

**WIDE-BAND VIDEO AMPLIFIER  
FEATURING**

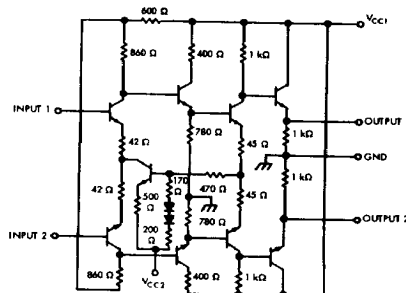
**Flat Frequency Response with Low Phase-Shift from DC to 40 MHz**

**description**

This wide-band video amplifier features a flat frequency response and low phase-shift from dc to 40 MHz. Differential inputs and outputs are provided which permit it to be used as a high-frequency differential amplifier.

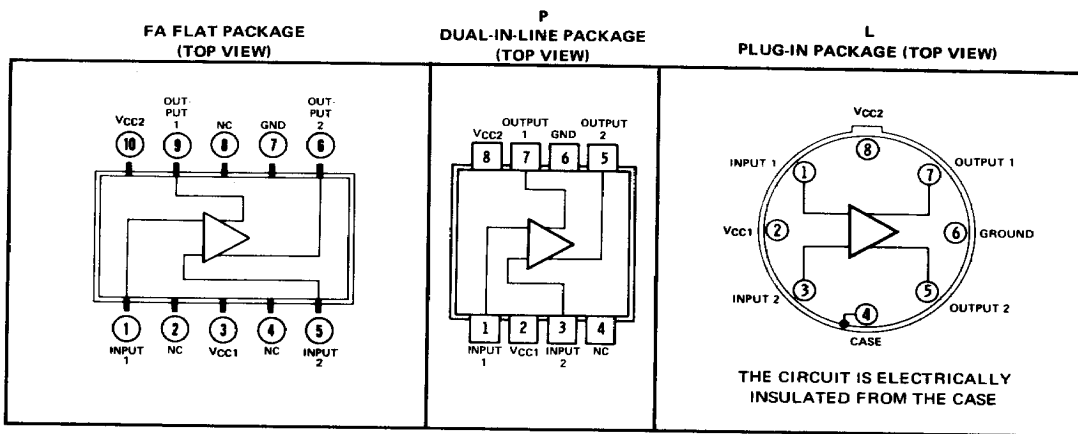
Elements of the SN7510 video-amplifier bar include transistors with transition frequency as high as 1.2 GHz under low-current and low- $V_{CE}$  conditions. Circuit frequency response from dc to greater than 100 MHz is possible.

**schematic**



Component values shown are nominal.

**terminal assignments**



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# TYPE SN7510

## DIFFERENTIAL VIDEO AMPLIFIER

### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltages (See Note 1): $V_{CC1}$ . . . . .	+8 V
$V_{CC2}$ . . . . .	-8 V
Differential input voltage . . . . .	5 V
Positive input voltage (See Note 1) . . . . .	$V_{CC1}$
Negative input voltage (See Note 1) . . . . .	$V_{CC2}$
Operating free-air temperature range . . . . .	0°C to 70°C
Storage temperature range . . . . .	-65°C to 150°C

NOTE 1: These voltage values are with respect to network ground.

