

Video amplifier

NE592

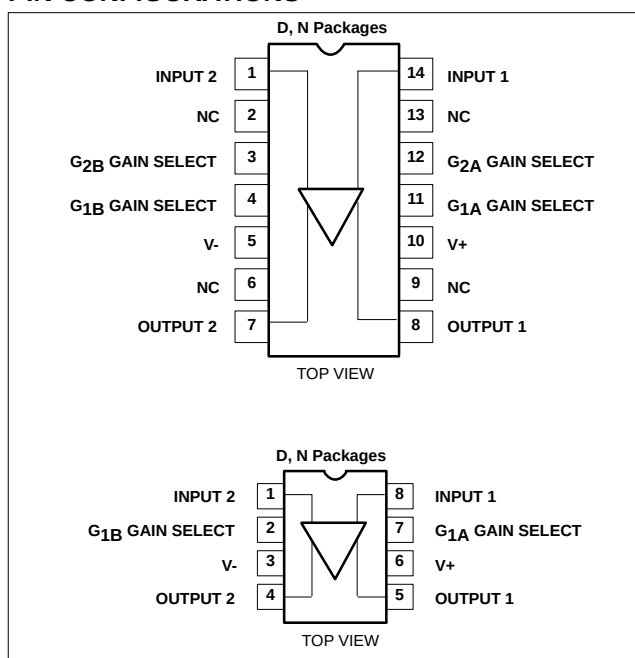
DESCRIPTION

The NE592 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 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

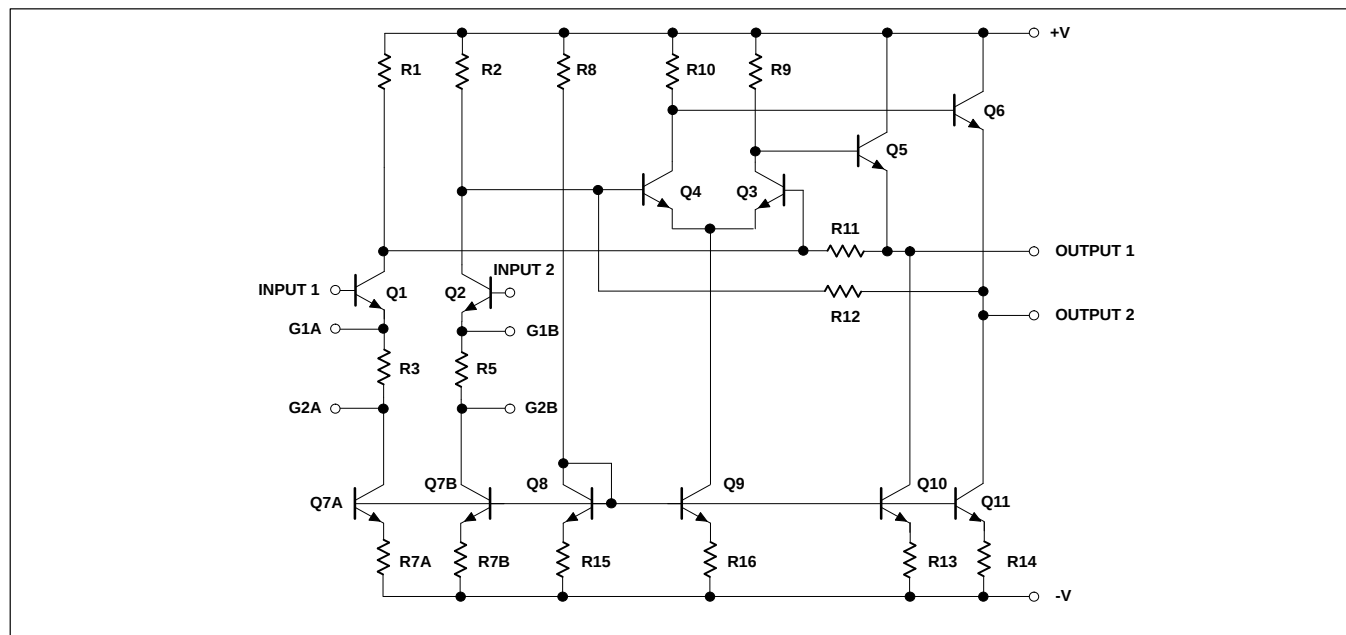
PIN CONFIGURATIONS



APPLICATIONS

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

BLOCK DIAGRAM



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ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE592N14	0405B
14-Pin Small Outline (SO) package	0 to +70°C	NE592D14	0175D
8-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE592N8	0404B
8-Pin Small Outline (SO) package	0 to +70°C	NE592D8	0174C

