NE/SE535-T • NE/SE5535-F,K,N,N-14

DESCRIPTION

The 535 and 5535 are new generation operational amplifiers featuring high slew rates combined with improved input characteristics. The 535 is a single device while the 5535 is a dual configuration. Internally compensated for unity gain, the SE535 and SE5535 feature a guaranteed unity gain slew rate of 10V/μs with 2mV maximum offset voltage. Industry standard pin out and internal compensation allow the user to upgrade system performance by directly replacing general purpose amplifiers, such as 741, 747 and 1558.

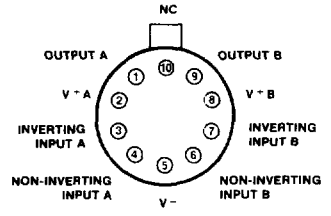
FEATURES

- **15V/μs unity gain slew rate**
- **Internal frequency compensation**
- **Low input offset voltage—2mV max**
- **Low input bias current 60nA max**
- **Short circuit protected**
- **Offset null capability**
- **Large common mode and differential voltage ranges**

	535	5535
• **Pin out**	**741**	**747,1558**
• **Configuration**	**Single**	**Dual**

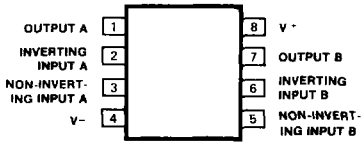
PIN CONFIGURATIONS

K PACKAGE



ORDER PART NO.
SE5535K NE5535K

N PACKAGE



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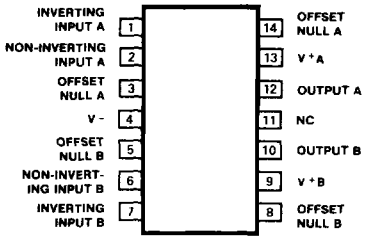
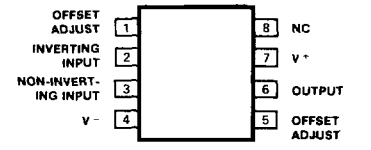
SE5535N NE5535N

F,N-14 PACKAGE



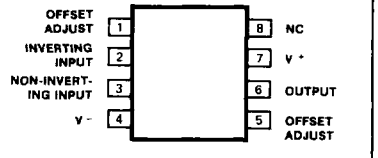
ORDER PART NO.
SE5535N-14 SE5535F
NE5535N-14 NE5535F

