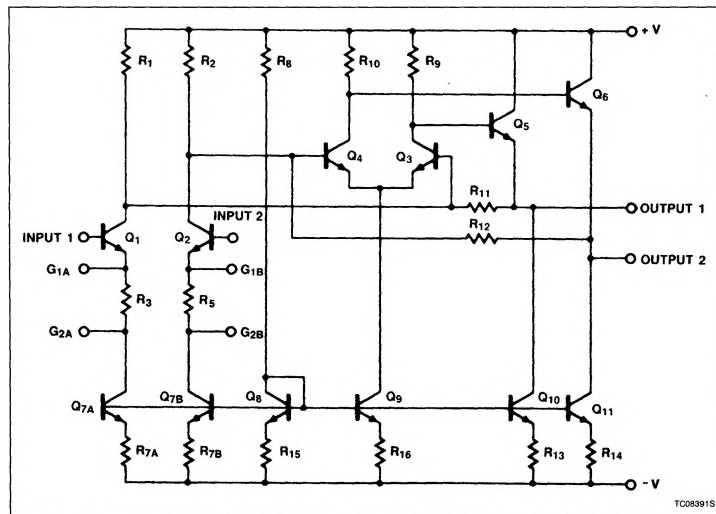


Linear Products

DESCRIPTION

The NE/SA/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.

EQUIVALENT CIRCUIT



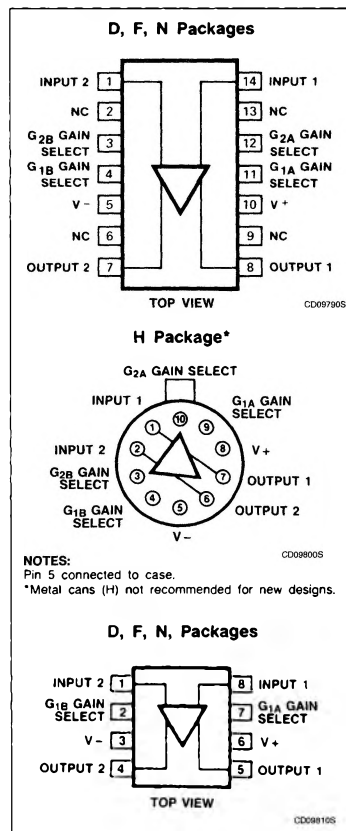
FEATURES

- 120MHz unity gain bandwidth
- Adjustable gains from 0 to 400
- Adjustable pass band
- No frequency compensation required
- Wave shaping with minimal external components
- MIL-STD processing available

APPLICATIONS

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

PIN CONFIGURATIONS



Video Amplifier

NE/SA/SE592

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 Plastic DIP	-40°C to +85°C	SA592N8
8-Pin SO	0 to +70°C	NE592D8
8-Pin SO	-40°C to +85°C	SA592D8
10-Lead Metal Can	0 to +70°C	NE592H
10-Lead Metal Can	-55°C to +125°C	SE592H

NOTE:

N8, N14, D8 and D14 package parts also available in "High" gain version by adding "H" before package designation, i.e., NE592HD8.

ABSOLUTE MAXIMUM RATINGS $T_A = +25^\circ\text{C}$, 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 ambient temperature range SE592 NE592	-40 to +85 0 to +70	°C °C
T_{STG}	Storage temperature range	-65 to +150	°C
$P_{D\ MAX}$	Maximum power dissipation, $T_A = 25^\circ\text{C}$ (still air) ¹ F-14 package F-8 package D-14 package D-8 package H package N-14 package N-8 package	1.17 0.79 0.98 0.79 0.83 1.44 1.17	W W W W W W W

NOTE:

1. Derate above 25°C at the following rates:

- F-14 package at 9.3mW/°C
- F-8 package at 6.3mW/°C
- D-14 package at 7.8mW/°C
- D-8 package at 6.3mW/°C
- H package at 6.7mW/°C
- N-14 package at 11.5mW/°C
- N-8 package at 9.3mW/°C

Video Amplifier

NE/SA/SE592

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

SYMBOL	PARAMETER	TEST CONDITIONS	NE/SA592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part	$R_L = 2\text{k}\Omega$, $V_{OUT} = 3V_{P.P}$	250	400	600	300	400	500	V/V
	Gain 1^1		80	100	120	90	100	110	V/V
	Gain $2^{2, 4}$								
	High gain part		400	500	600				V/V
R_{IN}	Input resistance			4.0			4.0		$\text{k}\Omega$
	Gain 1^1			30			30		$\text{k}\Omega$
	Gain $2^{2, 4}$		10			20			
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	$V_{CM} \pm 1\text{V}$, $f < 100\text{kHz}$ $V_{CM} \pm 1\text{V}$, $f = 5\text{MHz}$	60	86		60	86		dB
				60			60		dB
PSRR	Supply voltage rejection ratio	$\Delta V_S = \pm 0.5\text{V}$	50	70		50	70		dB
V_{OS}	Output offset voltage	$R_L = \infty$			1.5			1.5	V
					1.5			1.0	V
				0.35	0.75		0.35	0.75	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	$R_L = 2\text{k}\Omega$	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:

