HIGH SLEW RATE OPERATIONAL AMPLIFIER — SE/NE530

DESCRIPTION

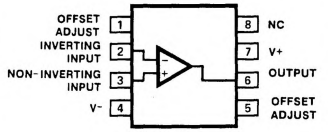
The 530 is a new generation operational amplifier featuring a high slew rate combined with improved input characteristics. Internally compensated, the SE530 guarantees slew rates of 25V/μs with 2mV maximum offset voltage. Industry standard pinout and internal compensation allow the user to upgrade system performance by directly replacing general purpose amplifiers such as the 741 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**

PIN CONFIGURATIONS

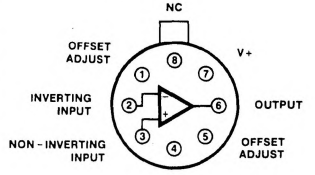
FE,N PACKAGE



TOP VIEW

ORDER NUMBERS
NE530FE, NE530N
SE530FE, SE530N

H PACKAGE*



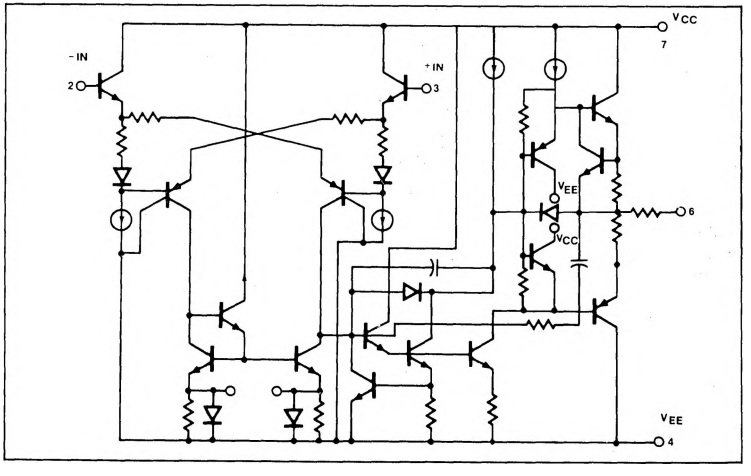
ORDER NUMBERS
NE530H SE530H

*Metal cans (H) not recommended for new designs.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage		
SE530	±22	V
NE530	±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	-55 to +125	°C
NE530	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



HIGH SLEW RATE OPERATIONAL AMPLIFIER — SE/NE530

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

PARAMETER		TEST CONDITIONS	SE530			NE530			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Input offset voltage	$R_S \leq 10k\Omega$ Over temperature		0.7	4.0 5.0		2.0	6.0 7.0	mV mV
ΔV_{OS}	Temperature coefficient of input offset voltage	Over temperature		3	15		6		μV/°C
I_{OS}	Input offset current	 Over temperature		5	20 40		15	40 80	nA nA
ΔI_{OS}	Input offset current	Over temperature		25			40		pA/°C
I_B	Input bias current	 Over temperature		45	80 200		65	150 200	nA nA
ΔI_B	Input current	Over temperature		50			80		pA/°C
R_{IN}	Input resistance		3	10		1	6		MΩ
V_{CM}	Input common mode voltage range		± 12	± 13		± 12	± 13		V
A_{VOL}	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
V_{OUT}	Output voltage swing	$R_L \geq 10k\Omega$ $R_L \geq 2k\Omega$	± 12 ± 10	± 14 ± 13		± 12 ± 10	± 14 ± 13		V V
I_{SC}	Output short circuit current		10	25	50	10	25	50	mA
R_{OUT}	Output resistance			100			100		Ω
I_{CC}	Supply current	Each amplifier Over temperature		2.0 2.2	3.0 3.6		2.0 2.2	3.0	mA mA
CMRR	Common mode rejection ratio	$R_S \leq 10k\Omega$ Over temperature	70	90		70	90		dB
PSRR	Power supply rejection ratio	$R_S \leq 10k\Omega$ Over temperature		30	150		30	150	μV/V

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

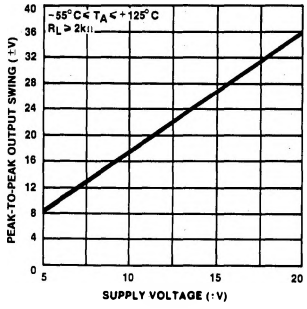
PARAMETER	TEST CONDITIONS	SE530/5530			NE530/5530			UNIT
		Min	Typ	Max	Min	Typ	Max	
Transient Response								
Small signal rise time			.06			.06		μs
Small signal overshoot			13			13		%
Settling time	TO 0.1% (10V step)		0.9			0.9		μs
Slew rate	±15V supply, $V_O = \pm 10V$, $R_L \geq 2k\Omega$							
Unity gain inverting		25	35		20	35		V/μs
Unity gain non-inverting		18	25		12	25		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
Input noise voltage	f = 1kHz		30			30		$nV/\sqrt{Hz}$

NOTE
1. Operating temperature range for the SE530 is −55°C to +125°C
Operating temperature range for the NE530 is 0°C to +70°C.

