DESCRIPTION

The SE/NE 592 is a monolithic, two stage, differential output, wideband video amplifier. It offers fixed gains of 100 and 400 without external components and adjustable gains from 400 to 0 with one external resistor. The input stage has been designed so that with the addition of a few external reactive elements between the gain select terminals, the circuit can function as a high pass, low pass, or band pass filter. This feature makes the circuit ideal for use as a video or pulse amplifier in communications, magnetic memories, display and video recorder systems. The 592 is a pin-for-pin replacement for the μA733.

FEATURES

- **120 MHz BANDWIDTH**
- **ADJUSTABLE GAINS FROM 0 TO 400**
- **ADJUSTABLE PASS BAND**
- **NO FREQUENCY COMPENSATION REQUIRED**

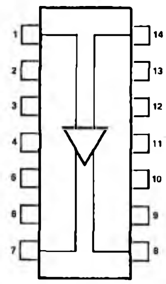
ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±8V
Differential Input Voltage	±5V
Common Mode Input Voltage	±6V
Output Current	10mA
Operating Temperature Range	
SE592K	$-55^{o}C$ to $+125^{o}C$
NE592K	$0^{o}C$ to $+70^{o}C$
Storage Temperature Range	$-65^{o}C$ to $+150^{o}C$

PIN CONFIGURATIONS

A PACKAGE

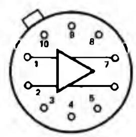
(Top View)



1. Input 2
2. NC
3. G_{2B} Gain Select
4. G_{1B} Gain Select
5. V⁻
6. NC
7. Output 2
8. Output 1
9. NC
10. V⁺
11. G_{1A} Gain Select
12. G_{2A} Gain Select
13. NC
14. Input 1

ORDER PART NOS. SE592A/NE592A

K PACKAGE



1. Input 1
2. Input 2
3. G_{2B} Gain Select
4. G_{1B} Gain Select
5. V⁻
6. Output 2
7. Output 1
8. V⁺
9. G_{1A} Gain Select
10. G_{2A} Gain Select

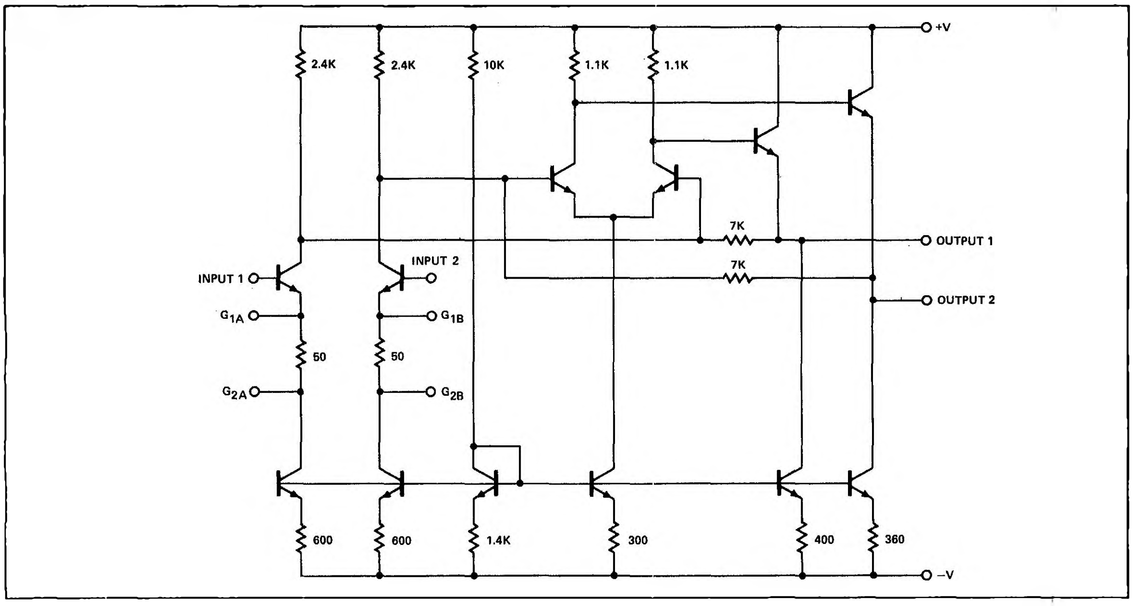
NOTE: Pin 5 connected to case.

