

HIGH SLEW RATE OPERATIONAL AMPLIFIER

SE/NE530

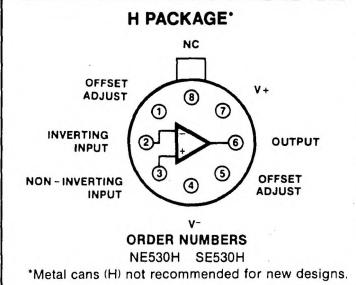
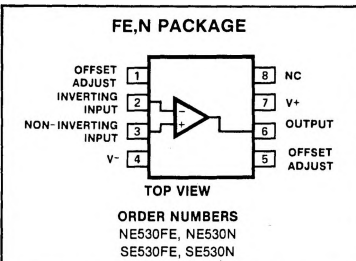
DESCRIPTION

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 $25V/\mu s$ 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
- $35V/\mu s$ 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

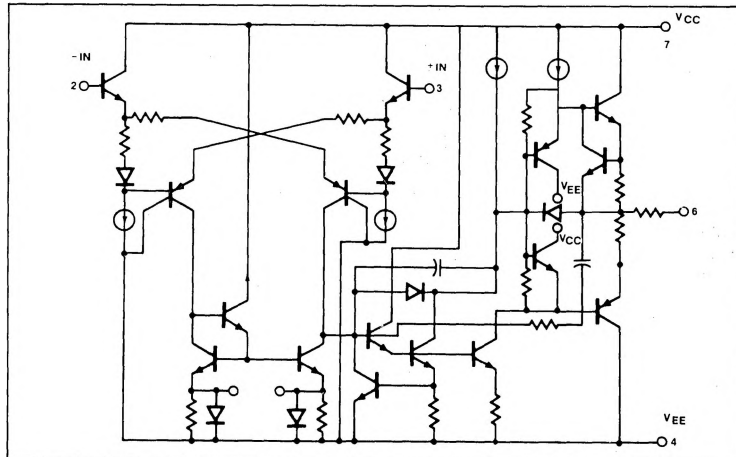
PIN CONFIGURATIONS



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	$^{\circ}C$
NE530	0 to +70	$^{\circ}C$
Storage temperature range	-65 to +150	$^{\circ}C$
Lead temperature range (Solder, 60sec)	300	$^{\circ}C$
Output short circuit	Indefinite	

EQUIVALENT SCHEMATIC EACH AMPLIFIER



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SE/NE530

DC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_{CC} = \pm 15\text{V}$ unless otherwise specified.¹

PARAMETER	TEST CONDITIONS	SE530			NE530			UNIT
		Min	Typ	Max	Min	Typ	Max	
V_{OS} Input offset voltage	$R_S \leq 10\text{k}\Omega$ 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		$\mu\text{V}/^\circ\text{C}$
I_{OS} Input offset current	Over temperature		5	20 40		15	40 80	nA nA
ΔI_{OS} Input offset current	Over temperature		25			40		$\text{pA}/^\circ\text{C}$
I_B Input bias current	Over temperature		45	80 200		65	150 200	nA nA
ΔI_B Input current	Over temperature		50			80		$\text{pA}/^\circ\text{C}$
R_{IN} Input resistance		3	10		1	6		M Ω
V_{CM} Input common mode voltage range		± 12	± 13		± 12	± 13		V
A_{VOL} Large signal voltage gain	$R_L \geq 2\text{k}\Omega$, $V_O = \pm 10\text{V}$ Over temperature	50 25	200		50 25	200		V/mV V/mV
V_{OUT} Output voltage swing	$R_L \geq 10\text{k}\Omega$ $R_L \geq 2\text{k}\Omega$	± 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	$R_S \leq 10\text{k}\Omega$ Over temperature	70	90		70	90		dB
PSRR Power supply rejection ratio	$R_S \leq 10\text{k}\Omega$ Over temperature		30	150		30	150	$\mu\text{V}/\text{V}$

AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_{CC} = \pm 15\text{V}$ 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	$\pm 15\text{V}$ supply, $V_O = \pm 10\text{V}$, $R_L \geq 2\text{k}\Omega$	25 18	35 25		20 12	35 25		V/ μs V/ μs
Power bandwidth	5% THD, $V_O = \pm 10\text{V}$, $R_L \geq 2\text{k}\Omega$	360	500		280	500		kHz
Small signal bandwidth	Open loop		3			3		MHz
Input noise voltage	$f = 1\text{kHz}$		30			30		nV/ $\sqrt{\text{Hz}}$

NOTE

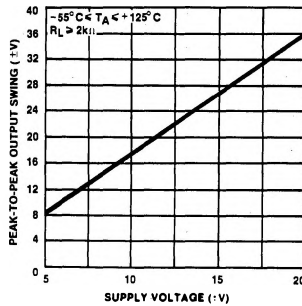
1. Operating temperature range for the SE530 is -55°C to $+125^\circ\text{C}$
Operating temperature range for the NE530 is 0°C to $+70^\circ\text{C}$.