N PACKAGE



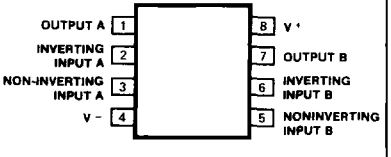
ORDER PART NO.
SE535N NE535N

T PACKAGE



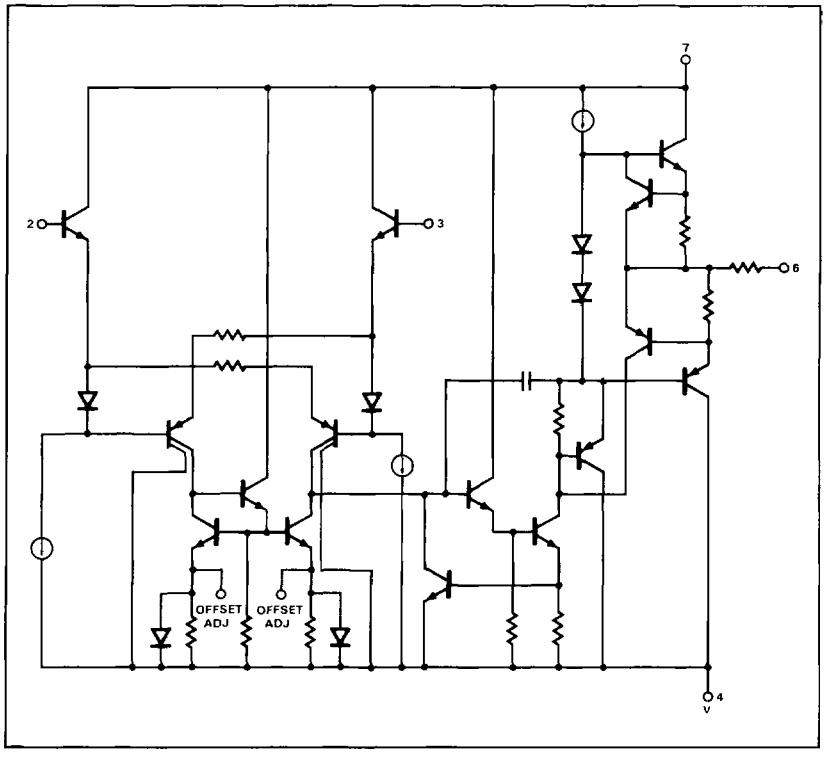
ORDER PART NO.
SE535T NE535T

T PACKAGE



ORDER PART NO.
SE5535T NE5535T

EQUIVALENT SCHEMATIC (One Amplifier)



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SE535/ SE5535	NE535/ NE5535	UNIT
Supply voltage	±22	±18	V
Internal power dissipation[1]			
N Package	500	500	mW
K/T Package	800	800	mW
F Package	1000	1000	mW
Differential input voltage	±30	±30	V
Input voltage[2]	±15	±15	V
Operating temperature range	-55 to +125	0 to +70	°C
Storage temperature range	-65 to +150	-65 to +150	°C
Lead temperature (solder, 60sec)	300	300	°C
Output short circuit[3]	Indefinite	Indefinite	

NOTES

1. Rating applies for thermal resistances junction to ambient of 240°C/W and 150°C/W for N and K, T packages, respectively. Maximum chip temperature is 150°C.
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit may be to ground or either supply. Rating applies to 125°C case temperature or 75°C ambient temperature.

DC ELECTRICAL CHARACTERISTICS

$T_A = 25°C$, $V_S = \pm 15V$ unless otherwise specified.*

PARAMETER		TEST CONDITIONS	SE535/SE5535			NE535/NE5535			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Input offset voltage	$R_S \leq 10k\Omega$		0.7	2.0		2.0	5.0	mV
		$R_S \leq 10k\Omega$, over temp.			3.0			6.0	mV
ΔV_{OS}	Input offset voltage drift	$R_S = 0\Omega$, over temp.		3.0	15		6.0		V/°C
I_{OS}	Input offset current			5	10		15	40	nA
		Over temp.			20			80	μVnA
I_B	Input current			45	60		65	150	nA
		Over temp.			100			200	nA
V_{CM}	Common mode voltage range		±12	±13		±12	±13		V
CMRR	Common mode rejection ratio	$R_S \leq 10k\Omega$, over temp.	70	90		70	90		dB
P_{SRR}	Power supply rejection	$R_S \leq 10k\Omega$, over temp.		30	150		30	150	μV/V
R_{IN}	Input resistance		3	10		1	6		MΩ
A_{VOL}	Large signal voltage gain	$R_L \geq 2k\Omega$, $V_{OUT} = \pm 10V$	50	500		50	500		V/mV
		$R_L \geq 2k\Omega$, $V_{OUT} = \pm 10V$, over temp.	25			25			V/mV
V_{OUT}	Output voltage	$R_L \geq 2k\Omega$, over temp.	±10	±13		±10	±13		V
		$R_L \geq 10k\Omega$, over temp.	±12	±14		±12	±14		V
I_{CC}	Supply current	Per amplifier		1.8	2.8		1.8	2.8	mA
		Per amplifier, over temp.		2	3.3		2		mA
P_D	Power dissipation	Per amplifier		54	84		54	84	mW
		Per amplifier, over temp.		60	99		60		mW
I_{SC}	Output short circuit current			25			25		mA
R_{OUT}	Output resistance			100			100		Ω

*NOTE

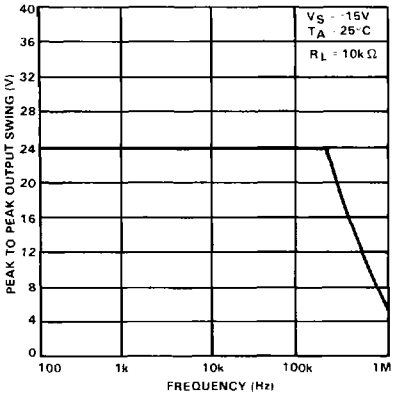
Temperature range
SE types $-55°C \leq T_A \leq 125°C$
NE types $0°C \leq T_A \leq 70°C$

AC ELECTRICAL CHARACTERISTICS $T_A = 25°C$ unless otherwise specified.

