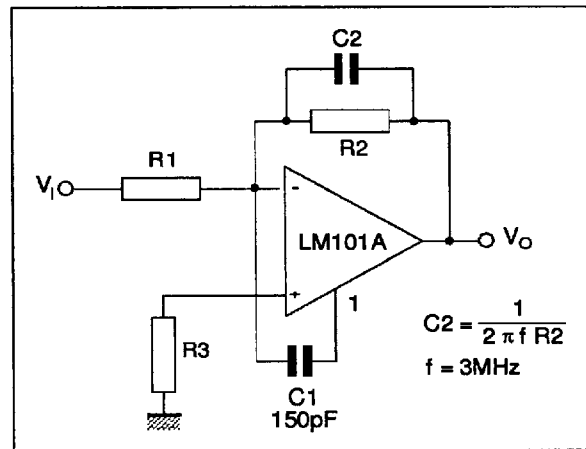
**ALTERNATE BALANCING CIRCUIT**



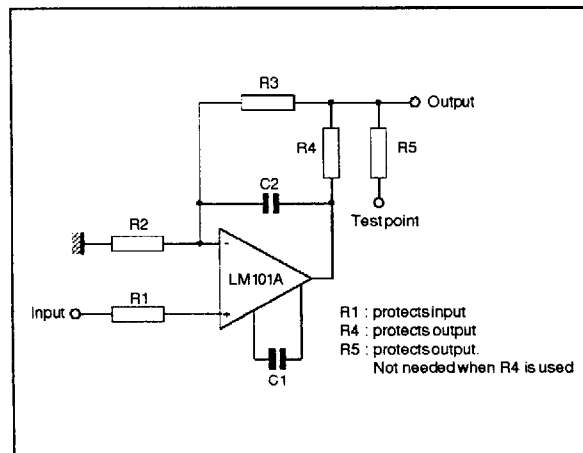
**SINGLE POLE COMPENSATION**



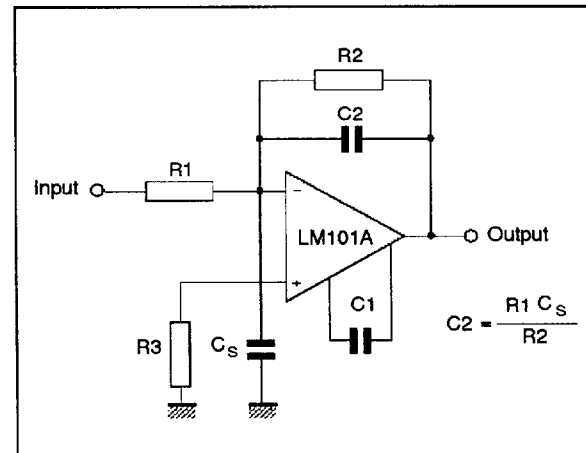
**FEEDFORWARD COMPENSATION**



**PROTECTING AGAINST GROSS FAULT CONDITIONS**



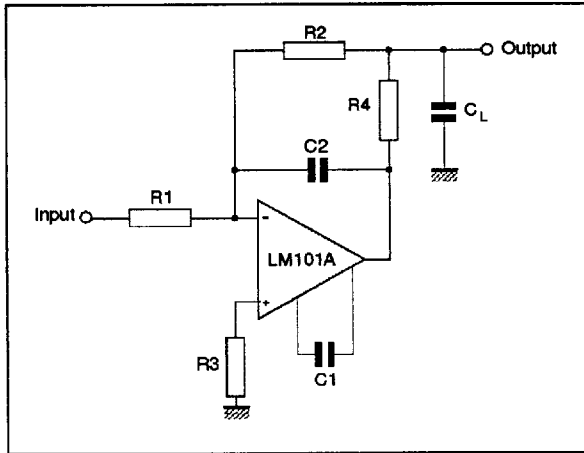
**COMPENSATING FOR STRAY INPUT CAPACITANCES OR LARGE FEEDBACK RESISTOR**



# LM101A - LM201A - LM301A

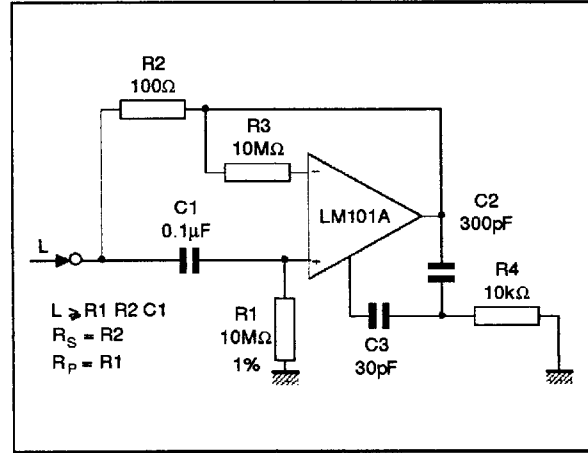
## BASIC DIAGRAM (continued)