HIGH SLEW RATE OPERATIONAL AMPLIFIER

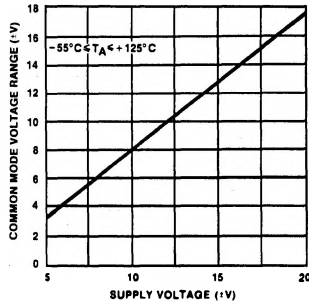
SE/NE530

TYPICAL PERFORMANCE CHARACTERISTICS

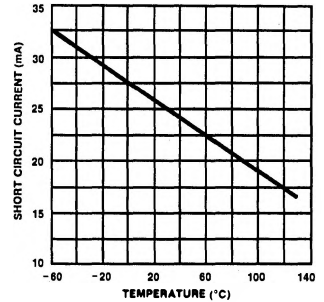
OUTPUT VOLTAGE SWING
AS A FUNCTION OF
SUPPLY VOLTAGE



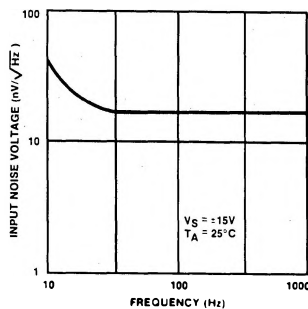
INPUT COMMON MODE
VOLTAGE RANGE AS A
FUNCTION OF SUPPLY VOLTAGE



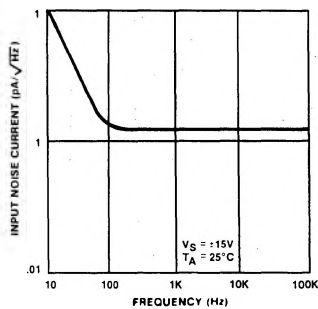
OUTPUT SHORT-CIRCUIT CURRENT
AS A FUNCTION OF
AMBIENT TEMPERATURE



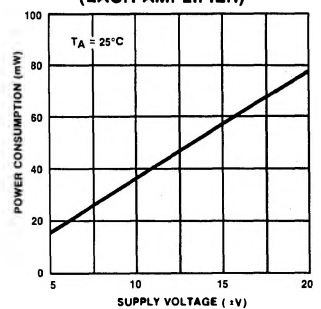
INPUT NOISE VOLTAGE
AS A FUNCTION OF
FREQUENCY



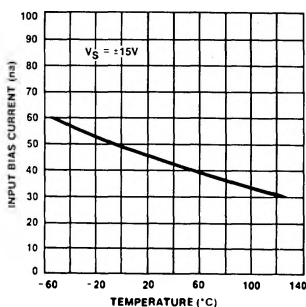
INPUT NOISE CURRENT
AS A FUNCTION OF
FREQUENCY



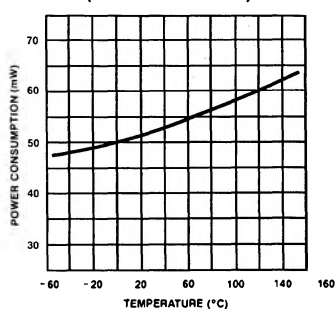
POWER CONSUMPTION
AS A FUNCTION OF
SUPPLY VOLTAGE
(EACH AMPLIFIER)



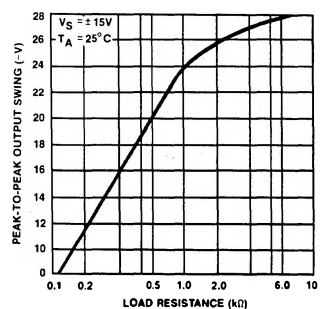
INPUT BIAS CURRENT
AS A FUNCTION OF
AMBIENT TEMPERATURE



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

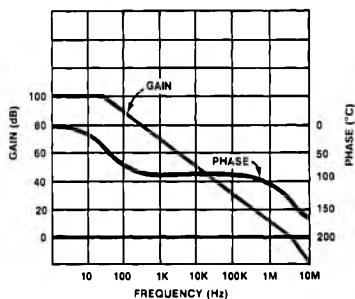


OUTPUT VOLTAGE SWING
AS A FUNCTION OF
LOAD RESISTANCE

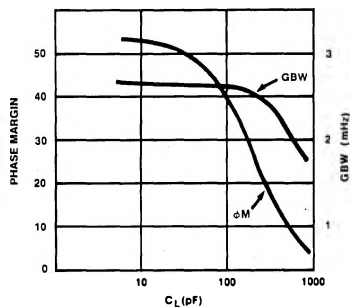


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

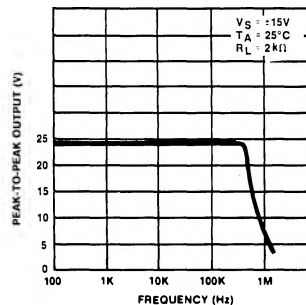
NE530 OPEN-LOOP GAIN AND PHASE vs FREQUENCY



