HIGH SLEW RATE OPERATIONAL AMPLIFIER NE/SE530/5530

DESCRIPTION

The 530/5530 are new generation operational amplifiers featuring high slew rates combined with improved input characteristics. Internally compensated, the SE530/5530 guarantee slew rates of 25V/μs with 2mV maximum offset voltage. Industry standard pinout and internal compensation allow the user to upgrade system performance by directly replacing general purpose amplifiers such as the 741, 747, 1458, 4558 and LF356 types.

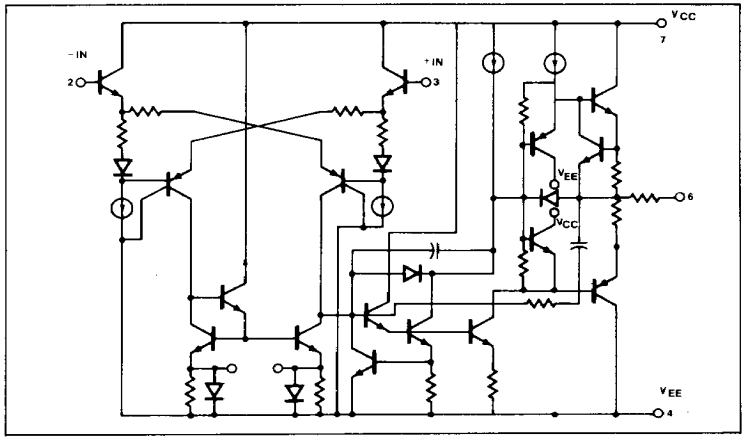
FEATURES

- **Gain bandwidth product—3MHz**
- **35V/μs slew rate (Gain = -1)**
- **Internal frequency compensation**
- **Low input offset voltage 2mV max**
- **Low input bias current-60nA max**
- **Short circuit protection**
- **Offset null capability**
- **Large common mode and differential voltage ranges**

ABSOLUTE MAXIMUM RATINGS

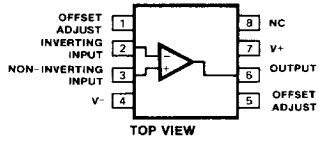
PARAMETER	RATING	UNIT
Supply voltage		
SE530/5530	±22	V
NE530/5530	±18	V
Internal power dissipation		
N Package	500	mW
H Package	800	mW
FE Package	1000	mW
Differential input voltage	±30	V
Input voltage	±15	V
Operating temperature range		
SE530/5530	-55 to +125	°C
NE530/5530	0 to +70	°C
Storage temperature range	-65 to +150	°C
Lead temperature range (Solder, 60sec)	300	°C
Output short circuit	Indefinite	

EQUIVALENT SCHEMATIC EACH AMPLIFIER



PIN CONFIGURATIONS

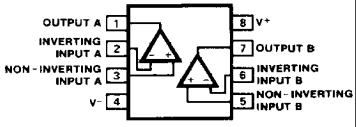
FE,N PACKAGE



TOP VIEW

ORDER NUMBERS
NE530FE, NE530N
SE530FE, SE530N

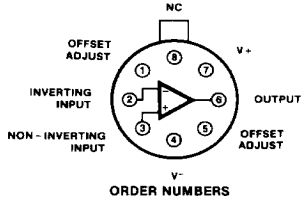
N PACKAGE



TOP VIEW

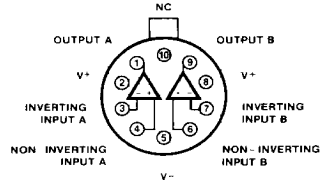
ORDER NUMBERS
NE5530N SE5530N

H PACKAGE*



ORDER NUMBERS
NE530H SE530H
*Metal cans (H) not recommended for new designs.

H PACKAGE*



ORDER NUMBERS
NE5530H SE5530H
*Metal cans (H) not recommended for new designs.