NOTES:

N8, N14, D8 and D14 package parts also available in "High" gain version by adding "H" before package designation, i.e., NE592HDB

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	0 to +70	°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		
	D-14 package	0.98	W
	D-8 package	0.79	W
	N-14 package	1.44	W
	N-8 package	1.17	W

NOTES:

- Derate above 25°C at the following rates:
D-14 package at $7.8\text{mW}/^\circ\text{C}$
D-8 package at $6.3\text{mW}/^\circ\text{C}$
N-14 package at $11.5\text{mW}/^\circ\text{C}$
N-8 package at $9.3\text{mW}/^\circ\text{C}$

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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			UNIT
			Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part	$R_L = 2\text{k}\Omega$, $V_{OUT} = 3V_{P-P}$				
	Gain 1 ¹		250	400	600	V/V
	Gain 2 ^{2, 4}		80	100	120	V/V
R_{IN}	Input resistance					
	Gain 1 ¹			4.0		k Ω
	Gain 2 ^{2, 4}		10	30		k Ω
C_{IN}	Input capacitance ²	Gain 2 ⁴		2.0		pF
I_{OS}	Input offset current			0.4	5.0	μA
I_{BIAS}	Input bias current			9.0	30	μA
V_{NOISE}	Input noise voltage	BW 1kHz to 10MHz		12		μV_{RMS}
V_{IN}	Input voltage range		± 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		dB
	Gain 2 ⁴					
	Gain 2 ⁴					
PSRR	Supply voltage rejection ratio	$\Delta V_S = \pm 0.5\text{V}$	50	70		dB
V_{OS}	Output offset voltage					
	Gain 1				1.5	V
	Gain 2 ⁴	$R_L = \infty$			1.5	V
V_{CM}	Output common-mode voltage	$R_L = \infty$	2.4	2.9	3.4	V
	Gain 2 ⁴	$R_L = \infty$		0.35	0.75	V
	Gain 3 ³	$R_L = \infty$				V
V_{OUT}	Output voltage swing differential	$R_L = 2\text{k}\Omega$	3.0	4.0		V
R_{OUT}	Output resistance			20		Ω
I_{CC}	Power supply current	$R_L = \infty$		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 14-pin version only.

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DC ELECTRICAL CHARACTERISTICS

DC Electrical Characteristics $V_{SS}=\pm 6V$, $V_{CM}=0$, $0^{\circ}C \leq T_A \leq 70^{\circ}C$, 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			UNIT
			Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part	$R_L=2k\Omega$, $V_{OUT}=3V_{P-P}$				
	Gain 1 ¹ Gain 2 ² , 4		250 80		600 120	V/V V/V
R_{IN}	Input resistance Gain 2 ² , 4		8.0			k Ω
I_{OS}	Input offset current				6.0	μA
I_{BIAS}	Input bias current				40	μA
V_{IN}	Input voltage range		± 1.0			V
CMRR	Common-mode rejection ratio Gain 2 ⁴	$V_{CM} \pm 1V$, $f < 100kHz$	50			dB
PSRR	Supply voltage rejection ratio Gain 2 ⁴	$\Delta V_S = \pm 0.5V$	50			dB
V_{OS}	Output offset voltage	$R_L = \infty$				
	Gain 1				1.5	V
	Gain 2 ⁴				1.5	
	Gain 3 ³				1.0	
V_{OUT}	Output voltage swing differential	$R_L=2k\Omega$	2.8			V
I_{CC}	Power supply current	$R_L = \infty$			27	mA

NOTES:

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- All gain select pins open.
- Applies to 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			UNIT
			Min	Typ	Max	
BW	Bandwidth					
	Gain 1 ¹ Gain 2 ² , 4			40 90		MHz MHz
t_R	Rise time	$V_{OUT}=1V_{P-P}$				
	Gain 1 ¹ Gain 2 ² , 4			10.5 4.5	12	ns ns
t_{PD}	Propagation delay	$V_{OUT}=1V_{P-P}$				
	Gain 1 ¹ Gain 2 ² , 4			7.5 6.0	10	ns ns