ORDER PART NOS. SE592K/NE592K

Thermal Resistance (θ_{J-A}, Junction to Ambient for each package):

A Package	$0.16^{o}C/mW$
K Package	$0.145^{o}C/mW$
Power Dissipation	500mW

EQUIVALENT CIRCUIT



ELECTRICAL CHARACTERISTICS

Standard Conditions (T_A = +25°C, V_S = ±6V, V_{CM} = 0 unless otherwise specified)

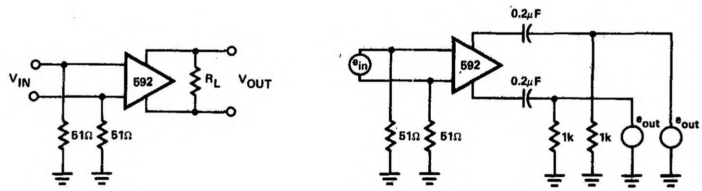
PARAMETER	TEST CONDITIONS	NE 592			SE 592			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Differential Voltage Gain								
Gain 1	Note 1 R_L = 2KΩ, V_{OUT} = 3V p-p	250	400	600	300	400	500	
Gain 2	Note 2	80	100	120	90	100	110	
Bandwidth								
Gain 1	Note 1		40			40		MHz
Gain 2	Note 2		90			90		MHz
Rise Time								
Gain 1	Note 1 V_{OUT} = 1V p-p		10.5			10.5		ns
Gain 2	Note 2		4.5	12		4.5	10	ns
Propagation Delay								
Gain 1	Note 1 V_{OUT} = 1V p-p		7.5			7.5		ns
Gain 2	Note 2		6.0	10		6.0	10	ns
Input Resistance								
Gain 1	Note 1		4.0			4.0		KΩ
Gain 2	Note 2	10	30		20	30		KΩ
Input Capacitance	Gain 2, Note 2		2.0			2.0		pF
Input Offset Current			0.4	5.0		0.4	3.0	μA
Input Bias Current			9.0	30		9.0	20	μA
Input Noise Voltage	BW 1 kHz to 10 kHz		12			12		μV rms
Input Voltage Range				±1.0			±1.0	V
Common Mode Rejection Ratio								
Gain 2	VCM ±1V, F < 100 kHz	60	86		60	86		dB
Gain 2	VCM ±1V, F = 5 MHz		60			60		dB
Supply Voltage Rejection Ratio								
Gain 2	ΔVS = ±0.5V	50	70		50	70		dB
Output Offset Voltage								
Gain 3	R_L = ∞, Note 3		0.35	0.75		0.35	0.75	V
Output Common Mode Voltage	R_L = ∞	2.4	2.9	3.4	2.4	2.9	3.4	V
Output Voltage Swing	R_L = 2K	3.0	4.0		3.0	4.0		
Output Resistance			20			20		Ω
Power Supply Current	R_L = ∞		18	24		18	24	mA

Recommended Operating Supply Voltages (V_S = ±6.0V)

NOTES:

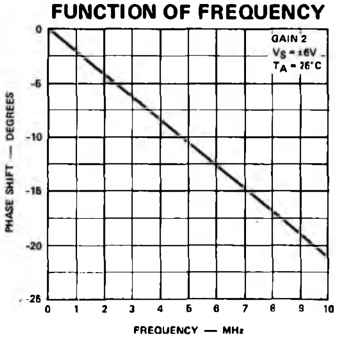
1. Gain select pins G_{1A} and G_{1B} connected together.
2. Gain select pins G_{2A} and G_{2B} connected together.
3. All gain select pins open.