DC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_{CC} = \pm 15V$ unless otherwise specified.[1]

PARAMETER	TEST CONDITIONS	SE530/5530			NE530/5530			UNIT
		Min	Typ	Max	Min	Typ	Max	
Input offset voltage	$R_S \leq 10k\Omega$ Over temperature		0.7	4.0 5.0		2.0	6.0 7.0	mV mV
Temperature coefficient of input offset voltage			3	15		6		$\mu V/°C$
Input offset current	 Over temperature		5	20 40		15	40 80	nA nA
Input bias current	 Over temperature		45	80 200		65	150 200	nA nA
Input resistance		3	10		1	6		MΩ
Input voltage range		±12	±13		±12	±13		V
Large signal voltage gain	$R_L \geq 2k\Omega$, $V_O = \pm 10V$ Over temperature	50 25	200		50 25	200		V/mV V/mV
Output voltage swing	$R_L \geq 10k\Omega$ $R_L \geq 2k\Omega$	±12 ±10	±14 ±13		±12 ±10	±14 ±13		V V V
Output short circuit current			25			25		mA
Output resistance			100			100		Ω
Supply current	Each amplifier Over temperature		2.0 2.2	3.0 3.6		2.0 2.2	3.0	mA mA
Common mode rejection ratio	$R_S \leq 10k\Omega$ Over temperature	70	90		70	90		dB
Power supply rejection ratio	$R_S \leq 10k\Omega$ Over temperature		30	150		30	150	$\mu V/V$

AC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_{CC} = \pm 15V$ unless otherwise specified.

PARAMETER	TEST CONDITIONS	SE530/5530			NE530/5530			UNIT
		Min	Typ	Max	Min	Typ	Max	
Transient Response Small signal rise time Small signal overshoot Settling time	 TO 0.1% (10V step)		 .06 13 0.9			 .06 13 0.9		 μs % μs
Slew rate Unity gain inverting Unity gain non-inverting	±15V supply, $V_O = \pm 10V$, $R_L \geq 2k\Omega$	 25 18	 35 25		 20 12	 35 25		 V/μs V/μs
Power bandwidth	5% THD, $V_O = \pm 10V$, $R_L \geq 2k\Omega$	360	500		280	500		kHz
Small signal bandwidth	Open loop		3			3		MHz
Channel separation			120			120		dB

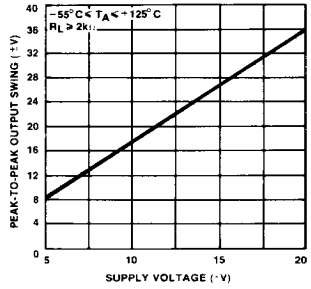
NOTE

1. Operating temperature range for the SE530/5530 is -55°C to +125°C.
   Operating temperature range for the NE530/5530 is 0°C to +70°C.

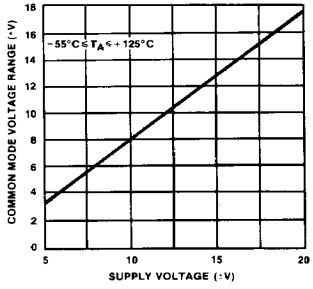
HIGH SLEW RATE OPERATIONAL AMPLIFIER NE/SE530/5530

TYPICAL PERFORMANCE CHARACTERISTICS

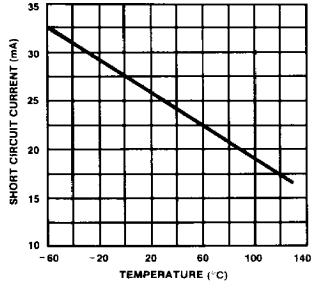
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



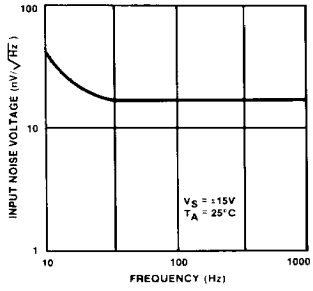
INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