### electrical characteristics, $T_A = 25^\circ\text{C}$ , $V_{CC1} = +6\text{ V}$ , $V_{CC2} = -6\text{ V}$

PARAMETER	TEST FIGURE	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{DO}$ Differential-output offset voltage	1			0.5	2	V
$V_{CMO(av)}$ Average common-mode output offset voltage	1		2	3	4	V
$I_{in}$ Input current	1			50	100	$\mu\text{A}$
$I_{DI}$ Differential-input offset current	1			5	30	$\mu\text{A}$
$V_{OM}$ Maximum peak-to-peak output voltage	2	Single-ended, load resistance = 5 k $\Omega$ , $f = 100\text{ kHz}$ , $V_{in} = 20\text{ mV rms}$		4.5		V
$D_S$ Single-ended output distortion	2	Load resistance = 5 k $\Omega$ , input distortion < 0.2%, $V_{out} = 1\text{ V rms}$ , $f = 10\text{ kHz}$		2		%
$V_{N(in)}$ Equivalent average input noise voltage	3	Single-ended, $R_S = 0$ , $f = 10\text{ Hz}$ to 500 kHz		5		$\mu\text{V}$
$V_{CMIM}$ Maximum common-mode input voltage				$\pm 1$		V
$A_{vs}$ Small-signal voltage gain	2	Single-ended, load resistance = 5 k $\Omega$ , $f = 100\text{ kHz}$	60	90	120	
$A_{vcm}$ Common-mode-input voltage gain	4	Single-ended, load resistance = 5 k $\Omega$ , $V_{in} = 0.3\text{ V rms}$ , $f = 100\text{ kHz}$		-40	-20	dB
CMRR Common-mode rejection ratio	4	Load resistance = 5 k $\Omega$ , $f = 100\text{ kHz}$		80		dB
BW Bandwidth (-3 dB)	2			40		MHz
$r_{in}$ Input resistance	5	$f = 100\text{ kHz}$		6		k $\Omega$
$C_{in}$ Input capacitance	5	$f = 100\text{ kHz}$		7		pF
$z_{out}$ Output impedance	5	$f = 100\text{ kHz}$		35		$\Omega$
$P_T$ Total power dissipation	1	No input signal, no external load		165	220	mW
$t_r$ Rise time	6	Single-ended, $V_{in} = 5\text{ mV}$		10	15	ns
$t_f$ Fall time	6	Single-ended, $V_{in} = 5\text{ mV}$		10	15	ns

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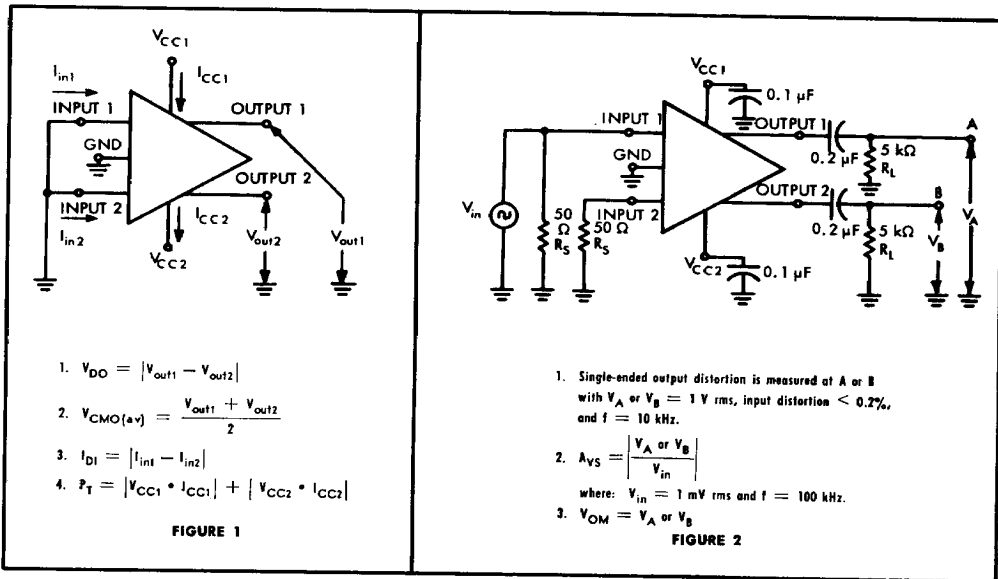
# TYPE SN7510 DIFFERENTIAL VIDEO AMPLIFIER

## letter symbol and parameter definitions

$V_{DO}$	The d-c differential voltage that exists between the output terminals when the input terminals are at ground.
$V_{CMO(a.v)}$	The average of the d-c output voltages with respect to ground when the input terminals are grounded.
$I_{DI}$	The difference in the currents into the two input terminals.
$V_{OM}$	The maximum peak-to-peak output voltage swing that can be obtained without clipping.
$V_{CMIM}$	The maximum common-mode voltage that can be impressed on the input terminals while maintaining differential operation.
CMRR	The ratio of the differential-mode voltage gain to the common-mode voltage gain.
BW	The range of frequencies within which the open-loop voltage gain is within 3 dB of the mid-frequency value.

