

NE/SE592 Video Amplifier

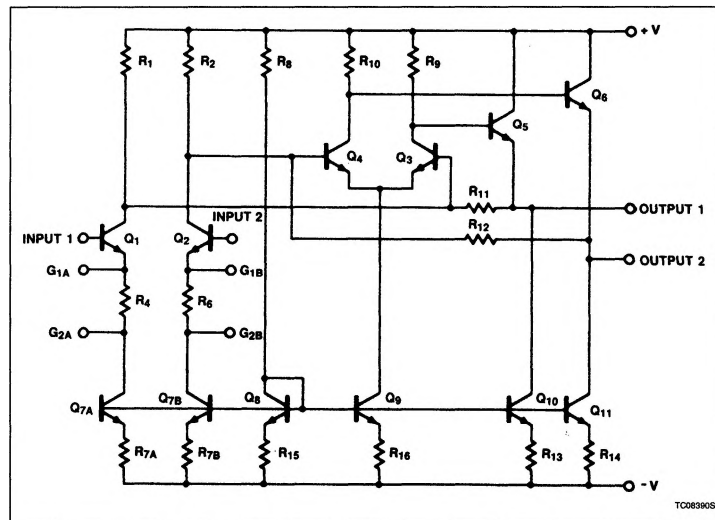
Product Specification

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.

EQUIVALENT CIRCUIT



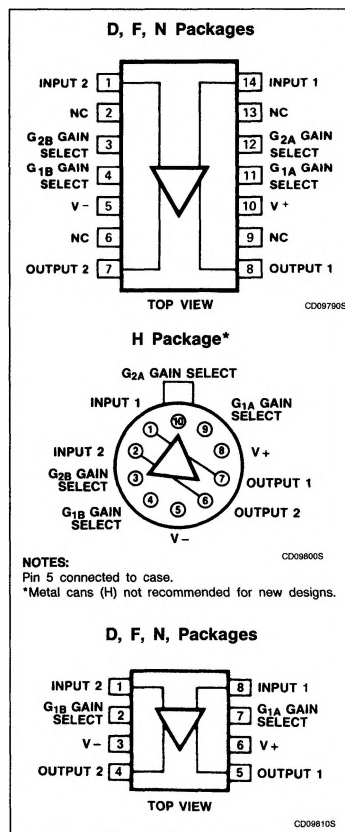
FEATURES

- 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



Video Amplifier

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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 $T_A = +25^\circ\text{C}$, 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 temperature range		
	SE592	-55 to +125	°C
	NE592	0 to +70	°C
T_{STG}	Storage temperature range	-65 to +150	°C
P_D	Power dissipation	500	mW

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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	NE592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part Gain 1^1 Gain $2^{2, 4}$	$R_L = 2\text{k}\Omega$, $V_{OUT} = 3V_{P-P}$	250	400	600	300	400	500	V/V
			80	100	120	90	100	110	V/V
	High gain part		400	500	600				V/V
R_{IN}	Input resistance Gain 1^1 Gain $2^{2, 4}$			4.0			4.0		$\text{k}\Omega$
			10	30		20	30		$\text{k}\Omega$
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	$V_{CM} \pm 1\text{V}$, $f < 100\text{kHz}$	60	86		60	86		dB
		$V_{CM} \pm 1\text{V}$, $f = 5\text{MHz}$		60			60		dB
PSRR	Supply voltage rejection ratio Gain 2^4	$\Delta V_S = \pm 0.5\text{V}$	50	70		50	70		dB
V_{OS}	Output offset voltage Gain 1 Gain 2^4 Gain 3^3	$R_L = \infty$			1.5			1.5	V
		$R_L = \infty$			1.5			1.0	V
		$R_L = \infty$		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:

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.

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DC ELECTRICAL CHARACTERISTICS $V_{SS} = \pm 6V$, $V_{CM} = 0$, $0^\circ C \leq T_A \leq 70^\circ C$ for NE592; $-55^\circ C \leq T_A \leq 125^\circ C$ 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	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		600	200		600	V/V
			80		120	80		120	V/V
	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 Gain 2 ⁴ Gain 3 ³	$R_L = \infty$			1.5			1.5	V
		$R_L = \infty$			1.5			1.2	V
		$R_L = \infty$			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:

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 $T_A = +25^\circ C$, $V_{SS} = \pm 6V$, $V_{CM} = 0$, 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	NE592			SE592			UNIT
			Min	Typ	Max	Min	Typ	Max	
BW	Bandwidth Gain 1 ¹ Gain 2 ^{2, 4}			40			40		MHz
				90			90		MHz
t _R	Rise time Gain 1 ¹ Gain 2 ^{2, 4}	$V_{OUT} = 1V_{P-P}$		10.5			10.5		ns
				4.5	12		4.5	10	ns
t _{PD}	Propagation delay Gain 1 ¹ Gain 2 ^{2, 4}	$V_{OUT} = 1V_{P-P}$		7.5			7.5		ns
				6.0	10		6.0	10	ns

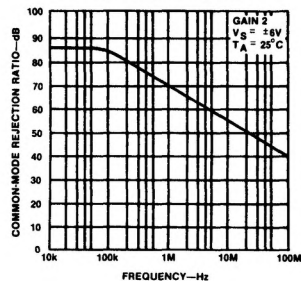
NOTES:

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.

