Signetics

NE/SE592
Video Amplifier

Product Specification

Linear Products

DESCRIPTION

The NE/SE592 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, video recorder systems, and floppy disk head amplifiers. Now available in an 8-pin version with fixed gain of 400 without external components and adjustable gain from 400 to 0 with one external resistor.

FEATURES

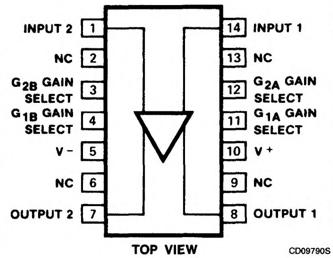
- **120MHz bandwidth**
- **Adjustable gains from 0 to 400**
- **Adjustable pass band**
- **No frequency compensation required**
- **Wave shaping with minimal external components**

APPLICATIONS

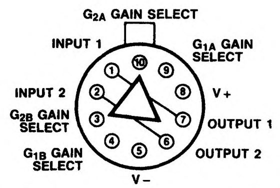
- **Floppy disk head amplifier**
- **Video amplifier**
- **Pulse amplifier in communications**
- **Magnetic memory**
- **Video recorder systems**

PIN CONFIGURATIONS

D, F, N Packages

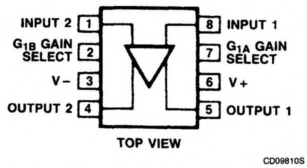


H Package*

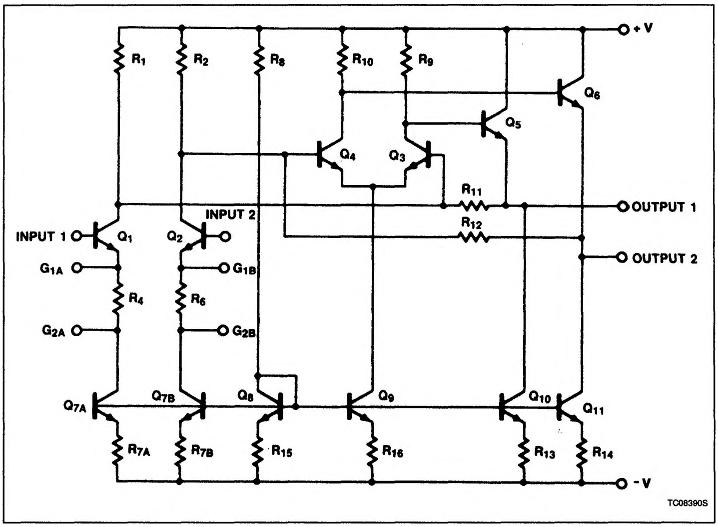


NOTES:
Pin 5 connected to case.
*Metal cans (H) not recommended for new designs.

D, F, N, Packages



EQUIVALENT CIRCUIT



ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
14-Pin Plastic DIP	0 to +70°C	NE592N14
14-Pin Cerdip	0 to +70°C	NE592F14
14-Pin Cerdip	−55°C to +125°C	SE592F14
14-Pin SO	0 to +70°C	NE592D14
8-Pin Plastic Dip	0 to +70°C	NE592N8
8-Pin Cerdip	−55°C to +125°C	SE592F8
8-Pin SO	0 to +70°C	NE592D8
10-Lead Metal Can	0 to +70°C	NE592H
10-Lead Metal Can	−55°C to +125°C	SE592H

NOTE:
Also N8, N14, D8 and D14 package parts available in "High" gain version by adding "H" before package designation, as: NE592HD8.

ABSOLUTE MAXIMUM RATINGS $T_A = +25°C$, unless otherwise specified.

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	±8	V
V_{IN}	Differential input voltage	±5	V
V_{CM}	Common-mode input voltage	±6	V
I_{OUT}	Output current	10	mA
T_A	Operating temperature range SE592 NE592	 −55 to +125 0 to +70	 °C °C
T_{STG}	Storage temperature range	−65 to +150	°C
P_D	Power dissipation	500	mW

DC ELECTRICAL CHARACTERISTICS $T_A = +25°C$, $V_{SS} = \pm 6V$, $V_{CM} = 0$, unless otherwise specified. Recommended operating supply voltages $V_S = \pm 6.0V$. All specifications apply to both standard and high gain parts unless noted differently.