TEST CIRCUITS (T_A = 25°C unless otherwise specified)

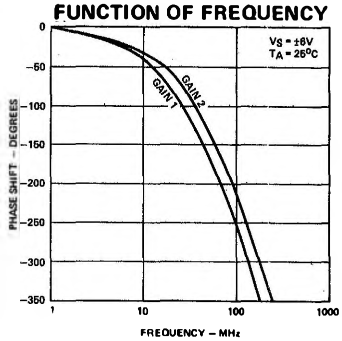


TYPICAL CHARACTERISTICS

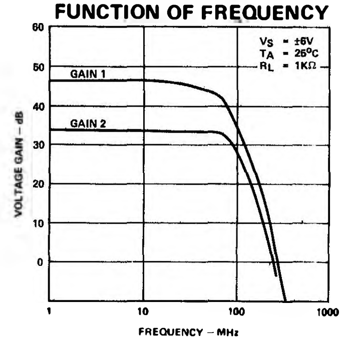
PHASE SHIFT AS A FUNCTION OF FREQUENCY



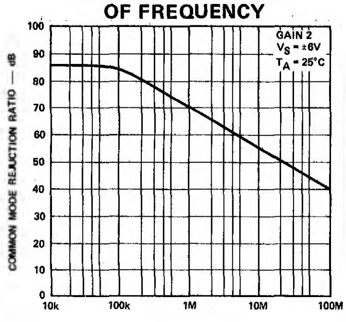
PHASE SHIFT AS A FUNCTION OF FREQUENCY



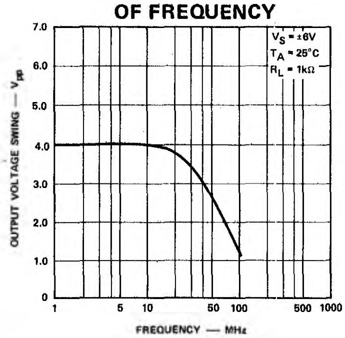
VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



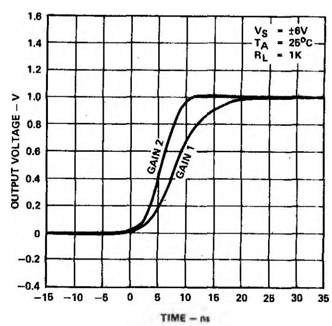
COMMON MODE REJECTION RATIO AS A FUNCTION OF FREQUENCY



OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY

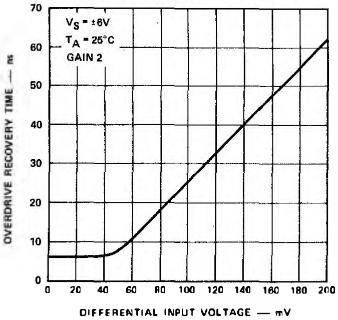


PULSE RESPONSE

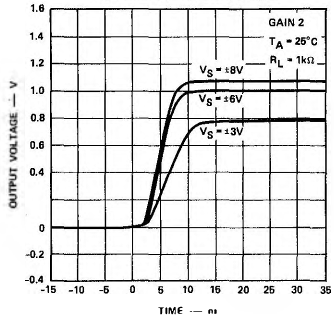


TYPICAL CHARACTERISTIC CURVES (Cont'd)

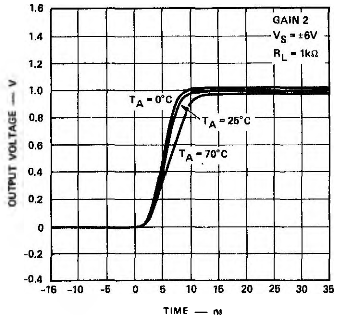
DIFFERENTIAL OVERDRIVE RECOVERY TIME



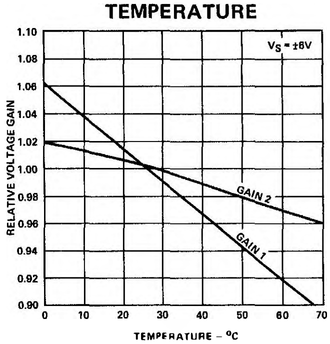
PULSE RESPONSE AS A FUNCTION OF SUPPLY VOLTAGE



