

## LINEAR INTEGRATED CIRCUITS

### DESCRIPTION

The 540 is a monolithic, class AB power amplifier designed specifically to drive a pair of complementary output transistors. The device features low standby current yet retains a high output current drive capability with internal current limiting. A wide power bandwidth and excellent linearity make this device ideal for use as an audio power amplifier.

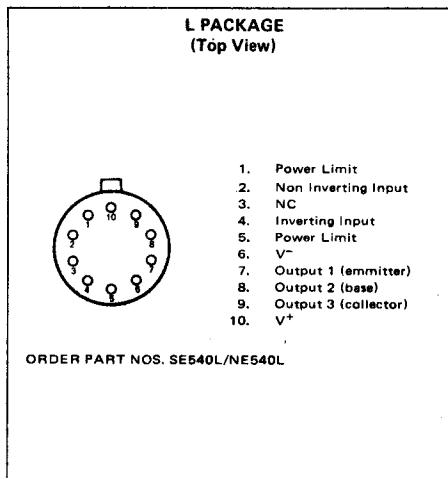
### FEATURES

- INTERNAL CURRENT LIMITING
- LOW STANDBY CURRENT
- HIGH OUTPUT CURRENT CAPABILITY
- WIDE POWER BANDWIDTH
- LOW DISTORTION

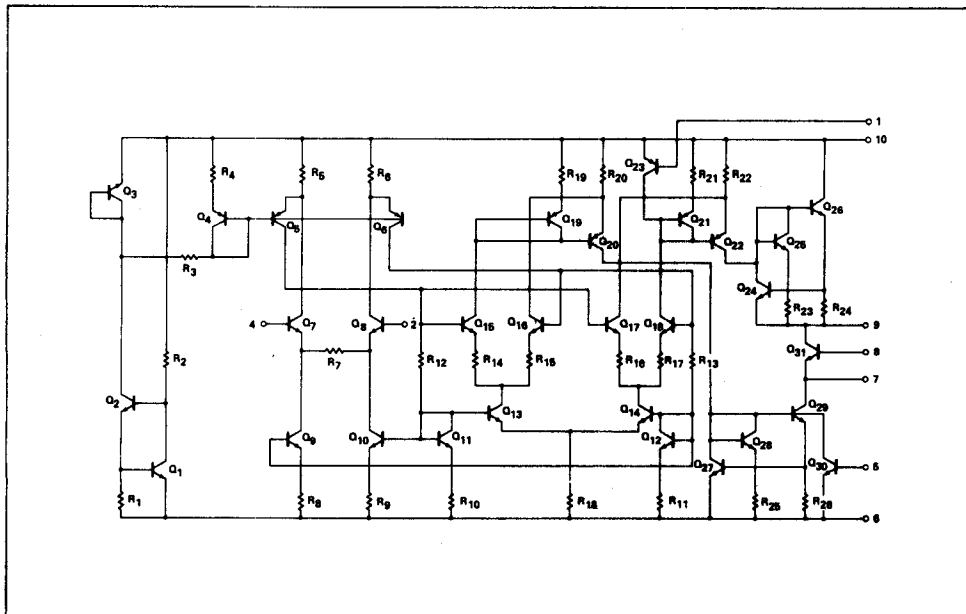
### ABSOLUTE MAXIMUM RATINGS

Supply Voltage	± 27 Volts SE540
	± 22 Volts NE540
Operating Temperature Range	-55°C to +125°C SE540
	0°C to +70°C NE540
Storage Temperature Range	-65°C to +150°C
Output Short Circuit Duration	Indefinite
(Not exceeding maximum dissipation.)	

### PIN CONFIGURATION



### SCHEMATIC DIAGRAM



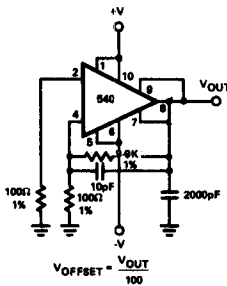
**SIGNETICS ■ SE/NE 540L – POWER DRIVER**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