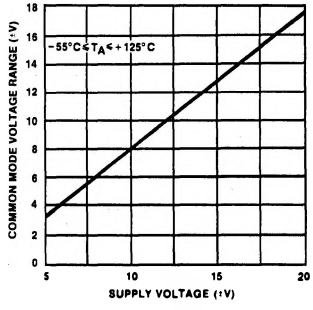
HIGH SLEW RATE OPERATIONAL AMPLIFIER — SE/NE530

TYPICAL PERFORMANCE CHARACTERISTICS

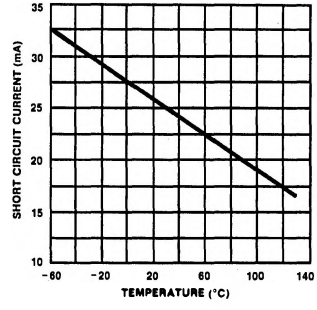
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



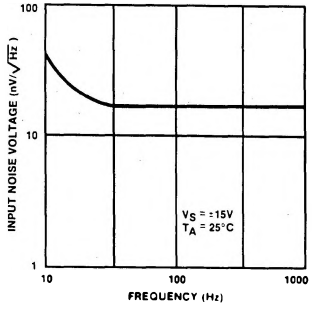
INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



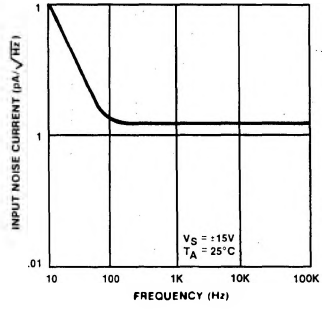
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



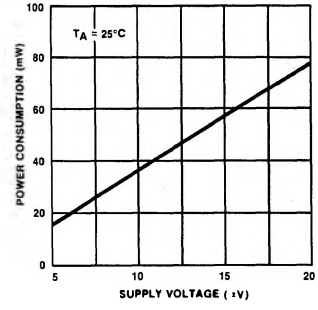
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



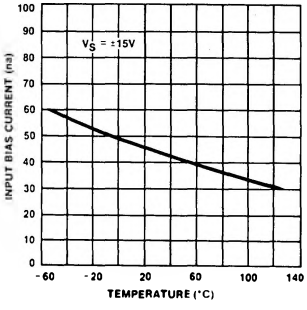
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



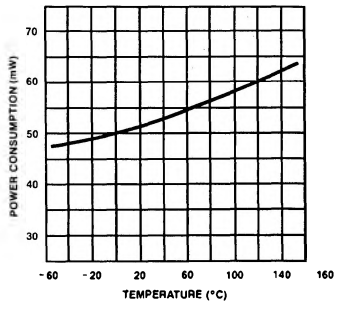
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE (EACH AMPLIFIER)



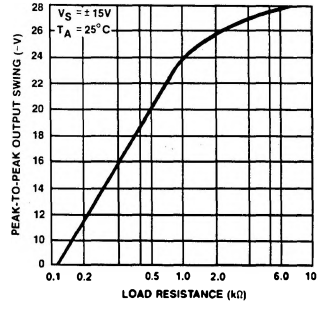
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



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



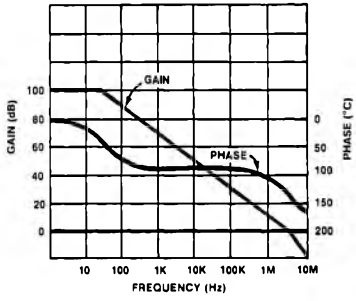
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



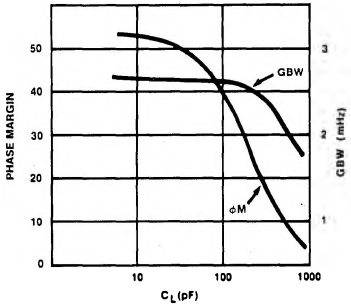
HIGH SLEW RATE OPERATIONAL AMPLIFIER — SE/NE530

TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

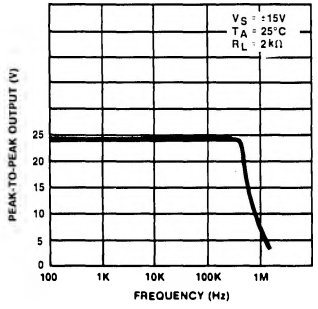
NE530 OPEN-LOOP GAIN AND PHASE vs FREQUENCY



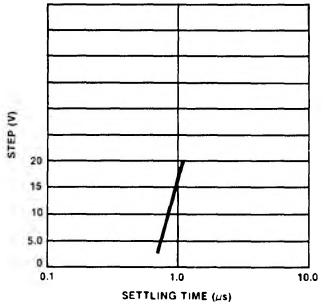
GAIN-BANDWIDTH PRODUCT AND PHASE MARGIN vs LOAD CAPACITANCE