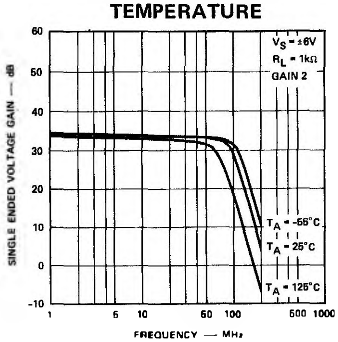
PULSE RESPONSE AS A FUNCTION OF TEMPERATURE



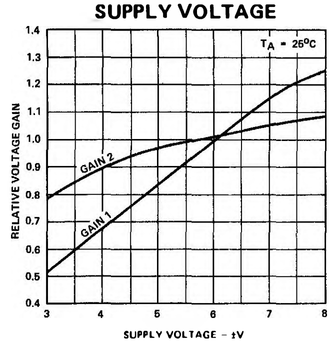
VOLTAGE GAIN AS A FUNCTION OF TEMPERATURE



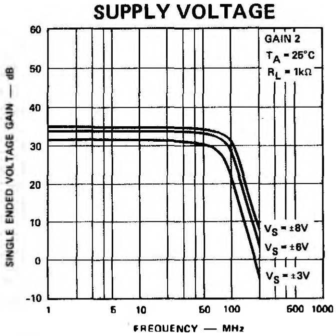
GAIN VS FREQUENCY AS A FUNCTION OF TEMPERATURE



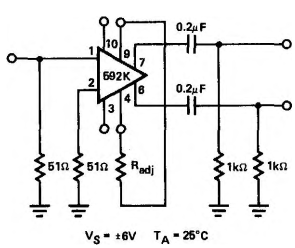
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGE



GAIN VS FREQUENCY AS A FUNCTION OF SUPPLY VOLTAGE



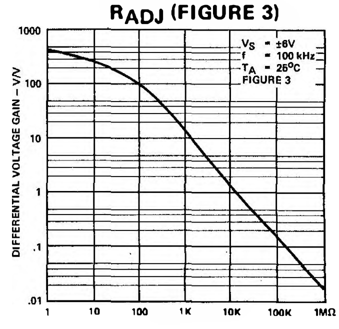
VOLTAGE GAIN ADJUST CIRCUIT



(Pin numbers apply to K Package)

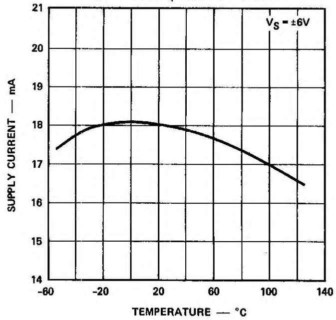
FIGURE 3

VOLTAGE GAIN AS A FUNCTION OF RADJ (FIGURE 3)

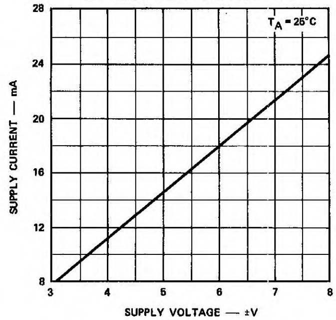


TYPICAL CHARACTERISTIC CURVES (Cont'd)

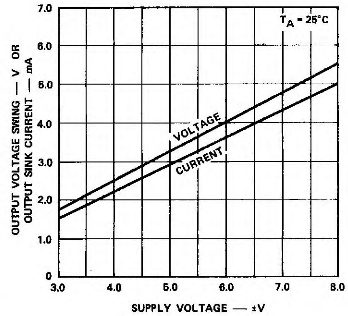
SUPPLY CURRENT AS A FUNCTION OF TEMPERATURE



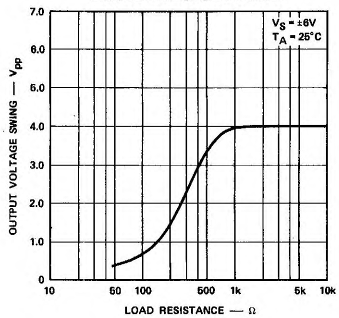
SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