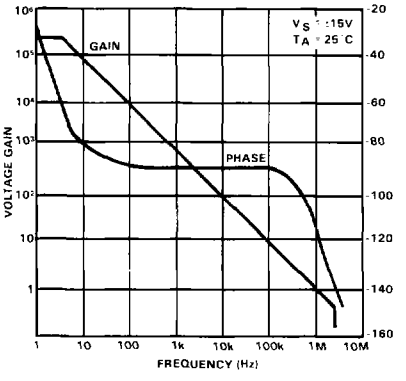
PARAMETER	TEST CONDITIONS	SE535/SE5535			NE535/NE5535			UNIT
		Min	Typ	Max	Min	Typ	Max	
Gain/bandwidth product			1			1		MHz
Transient response								
Small signal rise time			0.25			0.25		μs
Small signal overshoot			6			6		%
Settling time	To 0.1%		3			3		μs
Slew rate	$T_A = 25C$, $R_L \geq 10k\Omega$, unity gain, non-inverting	10	15		10	15		V/μs

TYPICAL PERFORMANCE CHARACTERISTICS

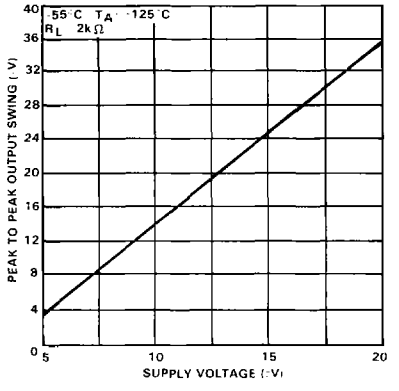
OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY



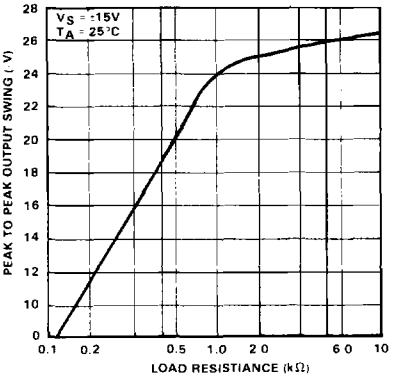
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE

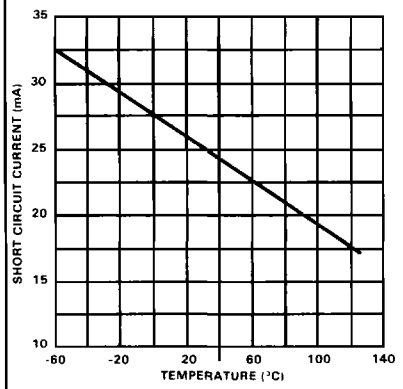


OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE

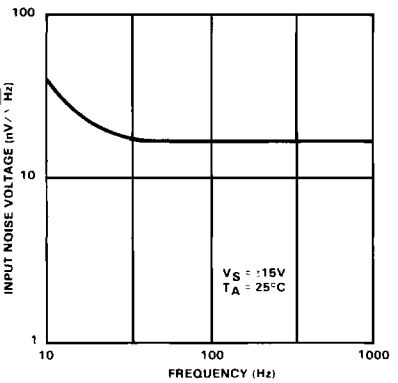


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

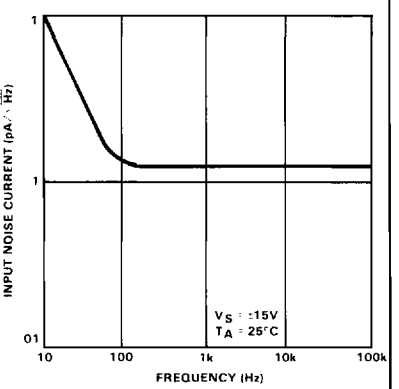
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