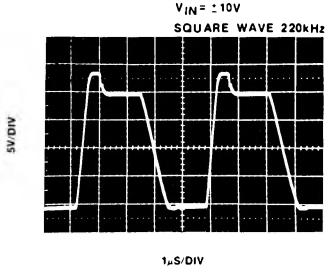
POWER BANDWIDTH



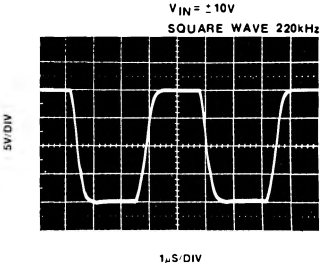
INPUT VOLTAGE STEP vs SETTLING TIME TO 10mV



SLEW RATE—VOLTAGE FOLLOWER

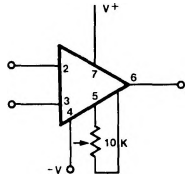


SLEW RATE (-1 AMPLIFIER)



TYPICAL CIRCUIT CONNECTION

OFFSET ADJUST CIRCUIT



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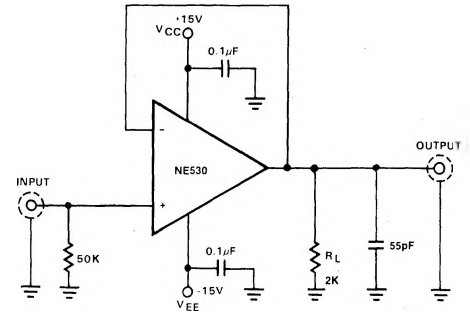
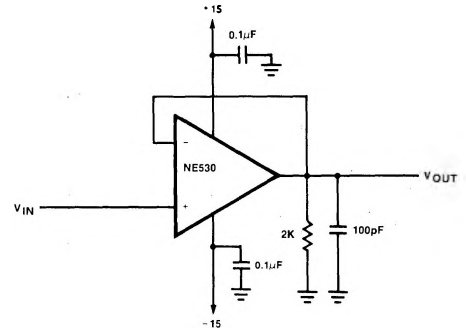
TEST LOAD CIRCUITS

SLEW RATE AND SETTLING TIME

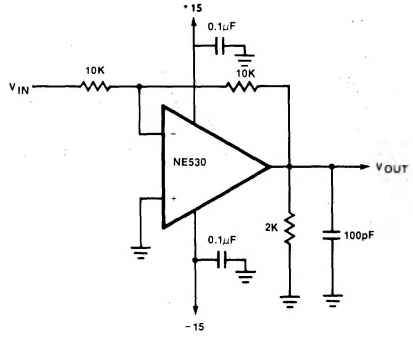


Pins not shown are not connected.
All resistor values are typical and in ohms.

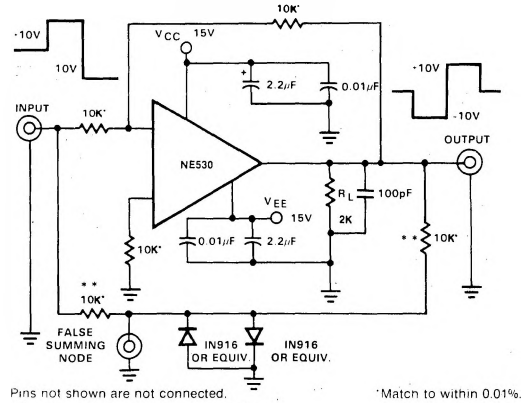
HIGH SLEW RATE—VOLTAGE FOLLOWER



HIGH SLEW RATE—INVERTING AMPLIFIER



TESTING SLEW RATE AND SETTLING TIME

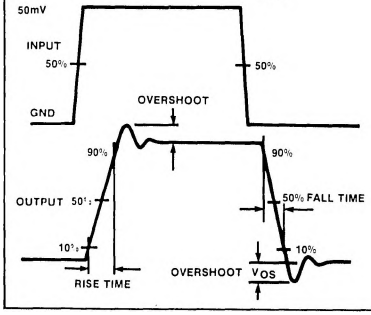


Pins not shown are not connected.
All resistor values are typical and in ohms.

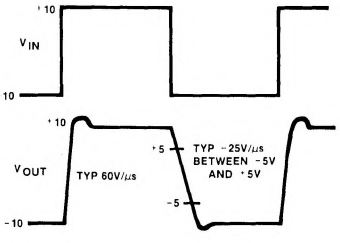
*Match to within 0.01%.
**Open for slew rate.

VOLTAGE WAVEFORMS

SMALL SIGNAL TRANSIENT RESPONSE DEFINITIONS



SLEW RATE—VOLTAGE FOLLOWER



SLEW RATE—INVERTING AMPLIFIER