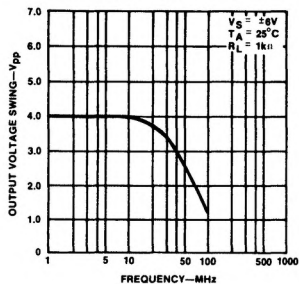
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TYPICAL PERFORMANCE CHARACTERISTICS

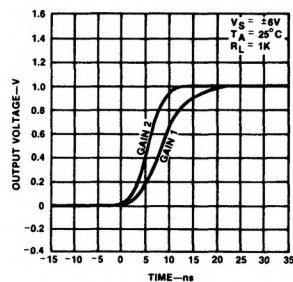
Common-Mode Rejection Ratio
as a Function of Frequency

OP044215

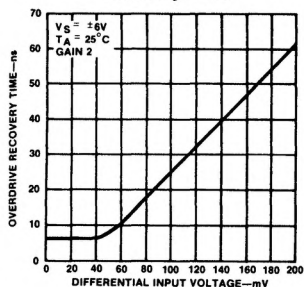
Output Voltage Swing As
a Function of Frequency

OP044305

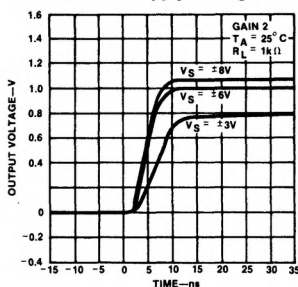
Pulse Response



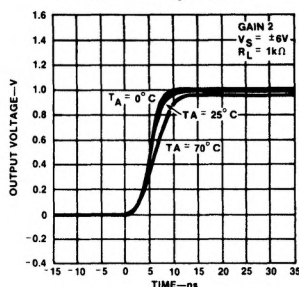
OP044405

Differential Overdrive
Recovery Time

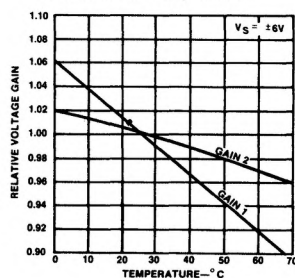
OP044505

Pulse Response as a
Function of Supply Voltage

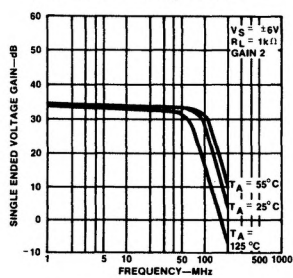
OP044605

Pulse Response as a
Function of Temperature

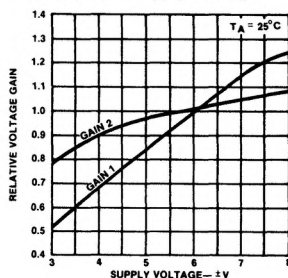
OP044705

Voltage Gain as a
Function of Temperature

OP044805

Gain vs Frequency as a
Function of Temperature

OP044905

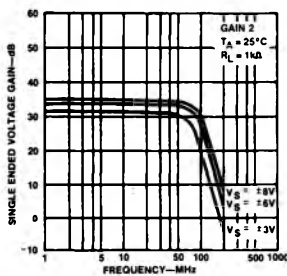
Voltage Gain as a
Function of Supply Voltage

OP045005

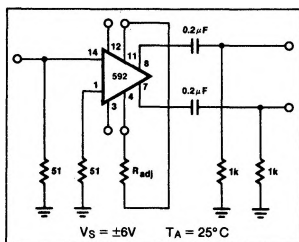
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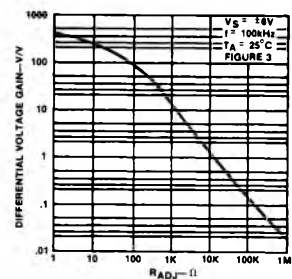
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Gain vs Frequency
as a Function of
Supply Voltage

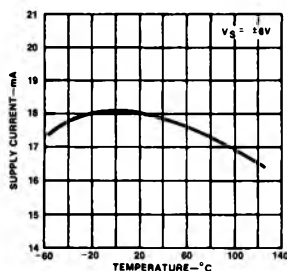
OP04510S

Voltage Gain
Adjust Circuit

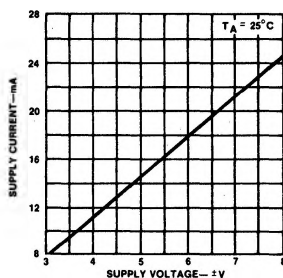
OP04521S

Voltage Gain as a
Function of R_{ADJ} (Figure 3)