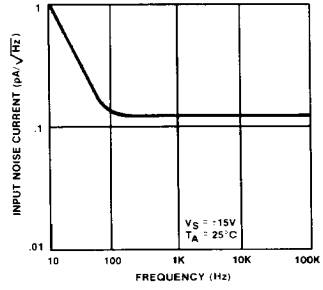
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



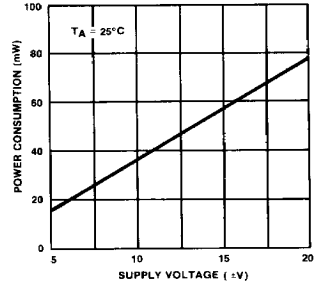
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



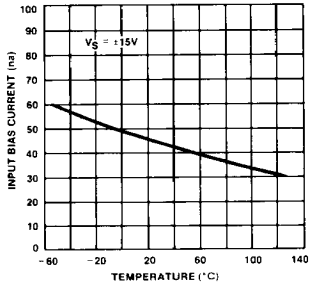
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



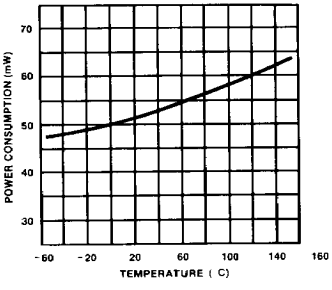
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE (EACH AMPLIFIER)



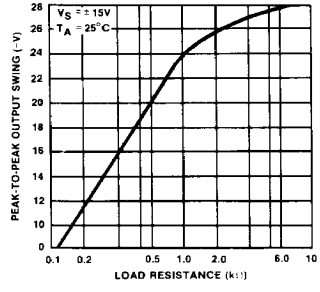
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE (EACH AMPLIFIER)

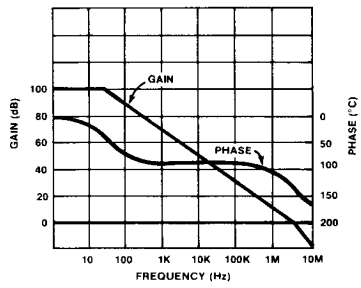


OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE

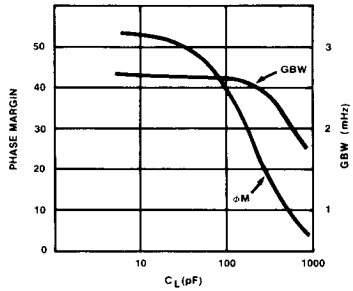


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

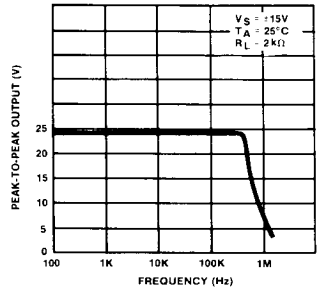
NE530 OPEN-LOOP GAIN AND PHASE vs FREQUENCY



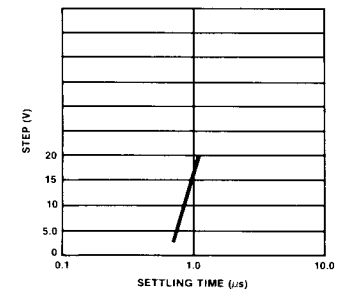
GAIN-BANDWIDTH PRODUCT AND PHASE MARGIN vs LOAD CAPACITANCE



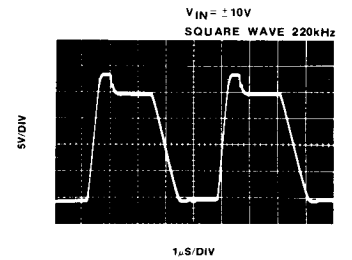
POWER BANDWIDTH



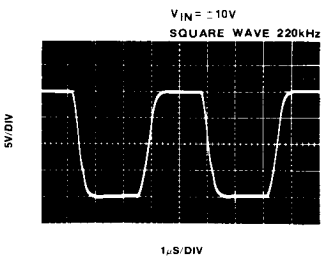
INPUT VOLTAGE STEP vs SETTLING TIME TO 10mV