## PARAMETER MEASUREMENT INFORMATION

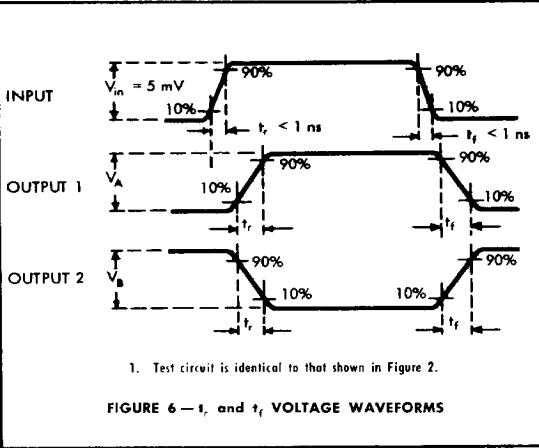
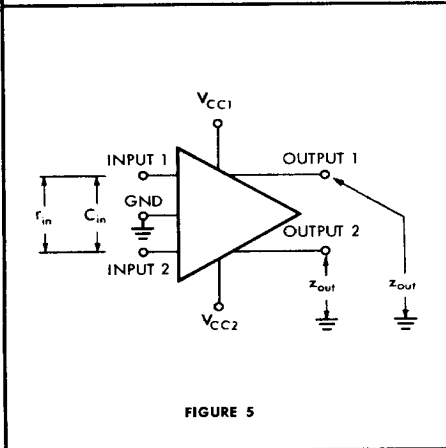
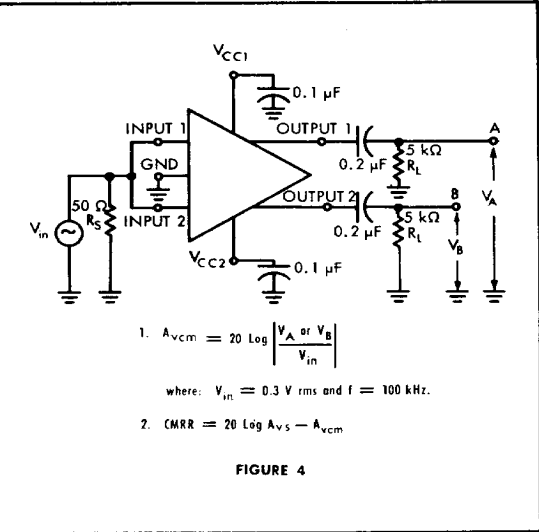
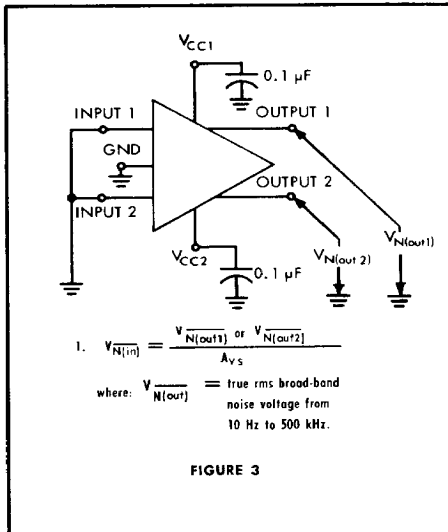
### test circuits



# TYPE SN7510 DIFFERENTIAL VIDEO AMPLIFIER

## PARAMETER MEASUREMENT INFORMATION

test circuits (continued)