SYMBOL	PARAMETER	TEST CONDITIONS	NE592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part Gain 1[1] Gain 2[2,4]	$R_L = 2k\Omega$, $V_{OUT} = 3V_{P-P}$	 250 80	 400 100	 600 120	 300 90	 400 100	 500 110	 V/V V/V
	High gain part		400	500	600				V/V
R_{IN}	Input resistance Gain 1[1] Gain 2[2,4]		 10	 4.0 30		 20	 4.0 30		 kΩ kΩ
C_{IN}	Input capacitance[2]	Gain 2[4]		2.0			2.0		pF
I_{OS}	Input offset current			0.4	5.0		0.4	3.0	μA
I_{BIAS}	Input bias current			9.0	30		9.0	20	μA
V_{NOISE}	Input noise voltage	BW 1kHz to 10MHz		12			12		μV_{RMS}
V_{IN}	Input voltage range		±1.0			±1.0			V
CMRR	Common-mode rejection ratio Gain 2[4] Gain 2[4]	 $V_{CM} \pm 1V$, $f < 100kHz$ $V_{CM} \pm 1V$, $f = 5MHz$	 60 	 86 60		 60 	 86 60		 dB dB
PSRR	Supply voltage rejection ratio Gain 2[4]	 $\Delta V_S = \pm 0.5V$	 50	 70		 50	 70		 dB
V_{OS}	Output offset voltage Gain 1 Gain 2[4] Gain 3[3]	 $R_L = \infty$ $R_L = \infty$ $R_L = \infty$		 0.35	 1.5 1.5 0.75		 0.35	 1.5 1.0 0.75	 V V V
V_{CM}	Output common-mode voltage	$R_L = \infty$	2.4	2.9	3.4	2.4	2.9	3.4	V
V_{OUT}	Output voltage swing differential	$R_L = 2k\Omega$	3.0	4.0		3.0	4.0		V
R_{OUT}	Output resistance			20			20		Ω
I_{CC}	Power supply current	$R_L = \infty$		18	24		18	24	mA

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.
4. Applies to 10- and 14-pin versions only.

DC ELECTRICAL CHARACTERISTICS

$V_{SS} = \pm 6V$, $V_{CM} = 0$, $0°C \leqslant T_A \leqslant 70°C$ for NE592; $-55°C \leqslant T_A \leqslant 125°C$ for SE592, unless otherwise specified. Recommended operating supply voltages $V_S = \pm 6.0V$. All specifications apply to both standard and high gain parts unless noted differently.

SYMBOL	PARAMETER	TEST CONDITIONS	NE592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part Gain 1[1] Gain 2[2, 4]	$R_L = 2k\Omega$, $V_{OUT} = 3V_{P-P}$	 250 80		 600 120	 200 80		 600 120	 V/V V/V
	High gain part		400	500	600				V/V
R_{IN}	Input resistance Gain 2[2, 4]		8.0			8.0			kΩ
I_{OS}	Input offset current				6.0			5.0	μA
I_{BIAS}	Input bias current				40			40	μA
V_{IN}	Input voltage range		±1.0			±1.0			V
CMRR	Common-mode rejection ratio Gain 2[4]	$V_{CM} \pm 1V$, $f < 100kHz$	50			50			dB
PSRR	Supply voltage rejection ratio Gain 2[4]	$\Delta V_S = \pm 0.5V$	50			50			dB
V_{OS}	Output offset voltage Gain 1 Gain 2[4] Gain 3[3]	 $R_L = \infty$ $R_L = \infty$ $R_L = \infty$			 1.5 1.5 1.0			 1.5 1.2 1.0	 V V V
V_{OUT}	Output voltage swing differential	$R_L = 2k\Omega$	2.8			2.5			V
I_{CC}	Power supply current	$R_L = \infty$			27			27	mA

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.
4. Applies to 14-pin version only.