SLEW RATE—VOLTAGE FOLLOWER

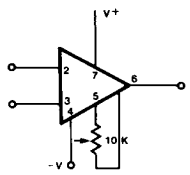


SLEW RATE (-1 AMPLIFIER)



TYPICAL CIRCUIT CONNECTION

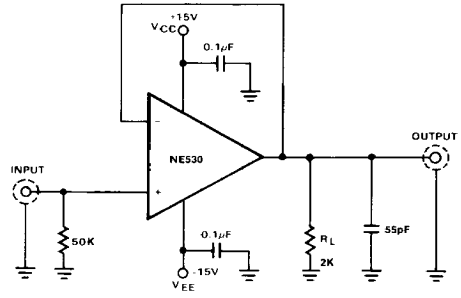
OFFSET ADJUST CIRCUIT



HIGH SLEW RATE OPERATIONAL AMPLIFIER NE/SE530/5530

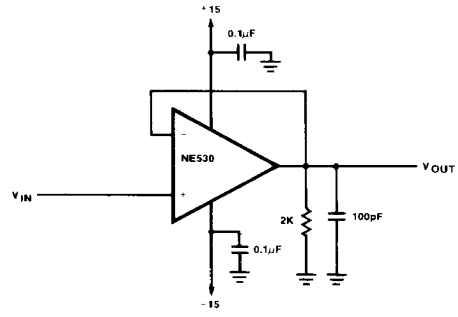
TEST LOAD CIRCUITS

SMALL SIGNAL TRANSIENT RESPONSE

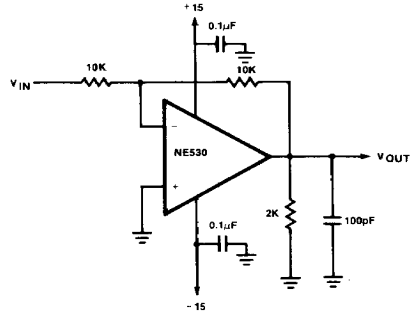


Pins not shown are not connected.
All resistor values are typical and in ohms.

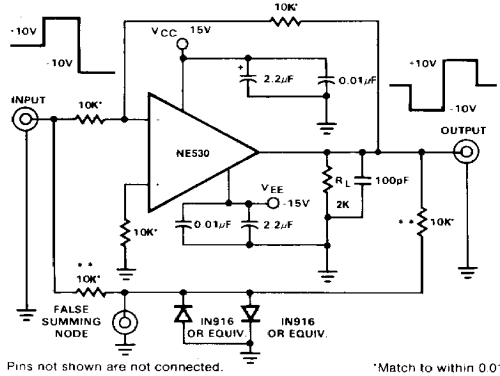
SLEW RATE—VOLTAGE FOLLOWER



SLEW RATE—INVERTING AMPLIFIER



SLEW RATE AND SETTLING TIME

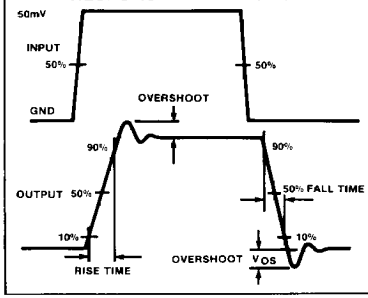


Pins not shown are not connected.
All resistor values are typical and in ohms.

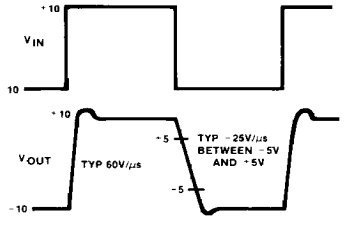
*Match to within 0.01%.
**Open for slew rate.

VOLTAGE WAVEFORMS

SMALL SIGNAL TRANSIENT RESPONSE DEFINITIONS



SLEW RATE—VOLTAGE FOLLOWER



SLEW RATE—INVERTING AMPLIFIER