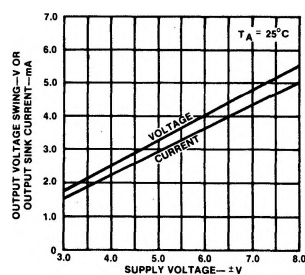
OP04530S

Supply Current as a
Function of Temperature

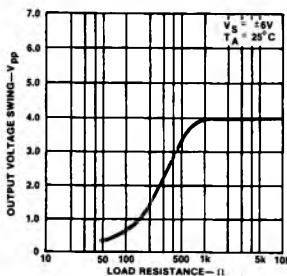
OP04540S

Supply Current as a
Function of Supply Voltage

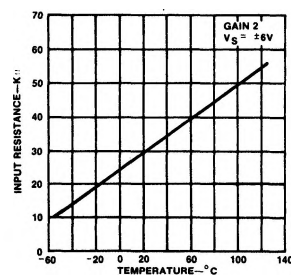
OP04550S

Output Voltage and Current
Swing as a Function of
Supply Voltage

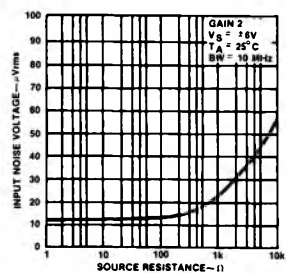
OP04560S

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

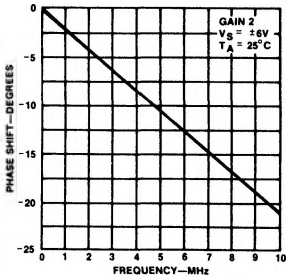
OP04590S

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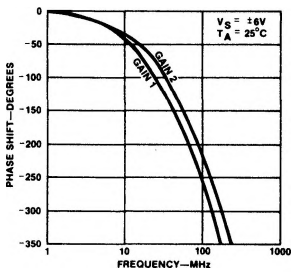
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Phase Shift as a Function of Frequency



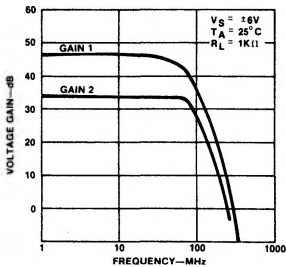
OP046205

Phase Shift as a Function of Frequency



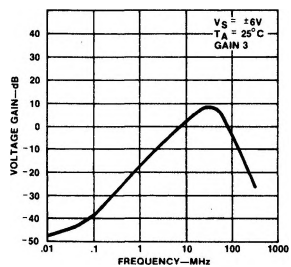
OP046105

Voltage Gain as a Function of Frequency



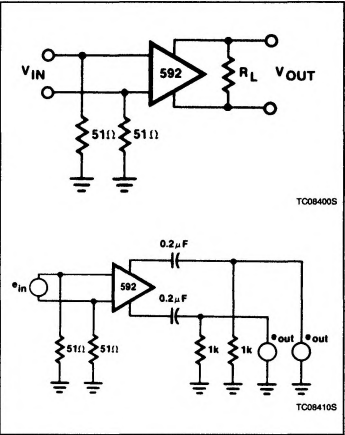
OP046205

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



OP046305

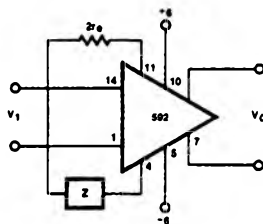
TEST CIRCUITS $T_A = 25^\circ C$, unless otherwise specified.



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TYPICAL APPLICATIONS



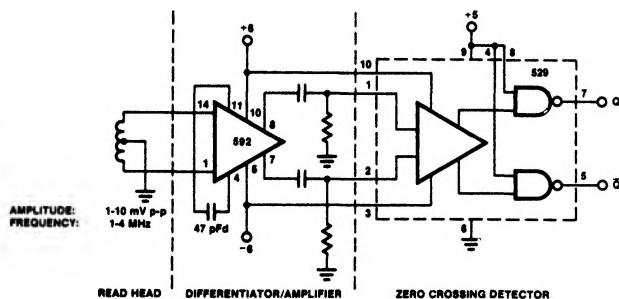
TC08420S

NOTE:

$$\frac{V_0(s)}{V_1(s)} \approx \frac{1.4 \times 10^4}{Z(s) + 2r_E}$$

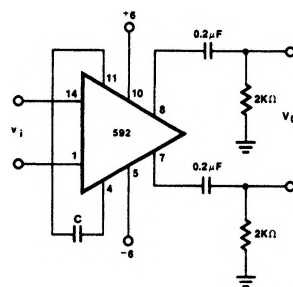
$$\approx \frac{1.4 \times 10^4}{Z(s) + 32}$$

Basic Configuration



TC08430S

Disc/Tape Phase-Modulated Readback Systems



TC08440S

NOTE:

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

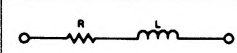
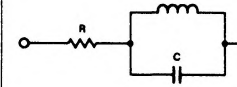
$$V_0 \approx 1.4 \times 10^4 C \frac{dV_1}{dt}$$

Differentiation With High
Common-Mode Noise Rejection

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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	$\frac{1.4 \times 10^4}{R} \left[\frac{s^2 + 1/LC}{s^2 + 1/LC + s/RC} \right]$

TC084226

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