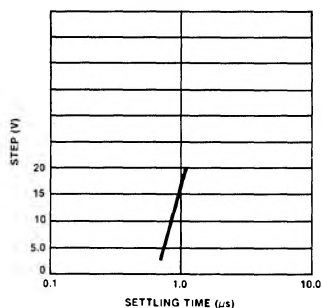
GAIN-BANDWIDTH PRODUCT AND PHASE MARGIN vs LOAD CAPACITANCE



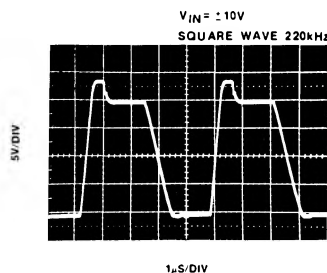
POWER BANDWIDTH



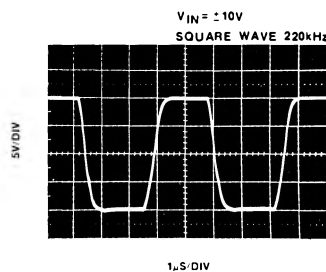
INPUT VOLTAGE STEP vs SETTLING TIME TO 10mV



SLEW RATE—VOLTAGE FOLLOWER

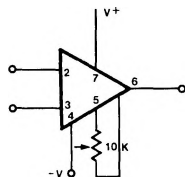


SLEW RATE (−1 AMPLIFIER)



TYPICAL CIRCUIT CONNECTION

OFFSET ADJUST CIRCUIT

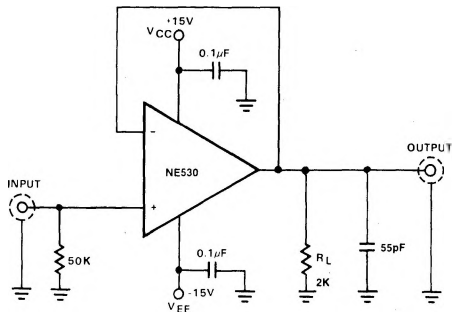


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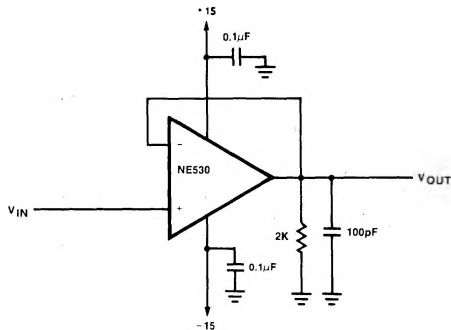
TEST LOAD CIRCUITS

SLEW RATE AND SETTLING TIME

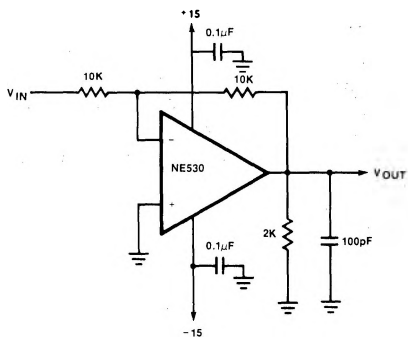


Pins not shown are not connected.
All resistor values are typical and in ohms.

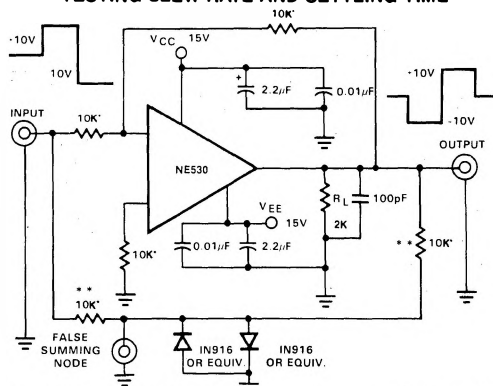
HIGH SLEW RATE—VOLTAGE FOLLOWER



HIGH SLEW RATE—INVERTING AMPLIFIER



TESTING SLEW RATE AND SETTLING TIME

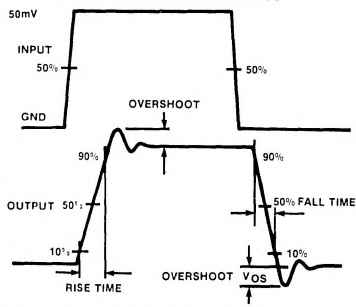


Pins not shown are not connected.
All resistor values are typical and in ohms.

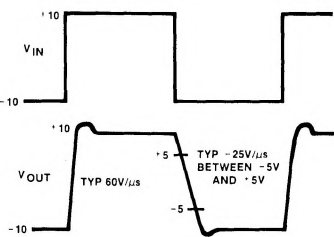
* Match to within 0.01%.
** Open for slew rate.

VOLTAGE WAVEFORMS

SMALL SIGNAL TRANSIENT RESPONSE DEFINITIONS



SLEW RATE—VOLTAGE FOLLOWER



SLEW RATE—INVERTING AMPLIFIER