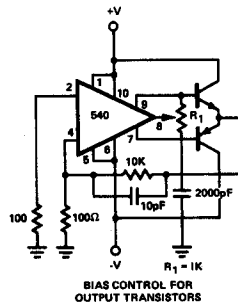
PARAMETER	TEST CONDITIONS	SE 540			NE 540			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
Operating Temperature Range		-55		+125	0		+70	$^\circ\text{C}$
Operating Supply Voltage		$\pm 5$		$\pm 25$	$\pm 5$		$\pm 20$	Volts
Quiescent Current			13	20		13	20	mA
Input Offset Voltage			5	7		7	10	mV
Input Offset Current			0.3	0.7		0.5	1	$\mu\text{A}$
Input Bias Current			1.5	3		2	5	$\mu\text{A}$
Input Impedance	40 dB Gain		20			20		$\text{k}\Omega$
Current Gain		80	100		70	90		dB
Gain Variation Over Temperature Range	40 dB Gain		$\pm 0.1$			$\pm 0.1$		dB
Frequency Response	40 dB Gain $\pm 1$ dB		500			100		kHz
Distortion	40 dB Gain Output 3 dB below maximum $R_L = 800\Omega$		0.25	0.5		0.5	1.0	%
Equivalent Input Noise Voltage	$R_S = 600\Omega$ 50 Hz to 500 kHz		10			10		$\mu\text{V}$
Power Supply Rejection Ratio	40 dB Gain	80	90		60	80		dB
Common Mode Rejection Ratio			110			90		dB
Output Drive Current		$\pm 120$	$\pm 150$		$\pm 80$	$\pm 100$		mA
Slew Rate	$V_S = \pm 20\text{V}$ $V_{OUT} = \pm 15\text{V}$		200			200		$\text{V}/\mu\text{s}$

**TEST CIRCUITS**

**OFFSET VOLTAGE MEASUREMENT**

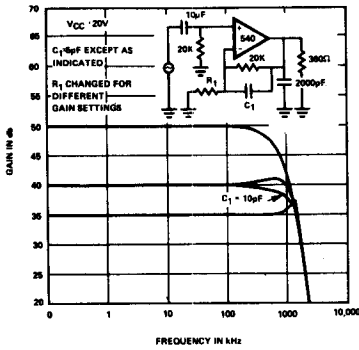


**OUTPUT BIAS CONTROL**

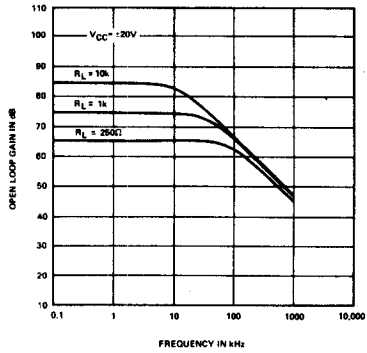


TYPICAL PERFORMANCE CHARACTERISTICS

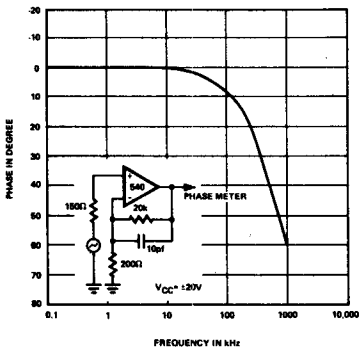
CLOSED LOOP  
FREQUENCY RESPONSE



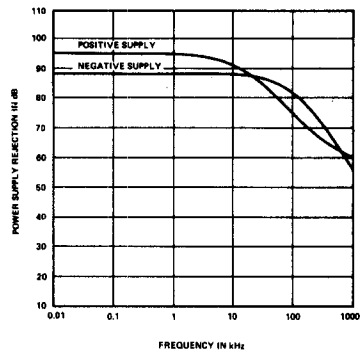
OPEN LOOP GAIN AND  
FREQUENCY RESPONSE



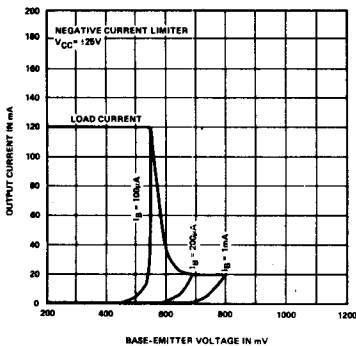
PHASE RESPONSE VERSUS  
FREQUENCY



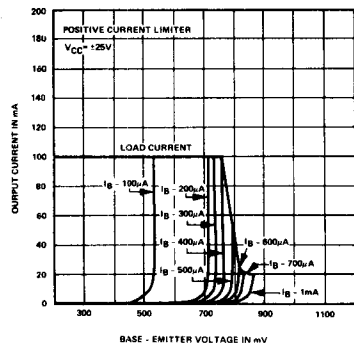
POWER SUPPLY REJECTION  
VERSUS FREQUENCY