AC ELECTRICAL CHARACTERISTICS

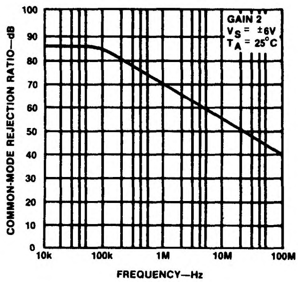
$T_A = +25°C$, $V_{SS} = \pm 6V$, $V_{CM} = 0$, unless otherwise specified. Recommended operating supply voltages $V_S = \pm 6.0V$. All specifications apply to both standard and high gain parts unless noted differently.

SYMBOL	PARAMETER	TEST CONDITIONS	NE592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
BW	Bandwidth Gain 1[1] Gain 2[2, 4]			 40 90			 40 90		 MHz MHz
t_R	Rise time Gain 1[1] Gain 2[2, 4]	$V_{OUT} = 1V_{P-P}$		 10.5 4.5	 12		 10.5 4.5	 10	 ns ns
t_{PD}	Propagation delay Gain 1[1] Gain 2[2, 4]	$V_{OUT} = 1V_{P-P}$		 7.5 6.0	 10		 7.5 6.0	 10	 ns ns

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.
4. Applies to 10- and 14-pin versions only.

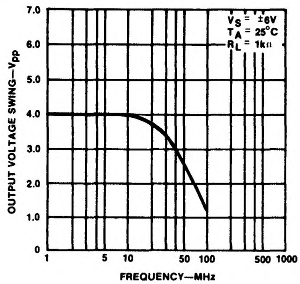
TYPICAL PERFORMANCE CHARACTERISTICS

Common-Mode Rejection Ratio as a Function of Frequency



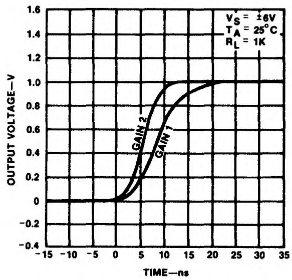
OP04421S

Output Voltage Swing As a Function of Frequency



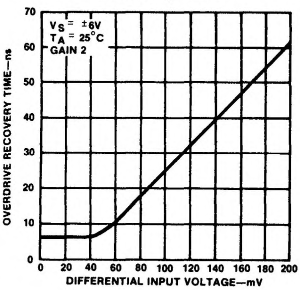
OP04430S

Pulse Response



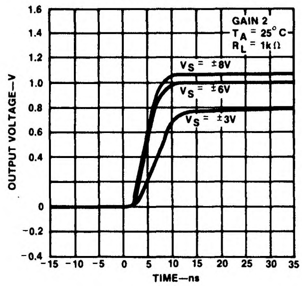
OP04440S

Differential Overdrive Recovery Time



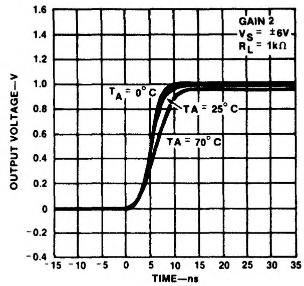
OP04450S

Pulse Response as a Function of Supply Voltage



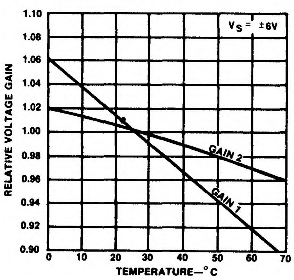
OP04460S

Pulse Response as a Function of Temperature



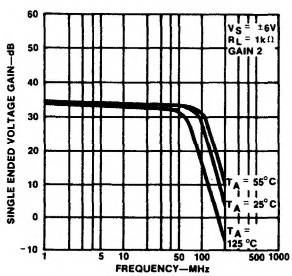
OP04470S

Voltage Gain as a Function of Temperature



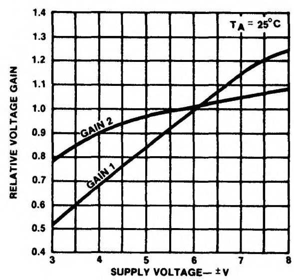
OP04480S

Gain vs Frequency as a Function of Temperature



OP04490S

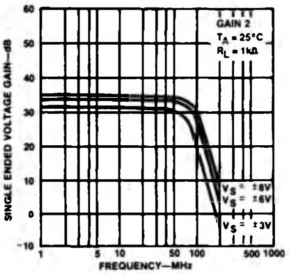
Voltage Gain as a Function of Supply Voltage