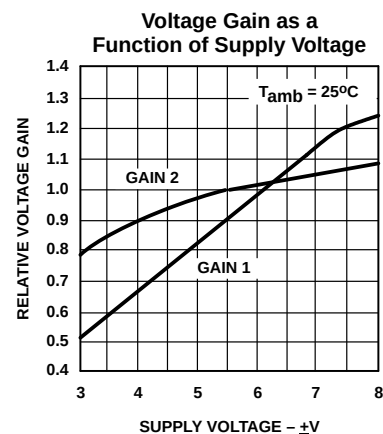
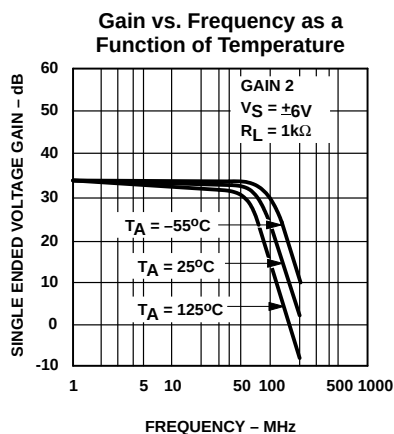
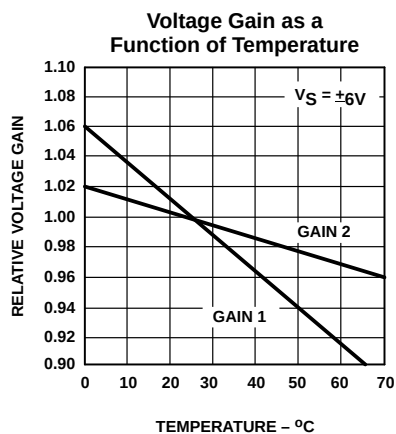
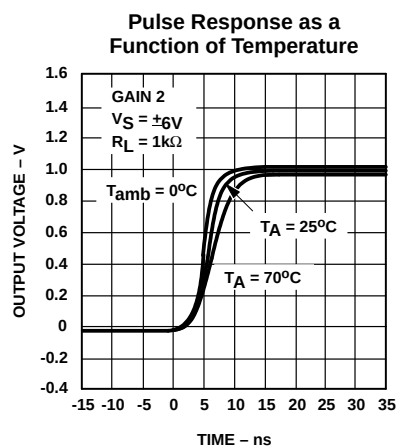
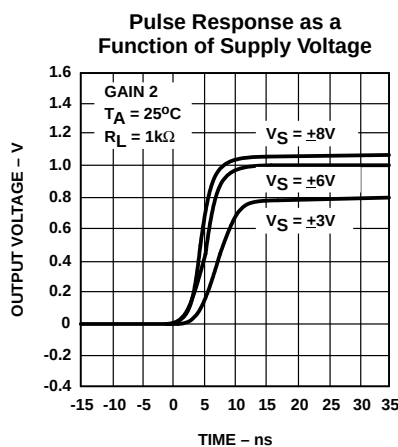
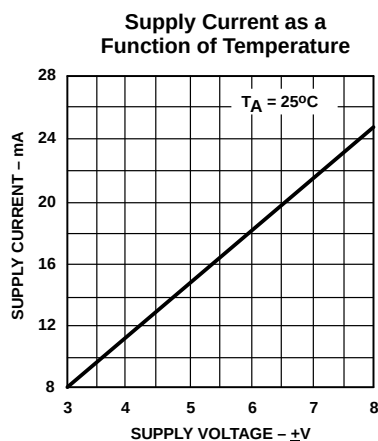
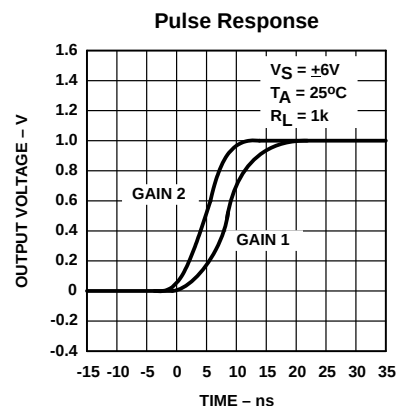
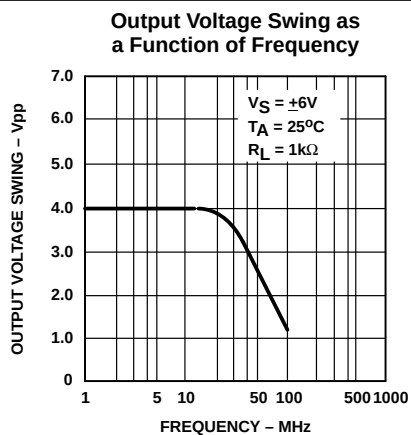
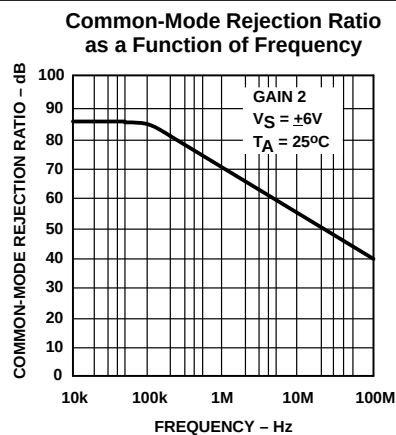
NOTES:

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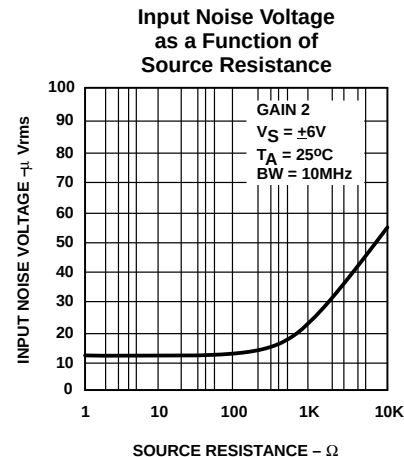
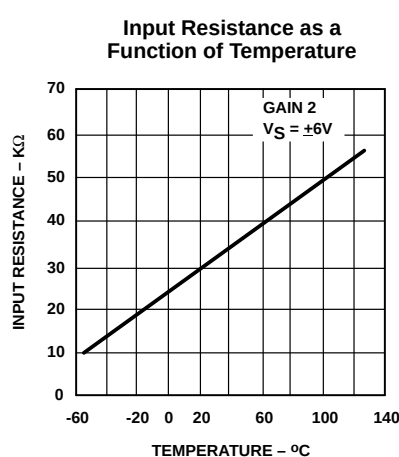
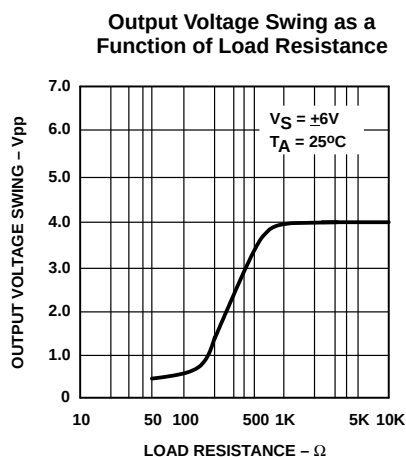
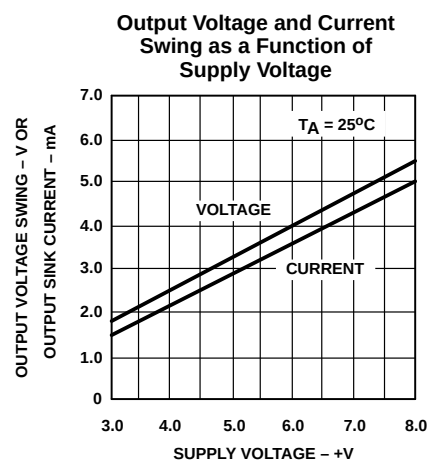
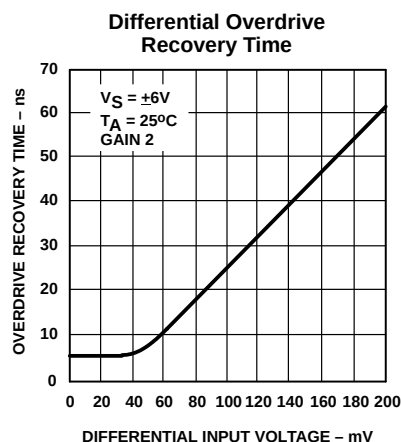
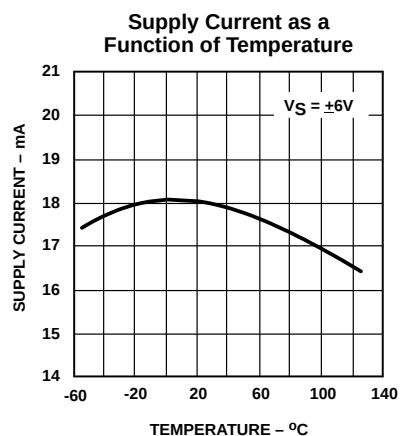
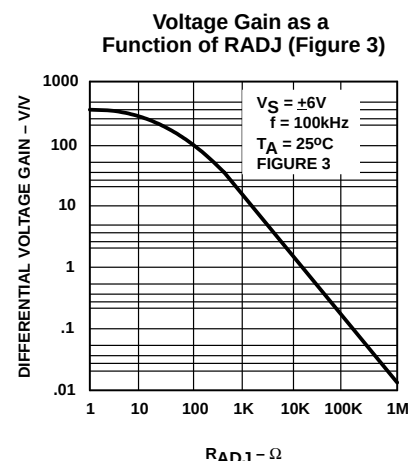
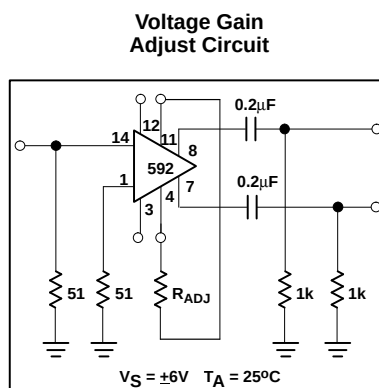
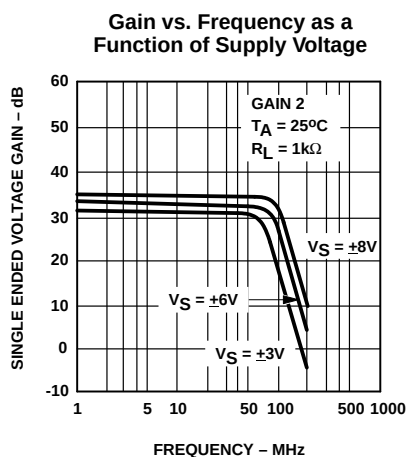
TYPICAL PERFORMANCE CHARACTERISTICS