OUTPUT CURRENT VERSUS  $I_B/V_{BE}$   
OF CURRENT LIMITER

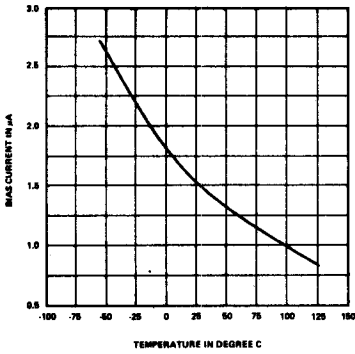


OUTPUT CURRENT VERSUS  $I_B/V_{BE}$   
OF CURRENT LIMITER

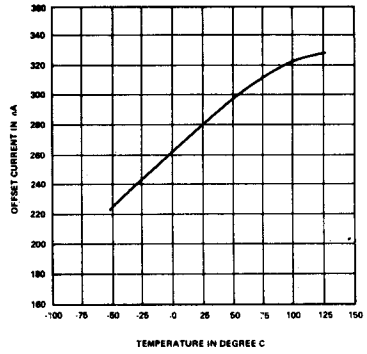


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd.)

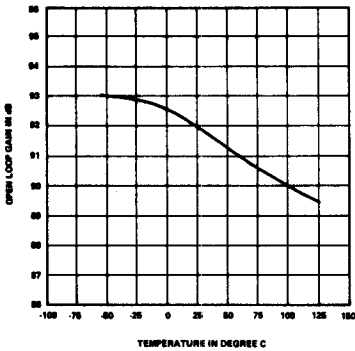
**BIAS CURRENT  
VERSUS TEMPERATURE**



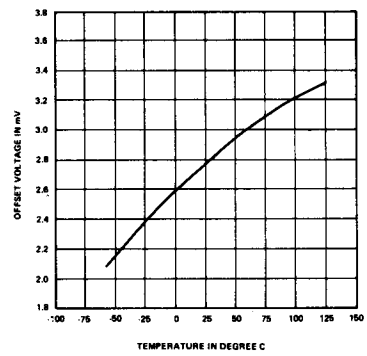
**OFFSET CURRENT  
VERSUS TEMPERATURE**



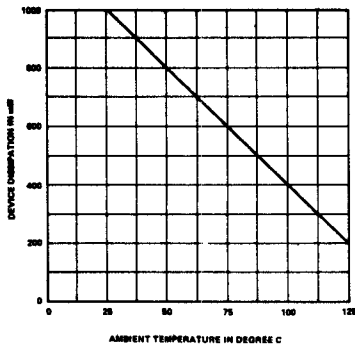
**OPEN LOOP GAIN  
VERSUS TEMPERATURE**



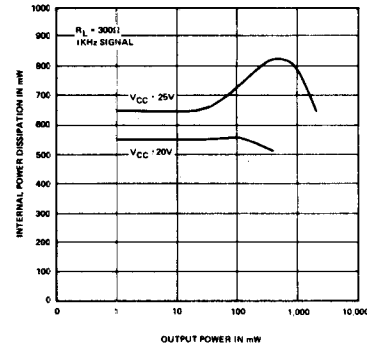
**OFFSET VOLTAGE  
VERSUS TEMPERATURE**



**MAXIMUM DISSIPATION  
VERSUS AMBIENT TEMPERATURE**

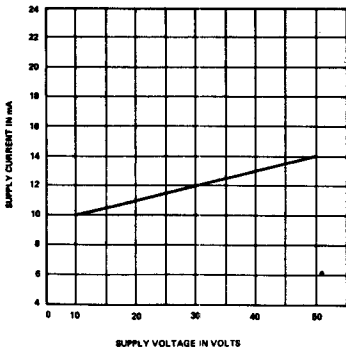


**INTERNAL POWER DISSIPATION  
VERSUS LOAD POWER**

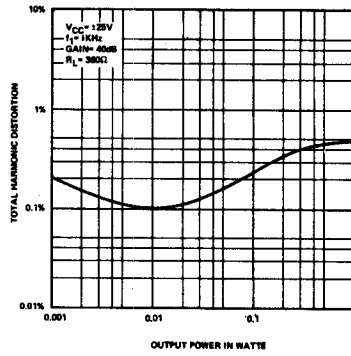


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd.)