OP04500S

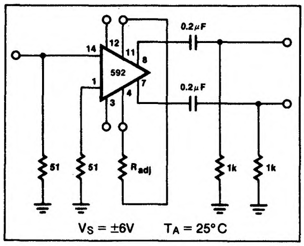
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Gain vs Frequency as a Function of Supply Voltage



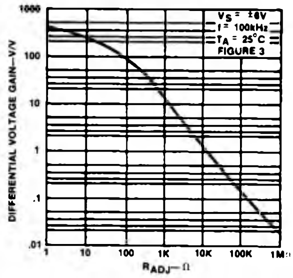
OP04510S

Voltage Gain Adjust Circuit



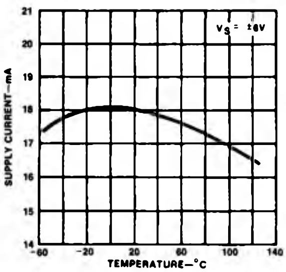
OP04521S

Voltage Gain as a Function of RADJ (Figure 3)



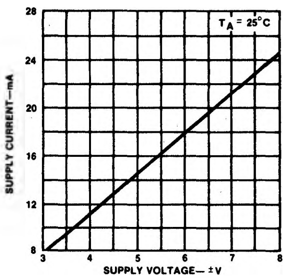
OP04530S

Supply Current as a Function of Temperature



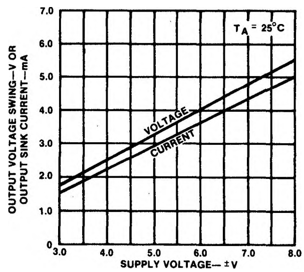
OP04540S

Supply Current as a Function of Supply Voltage



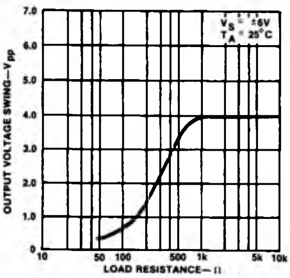
OP04550S

Output Voltage and Current Swing as a Function of Supply Voltage



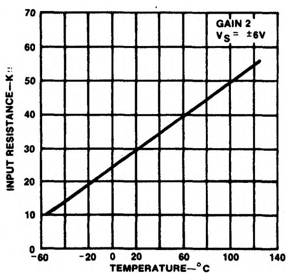
OP04560S

Output Voltage Swing as a Function of Load Resistance



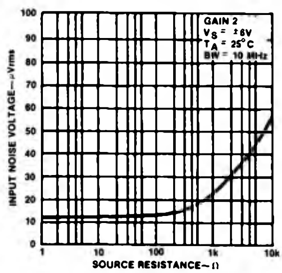
OP04570S

Input Resistance as a Function of Temperature



OP04580S

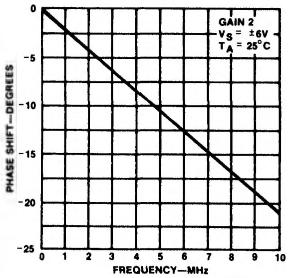
Input Noise Voltage as a Function of Source Resistance



OP04590S

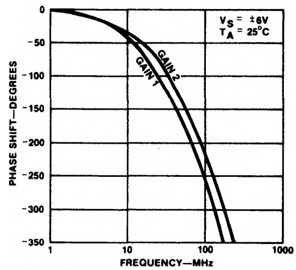
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Phase Shift as a Function of Frequency