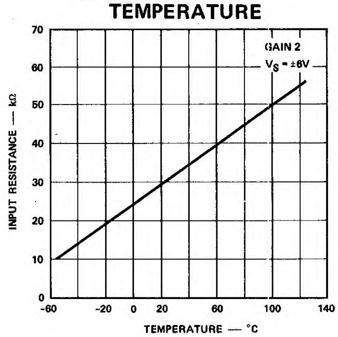
OUTPUT VOLTAGE AND CURRENT SWING AS A FUNCTION OF SUPPLY VOLTAGE



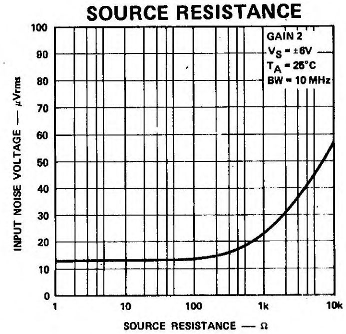
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



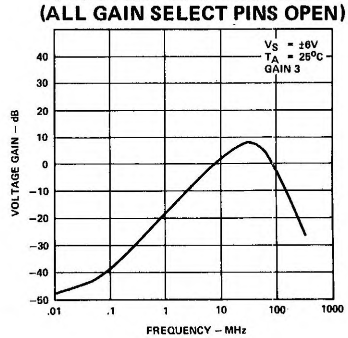
INPUT RESISTANCE AS A FUNCTION OF TEMPERATURE



INPUT NOISE VOLTAGE AS A FUNCTION OF SOURCE RESISTANCE

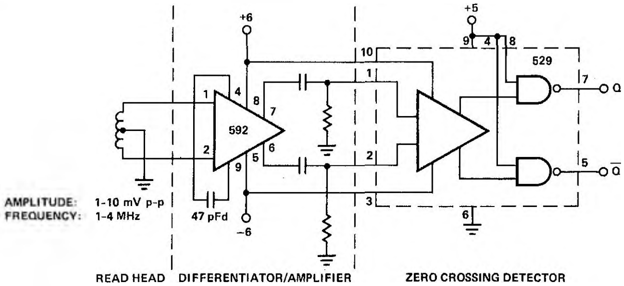


VOLTAGE GAIN AS A FUNCTION OF FREQUENCY (ALL GAIN SELECT PINS OPEN)

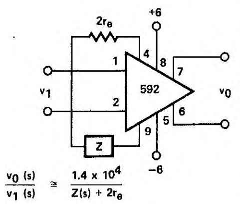


TYPICAL APPLICATIONS

DISC/TAPE PHASE MODULATED READBACK SYSTEMS



FILTER NETWORKS



$$\frac{v_0(s)}{v_1(s)} \cong \frac{1.4 \times 10^4}{Z(s) + 2r_e}$$

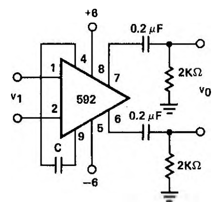
$$\cong \frac{1.4 \times 10^4}{Z(s) + 32}$$

BASIC CONFIGURATION

Z NETWORK	FILTER TYPE	$\frac{v_0(s)}{v_1(s)}$ TRANSFER FUNCTION
R L	LOW PASS	$\frac{1.4 \times 10^4}{L}\left[\frac{1}{s + R/L}\right]$
R C	HIGH PASS	$\frac{1.4 \times 10^4}{R}\left[\frac{s}{s + 1/RC}\right]$
R L C	BAND PASS	$\frac{1.4 \times 10^4}{L}\left[\frac{s}{s^2 + R/L\,s + 1/LC}\right]$
R L C	BAND REJECT	$\frac{1.4 \times 10^4}{R}\left[\frac{s^2 + 1/LC}{s^2 + 1/LC + s/RC}\right]$

NOTE: IN THE NETWORKS ABOVE, THE R VALUE USED IS ASSUMED TO INCLUDE $2\ r_e$, OR APPROXIMATELY 32 OHMS.

DIFFERENTIATION WITH HIGH COMMON MODE NOISE REJECTION



FOR FREQUENCY $F_1 << 1/2\pi\ (32)\ C$

$$v_0 \cong 1.4 \times 10^4\ C\ \frac{dv_i}{dT}$$