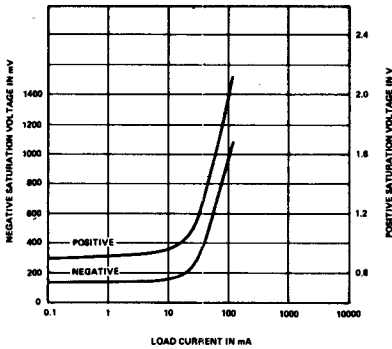
QUIESCENT CURRENT VERSUS SUPPLY VOLTAGE



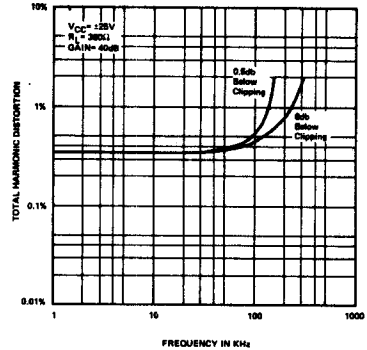
TOTAL HARMONIC DISTORTION VERSUS OUTPUT



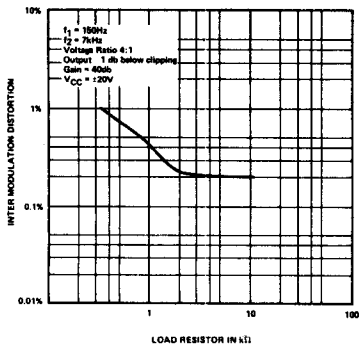
OUTPUT SATURATION VOLTAGE VERSUS LOAD



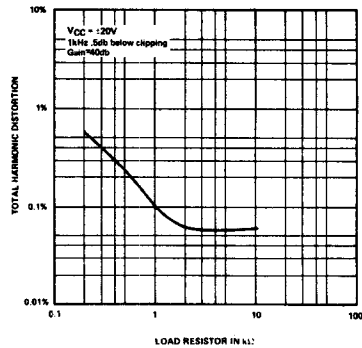
TOTAL HARMONIC DISTORTION VERSUS FREQUENCY



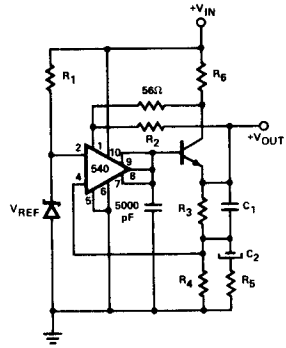
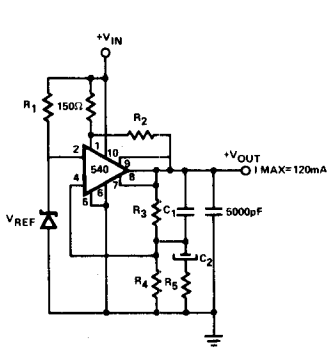
INTERMODULATION DISTORTION VERSUS LOAD



TOTAL HARMONIC DISTORTION VERSUS LOAD



POSITIVE VOLTAGE REGULATORS



$$V_{OUT} = \frac{R_2 + R_4}{R_4} V_{REF}$$

$$R_1 = \frac{V_{IN} - V_{REF}}{I_{ZENER}}$$

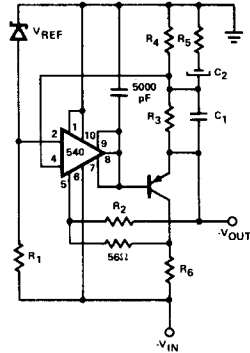
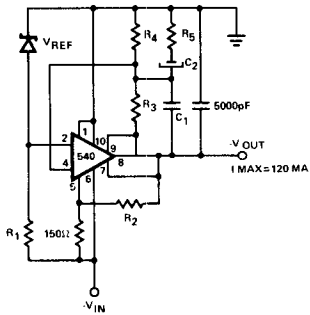
$$R_2 = \frac{2 V_{IN} - V_{OUT}}{4mA}$$