### ISOLATING LARGE CAPACITIVE LOAD

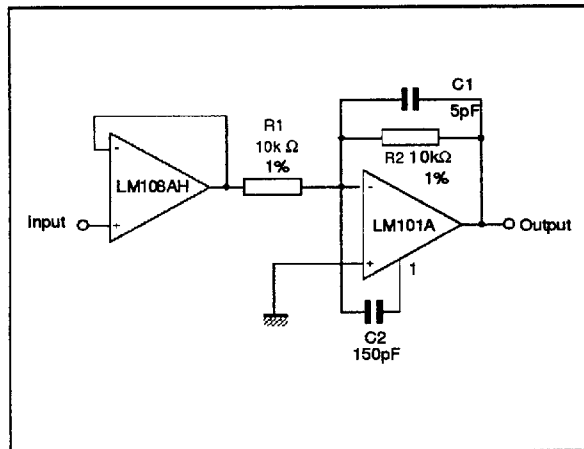


## TYPICAL APPLICATIONS

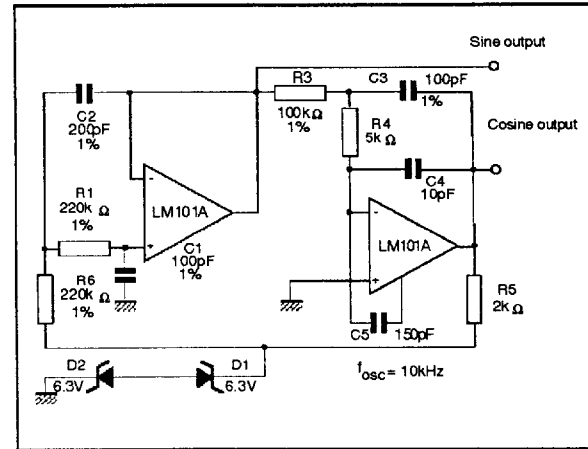
### SIMULATED INDUCTOR



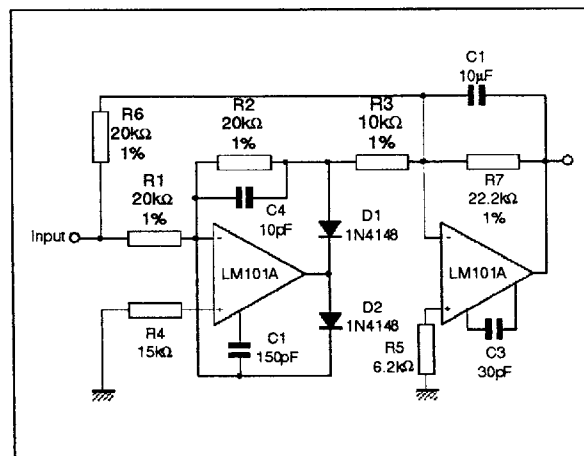
### FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE



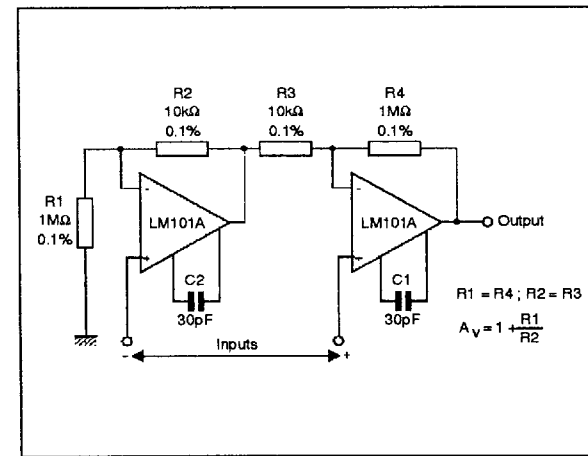
### SINE WAVE OSCILLATOR



### FAST AC/DC CONVERTER



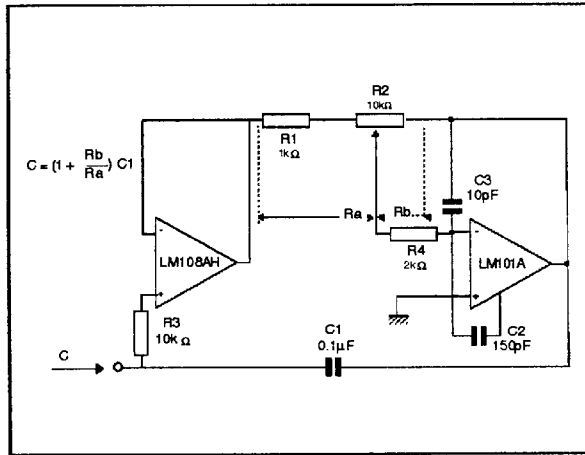
### INSTRUMENTATION AMPLIFIER



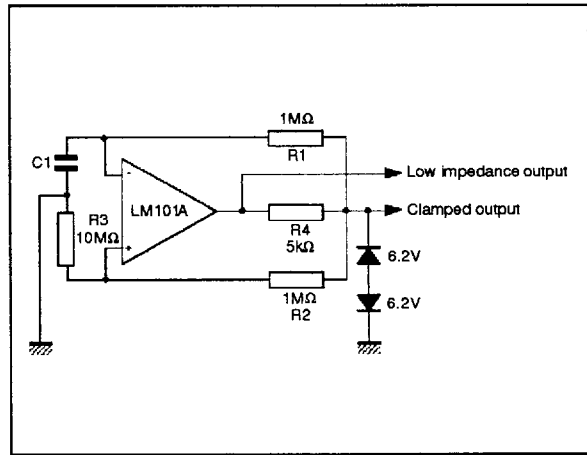


**TYPICAL APPLICATIONS (continued)**

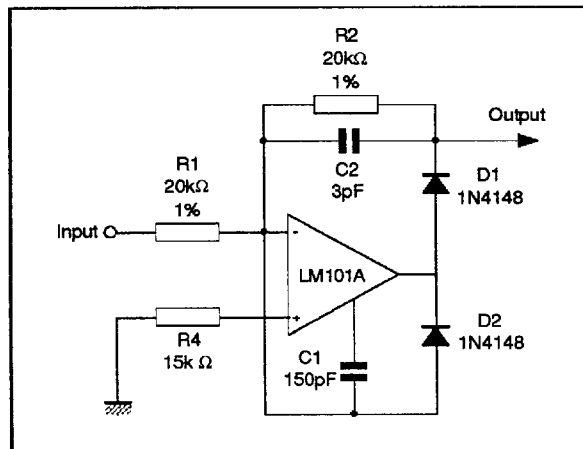
**VARIABLE CAPACITANCE MULTIPLIER**



**LOW FREQUENCY SQUARE WAVE GENERATOR**

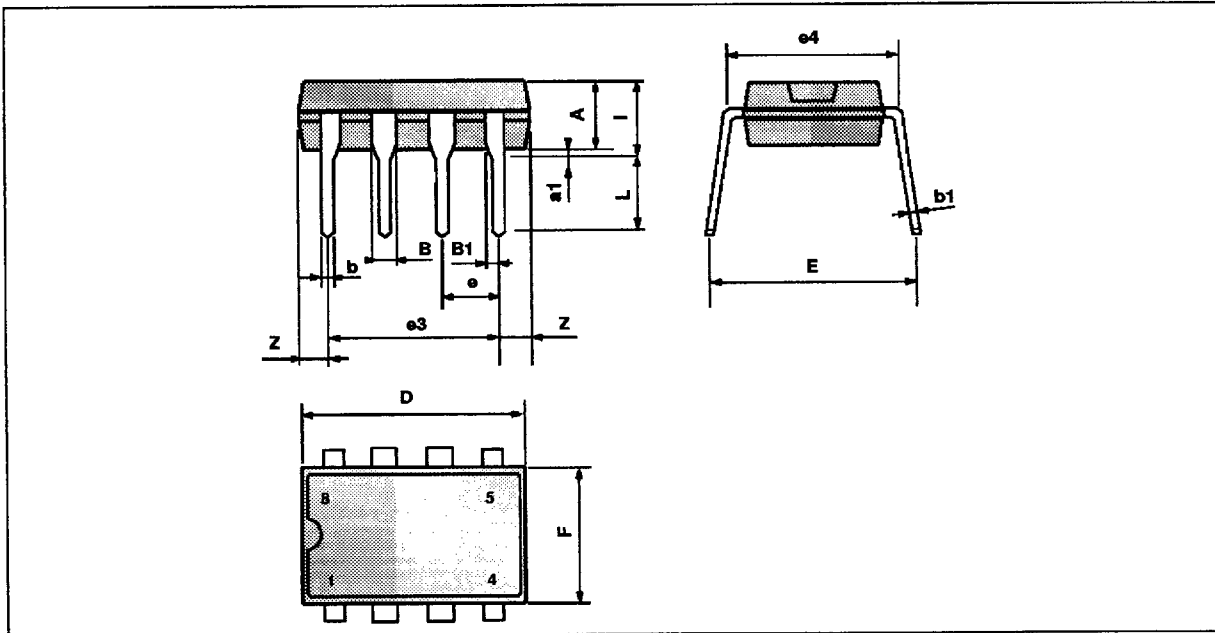


**FAST HALF WAVE RECTIFIER**



LM101A - LM201A - LM301A

PACKAGE MECHANICAL DATA  
8 PINS - PLASTIC DIP OR CERDIP