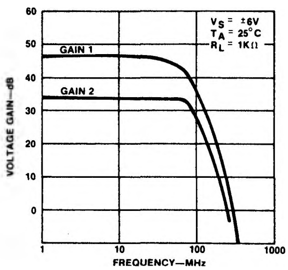
OP04600S

Phase Shift as a Function of Frequency



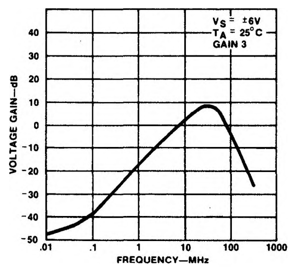
OP04610S

Voltage Gain as a Function of Frequency



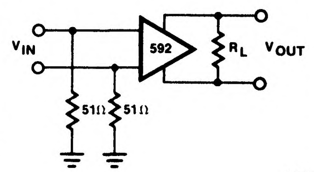
OP04620S

Voltage Gain as a Function of Frequency (All Gain Select Pins Open)

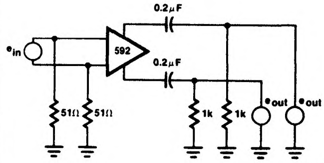


OP04630S

TEST CIRCUITS $T_A = 25°C$, unless otherwise specified.



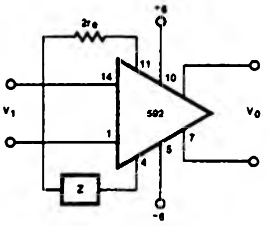
TC08400S



TC08410S

Video Amplifier NE/SE592

TYPICAL APPLICATIONS

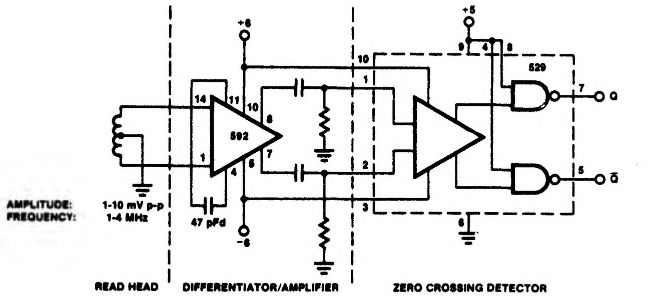


TC08420S

NOTE:

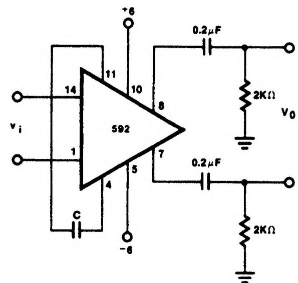
$$\frac{V_0(s)}{V_1(s)} \cong \frac{1.4 \times 10^4}{Z(s) + 2r_e} \cong \frac{1.4 \times 10^4}{Z(s) + 32}$$

Basic Configuration



TC08430S

Disc/Tape Phase-Modulated Readback Systems



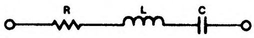
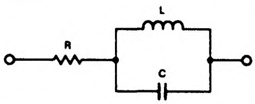
TC08440S

NOTE:
For frequency $F_1 << 1/2\pi(32)C$

$V_0 \cong 1.4 \times 10^4 C \frac{dV_i}{dT}$

Differentiation With High Common-Mode Noise Rejection

FILTER NETWORKS

Z NETWORK	FILTER TYPE	$\frac{V_O(s)}{V_1(s)}$ TRANSFER FUNCTION
	LOW PASS	$\frac{1.4 \times 10^4}{L}\left[\frac{1}{s + R/L}\right]$
	HIGH PASS	$\frac{1.4 \times 10^4}{R}\left[\frac{s}{s + 1/RC}\right]$
	BAND PASS	$\frac{1.4 \times 10^4}{L}\left[\frac{s}{s^2 + R/L\, s + 1/LC}\right]$
	BAND REJECT	$\frac{1.4 \times 10^4}{R}\left[\frac{s^2 + 1/LC}{s^2 + 1/LC + s/RC}\right]$

TC08422S

NOTE:
In the networks above, the R value used is assumed to include $2r_e$, or approximately 32Ω.