$$R_5 = \frac{R_3}{100}$$

$$C_1 = \frac{0.2}{R_3} \mu F$$

$$C_2 = 10 \mu F$$

NEGATIVE VOLTAGE REGULATORS



$$V_{OUT} = \frac{R_2 + R_4}{R_4} V_{REF}$$

$$R_1 = \frac{V_{IN} - V_{REF}}{I_{ZENER}}$$

$$R_2 = \frac{2 V_{IN} - V_{OUT}}{4mA}$$

$$R_5 = \frac{R_3}{100}$$

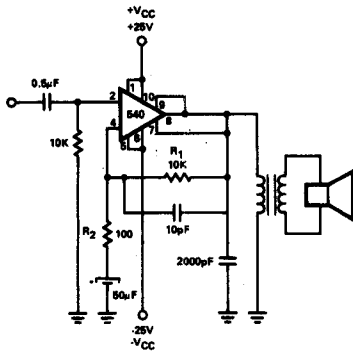
$$C_1 = \frac{0.2}{R_3} \mu F$$

$$C_2 = 10 \mu F$$

TYPICAL APPLICATIONS

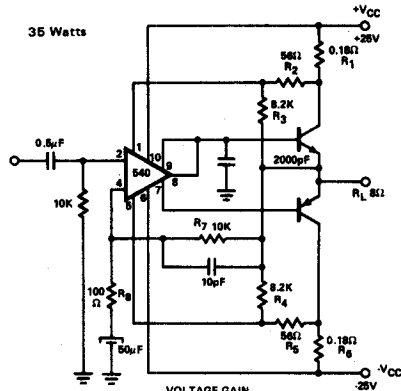
POWER AMPLIFIERS

1 Watt



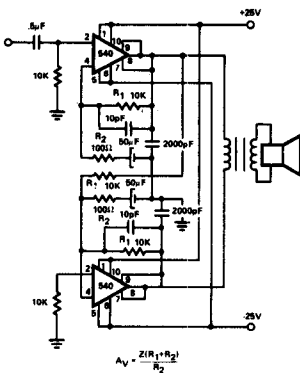
VOLTAGE GAIN  
 $A_v = \frac{R_1 + R_2}{R_2}$

35 Watts



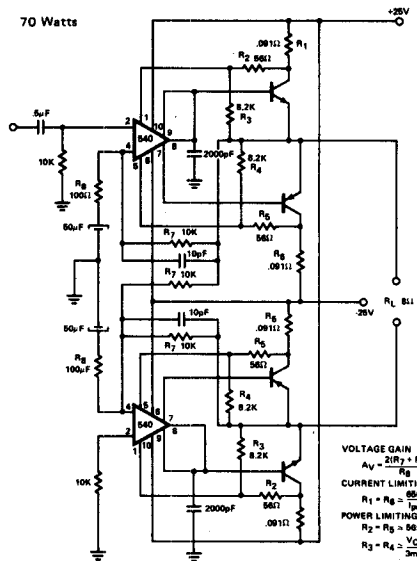
VOLTAGE GAIN  
 $A_v = \frac{R_7 + R_8}{R_8}$   
 CURRENT LIMITING  
 $R_1 = R_6 = \frac{650mV}{I_{peak}}$   
 POWER LIMITING  
 $R_2 = R_5 > 56\Omega$   
 $R_3 = R_4 = 3mA$

3 Watts



$A_v = \frac{Z(R_1 + R_2)}{R_2}$

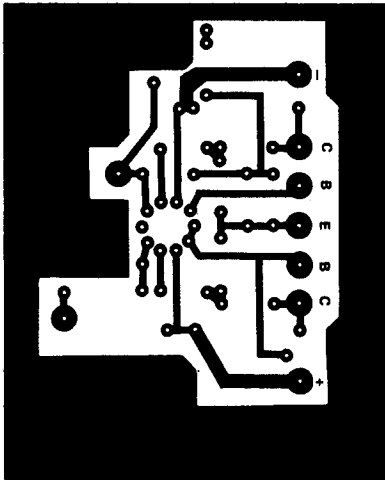
70 Watts



VOLTAGE GAIN  
 $A_v = \frac{2(R_7 + R_8)}{R_8}$   
 CURRENT LIMITING  
 $R_1 = R_6 = \frac{650mV}{I_{peak}}$   
 POWER LIMITING  
 $R_2 = R_5 > 56\Omega$   
 $R_3 = R_4 = \frac{V_{CC}}{3mA}$

35 WATT AMPLIFIER

P.C. BOARD LAYOUT (BOTTOM VIEW)



PARTS LAYOUT (TOP VIEW)