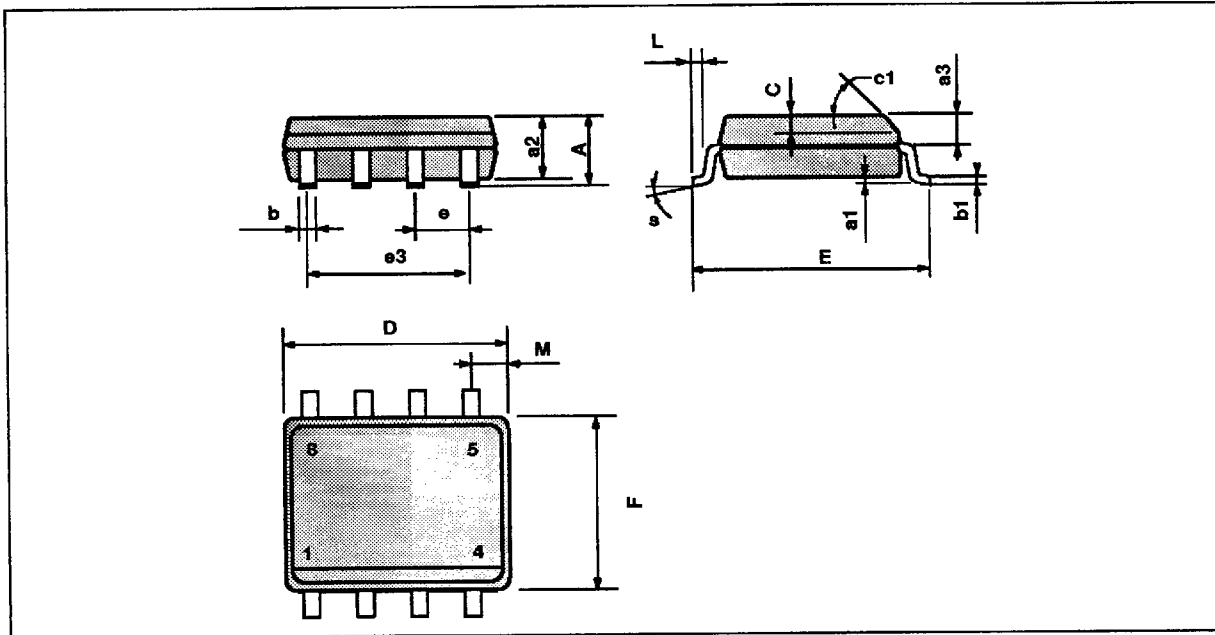


PM-DIP8.EPS

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			0.260
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-S014EPS

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° (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.)					

SO14.TBL

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No licence is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1995 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands  
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.

ORDER CODE :