- Gain select Pins G_{1A} and G_{1B} connected together.
- Gain select Pins G_{2A} and G_{2B} connected together.
- All gain select pins open.
- Applies to 10- and 14-pin versions only.

Video Amplifier

NE/SA/SE592

DC ELECTRICAL CHARACTERISTICS $V_{SS} = \pm 6V$, $V_{CM} = 0$, $0^\circ C \leq T_A \leq 70^\circ C$ for NE592; $-40^\circ C \leq T_A \leq 85^\circ C$ for SA592, $-55^\circ C \leq T_A \leq 125^\circ C$ 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	NE/SA592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part	$R_L = 2k\Omega$, $V_{OUT} = 3V_{P.P}$	250		600	200		600	V/V
	Gain 1 ¹		80		120	80		120	V/V
	Gain 2 ^{2, 4}								
	High gain part		400	500	600				V/V
R_{IN}	Input resistance Gain 2 ^{2, 4}		8.0			8.0			k Ω
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	$R_L = \infty$			1.5			1.5	V
	Gain 2 ⁴	$R_L = \infty$			1.5			1.2	V
	Gain 3 ³	$R_L = \infty$			1.0			1.0	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:

- Gain select Pins G_{1A} and G_{1B} connected together.
- Gain select Pins G_{2A} and G_{2B} connected together.
- All gain select pins open.
- Applies to 10- and 14-pin versions only.

AC ELECTRICAL CHARACTERISTICS $T_A = +25^\circ C$, $V_{SS} = \pm 6V$, $V_{CM} = 0$, 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	NE/SA592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
BW	Bandwidth Gain 1 ¹			40			40		MHz
	Gain 2 ^{2, 4}			90			90		MHz
t_R	Rise time Gain 1 ¹	$V_{OUT} = 1V_{P.P}$		10.5			10.5		ns
	Gain 2 ^{2, 4}			4.5	12		4.5	10	ns
t_{PD}	Propagation delay Gain 1 ¹	$V_{OUT} = 1V_{P.P}$		7.5			7.5		ns
	Gain 2 ^{2, 4}			6.0	10		6.0	10	ns

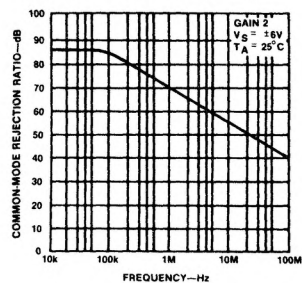
NOTES:

- Gain select Pins G_{1A} and G_{1B} connected together.
- Gain select Pins G_{2A} and G_{2B} connected together.
- All gain select pins open.
- Applies to 10- and 14-pin versions only.

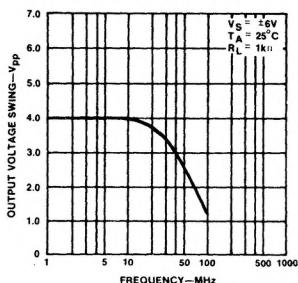
Video Amplifier

NE/SA/SE592

TYPICAL PERFORMANCE CHARACTERISTICS

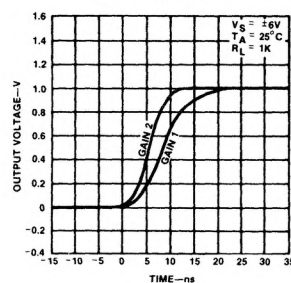
Common-Mode Rejection Ratio
as a Function of Frequency

OP04421S

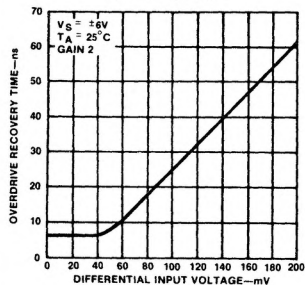
Output Voltage Swing as
a Function of Frequency