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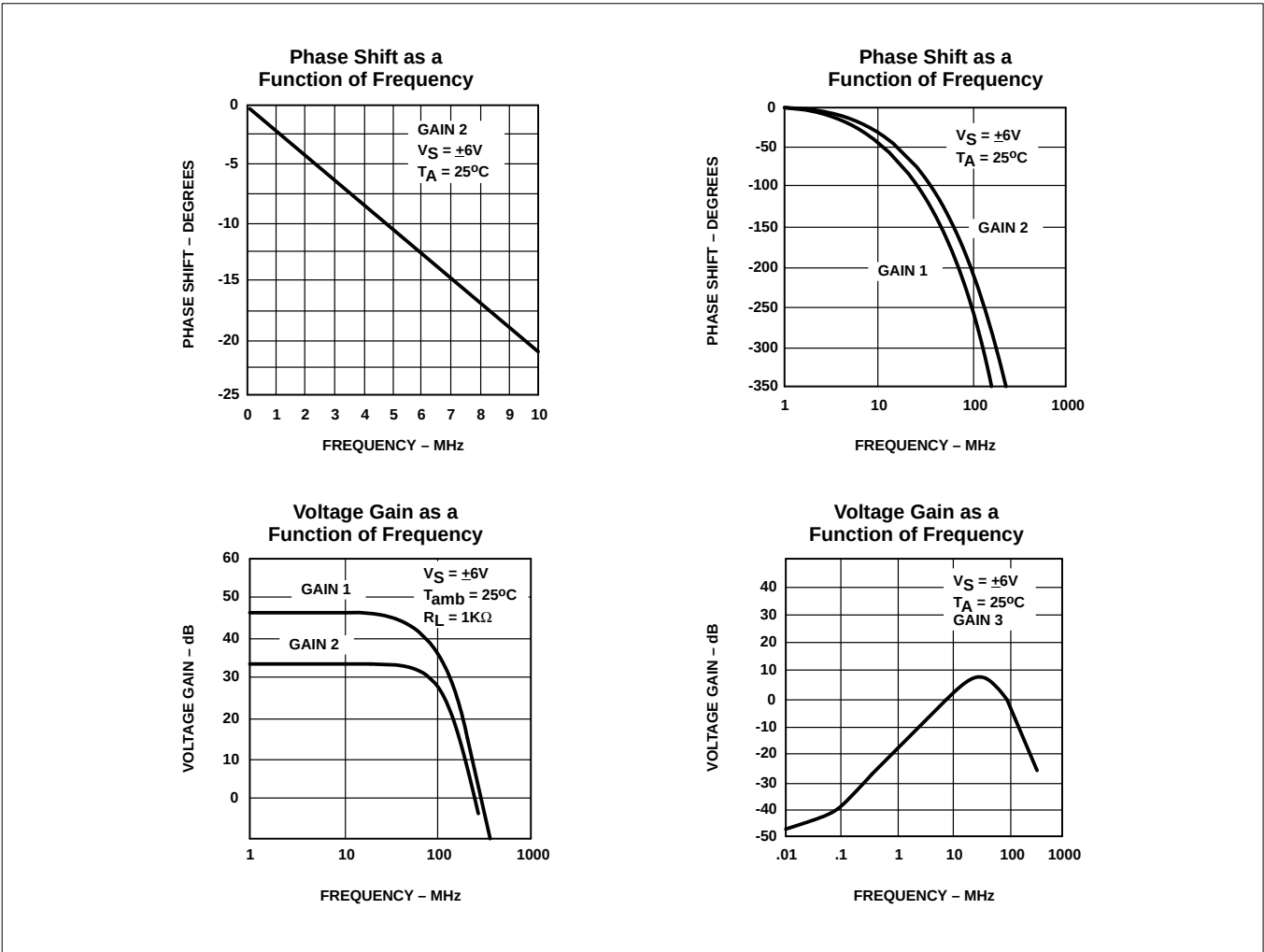
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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