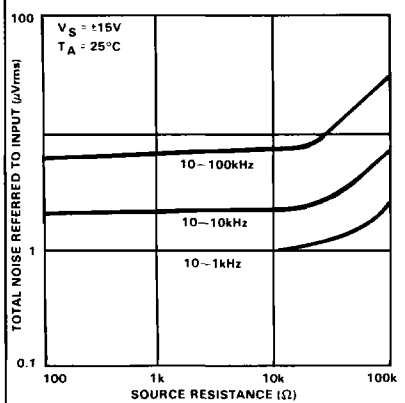
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



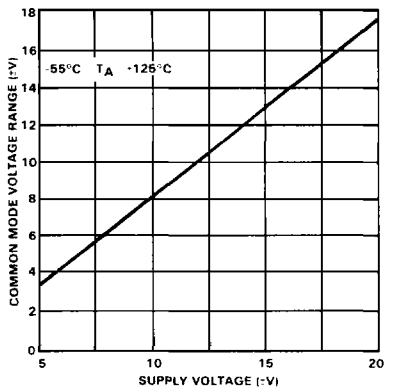
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



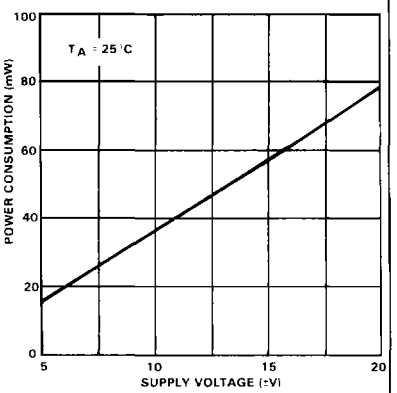
BROADBAND NOISE FOR VARIOUS BANDWIDTHS



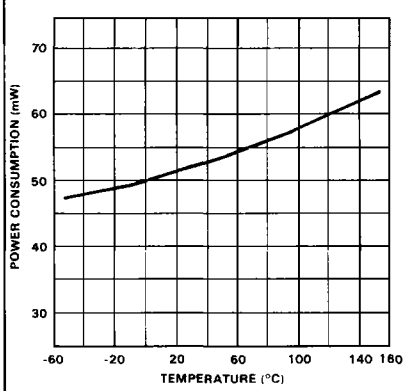
INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



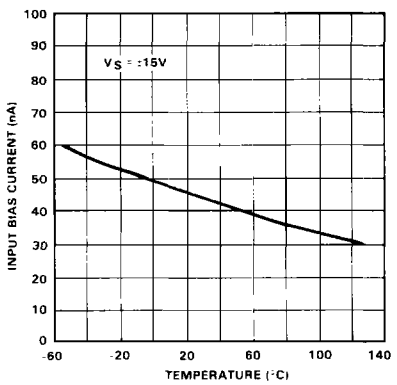
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE



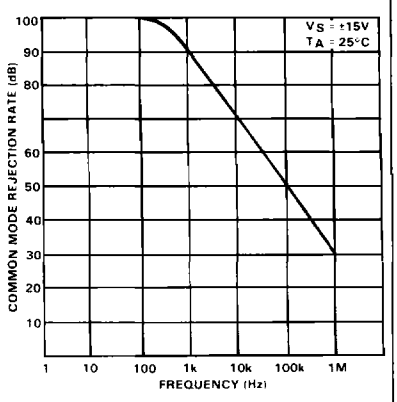
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE

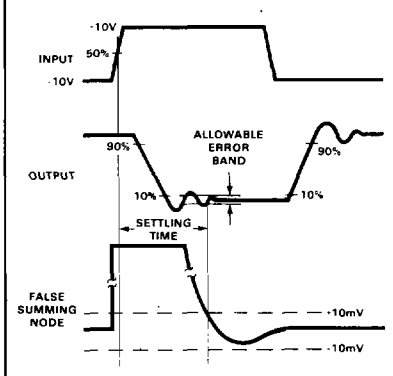


COMMON MODE REJECTION RATIO AS A FUNCTION OF FREQUENCY

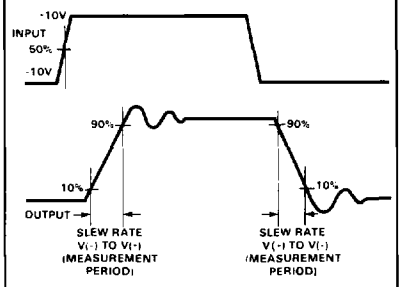


VOLTAGE WAVEFORMS

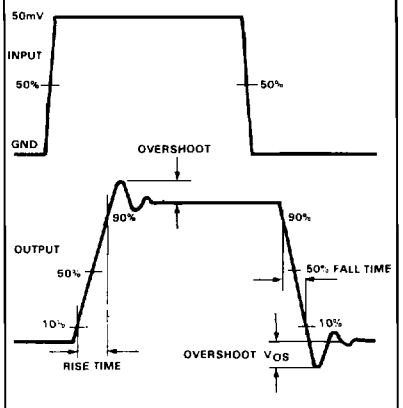
SETTLING TIME MEASUREMENT



SLEW RATE MEASUREMENT

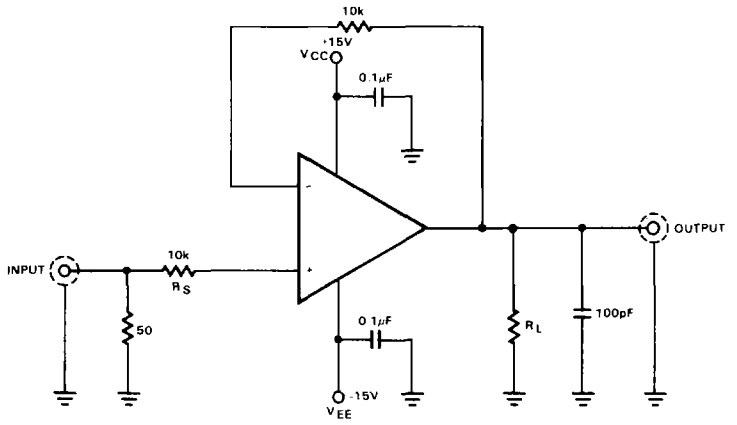


SMALL-SIGNAL TRANSIENT RESPONSE DEFINITIONS



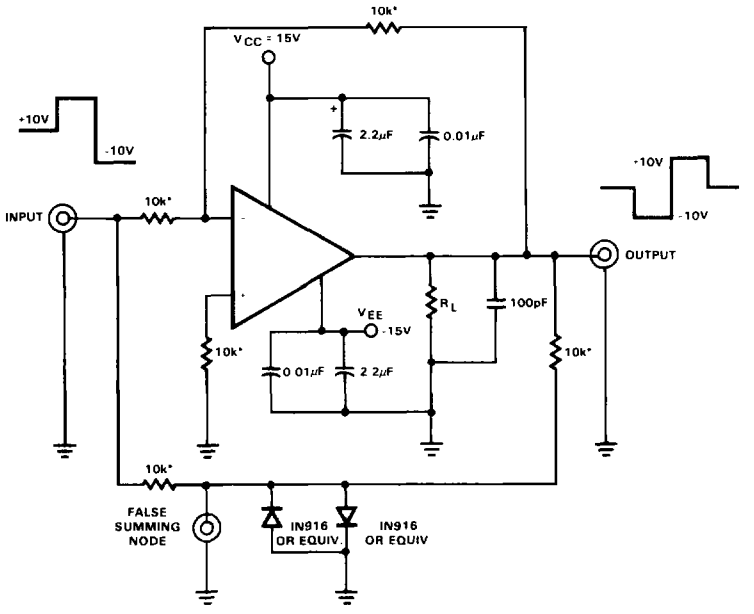
TEST CIRCUITS

SLEW RATE AND SMALL SIGNAL TRANSIENT RESPONSE



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

SETTLING TIME



*Match to within 0.01%.

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