OP04430S

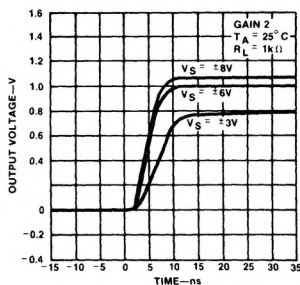
Pulse Response



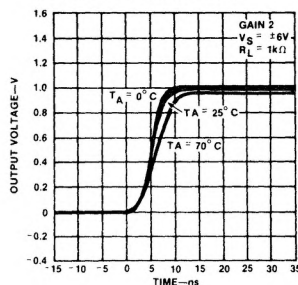
OP04460S

Differential Overdrive
Recovery Time

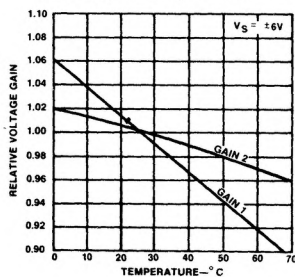
OP04450S

Pulse Response as a
Function of Supply Voltage

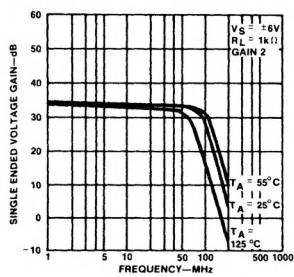
OP04460S

Pulse Response as a
Function of Temperature

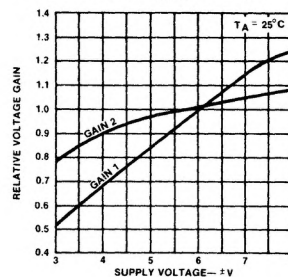
OP04470S

Voltage Gain as a
Function of Temperature

OP04480S

Gain vs Frequency as a
Function of Temperature

OP04490S

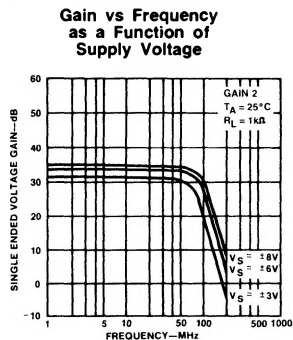
Voltage Gain as a
Function of Supply Voltage

OP04500S

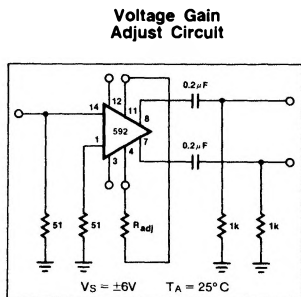
Video Amplifier

NE/SA/SE592

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

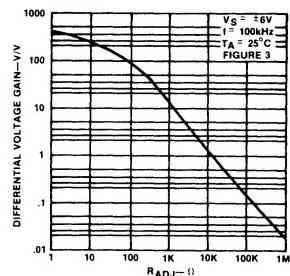


OP045105



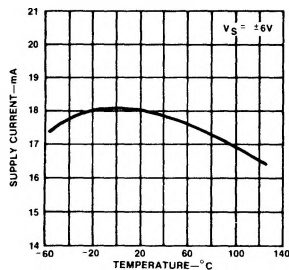
OP045215

Voltage Gain as a Function of RADJ (Figure 3)