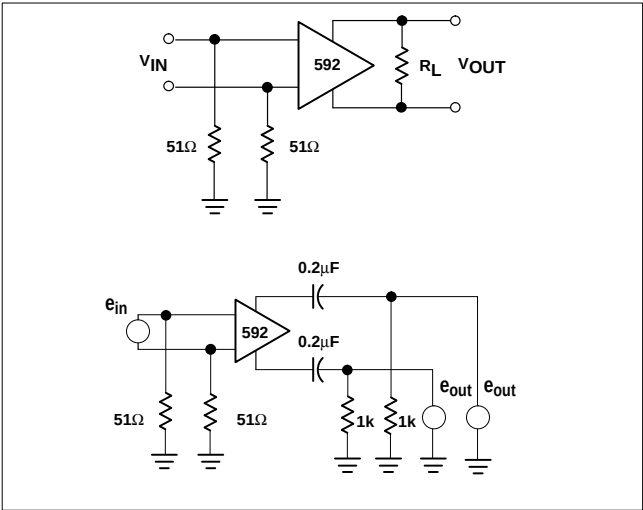


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TEST CIRCUITS $T_A = 25^\circ C$, unless otherwise specified.



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TYPICAL APPLICATIONS

NOTE:

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

Basic Configuration

READ HEAD DIFFERENTIATOR/AMPLIFIER ZERO CROSSING DETECTOR

Disc/Tape Phase-Modulated Readback Systems

Differentiation with High Common-Mode Noise Rejection

NOTE:

For frequency $F_1 \ll 1/2 \pi (32) C$

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

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

NOTES:

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

$S = j\omega$

$\omega = 2\pi f$