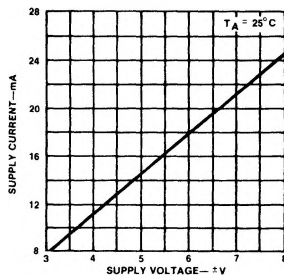
OP045305

Supply Current as a Function of Temperature



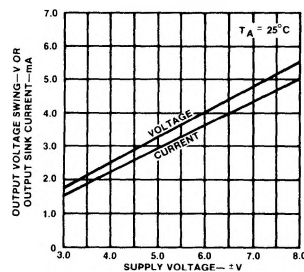
OP045405

Supply Current as a Function of Supply Voltage



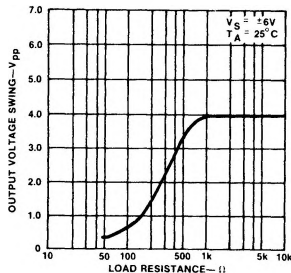
OP045505

Output Voltage and Current Swing as a Function of Supply Voltage



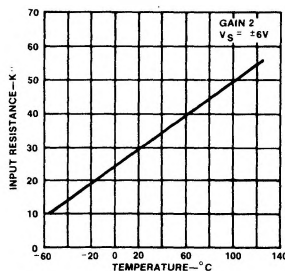
OP045605

Output Voltage Swing as a Function of Load Resistance



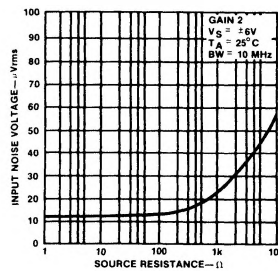
OP045705

Input Resistance as a Function of Temperature



OP045805

Input Noise Voltage as a Function of Source Resistance

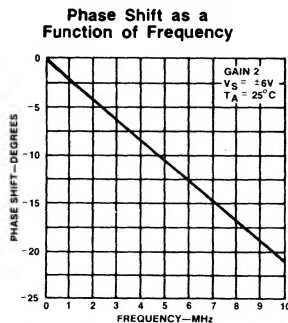


OP045905

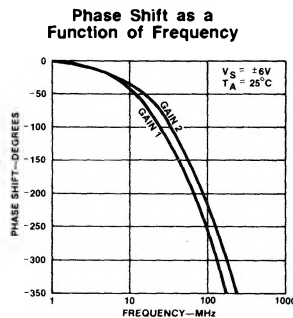
Video Amplifier

NE/SA/SE592

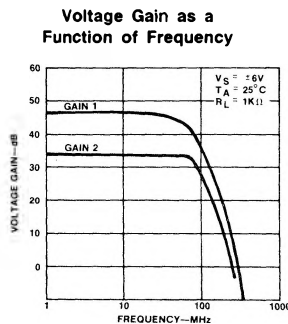
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



OP046005

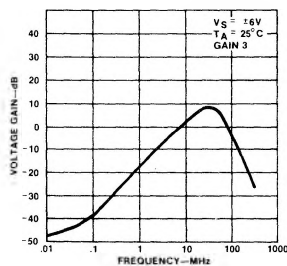


OP046105

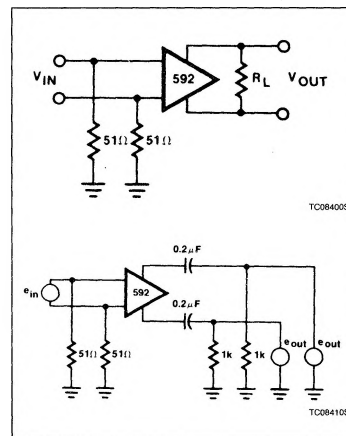


OP046205

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



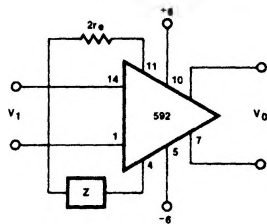
OP046305

TEST CIRCUITS $T_A = 25^\circ C$, unless otherwise specified.

Video Amplifier

NE/SA/SE592

TYPICAL APPLICATIONS



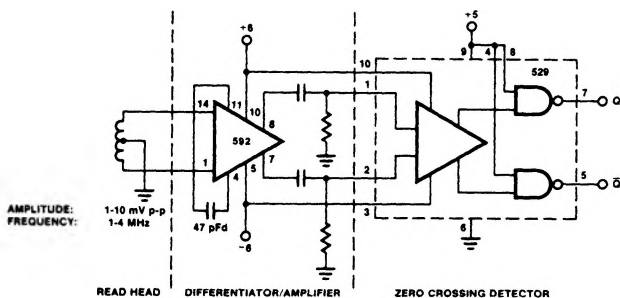
TC084205

NOTE:

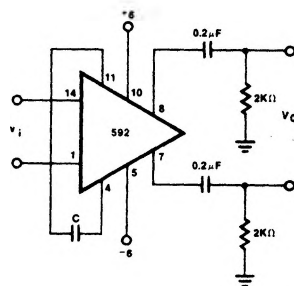
$$\frac{V_O(s)}{V_i(s)} \approx \frac{1.4 \times 10^4}{Z(s) + 2R_g}$$

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

Basic Configuration



TC084305



TC084405

NOTE:

For frequency $F_1 \ll \frac{1}{2} \pi (32) C$

$$V_O \approx 1.4 \times 10^4 C \frac{dV_i}{dt}$$

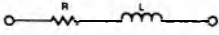
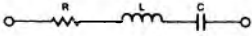
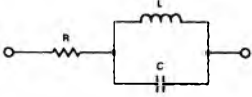
Differentiation with High
Common-Mode Noise Rejection

Disc/Tape Phase-Modulated Readback Systems

Video Amplifier

NE/SA/SE592

FILTER NETWORKS

Z NETWORK	FILTER TYPE	$V_0(s)$ TRANSFER $V_1(s)$ 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	$\frac{1.4 \times 10^4}{R} \left[\frac{s^2 + 1/LC}{s^2 + 1/LC + s/RC} \right]$

TC084225

NOTES:
In the networks above, the R value used is assumed to include $2r_e$, or approximately 32Ω .
 $S = j\omega$
 $\omega = 2\pi f$