# TYPE SN7510 DIFFERENTIAL VIDEO AMPLIFIER

## TYPICAL CHARACTERISTICS†

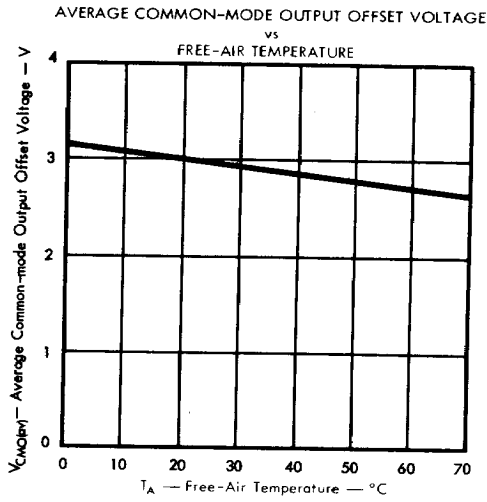


FIGURE 7

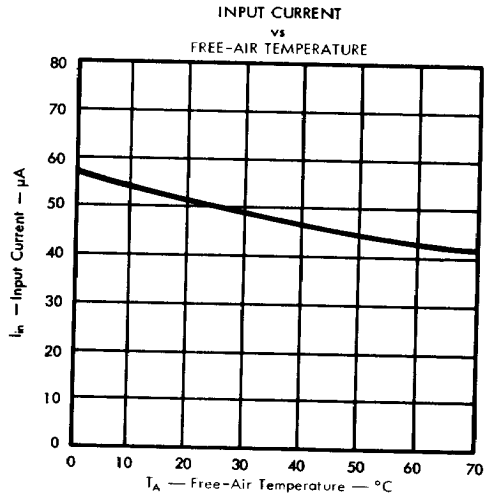


FIGURE 8

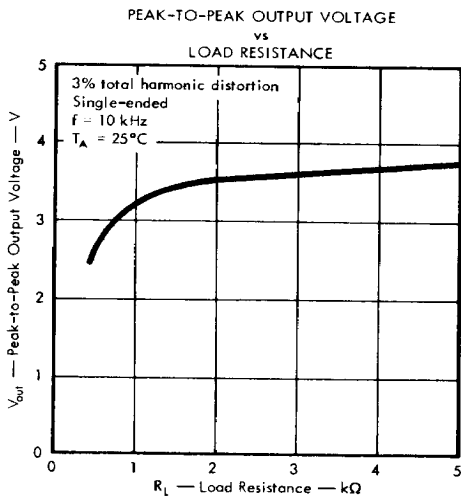


FIGURE 9

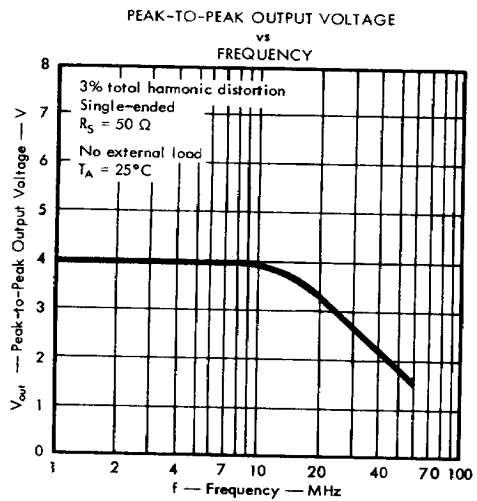


FIGURE 10

† Unless otherwise noted V<sub>CC1</sub> = +6 V, V<sub>CC2</sub> = -6 V.

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# TYPE SN7510 DIFFERENTIAL VIDEO AMPLIFIER

## TYPICAL CHARACTERISTICS†

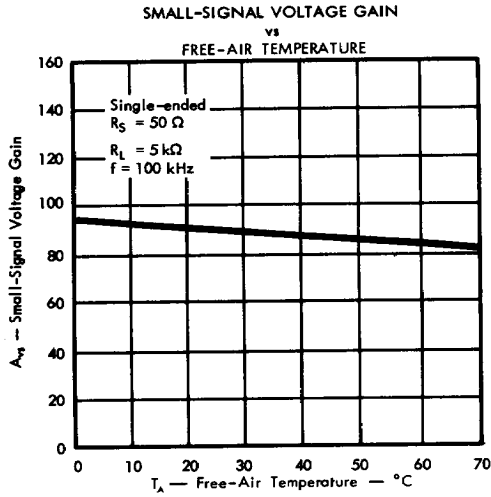


FIGURE 11

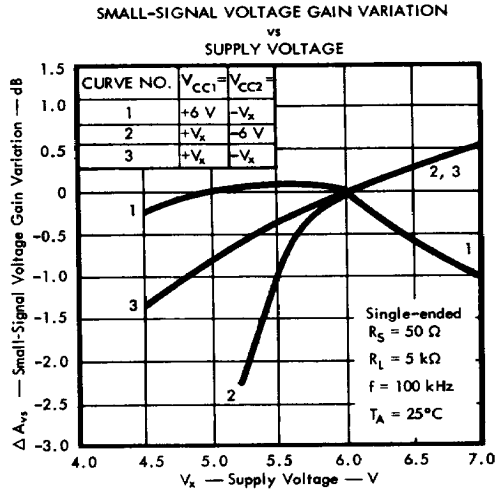


FIGURE 12

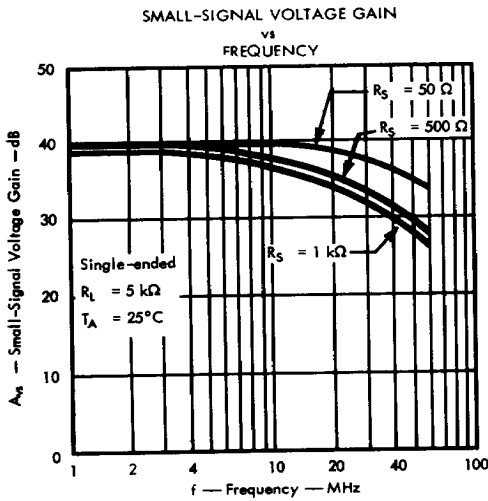


FIGURE 13

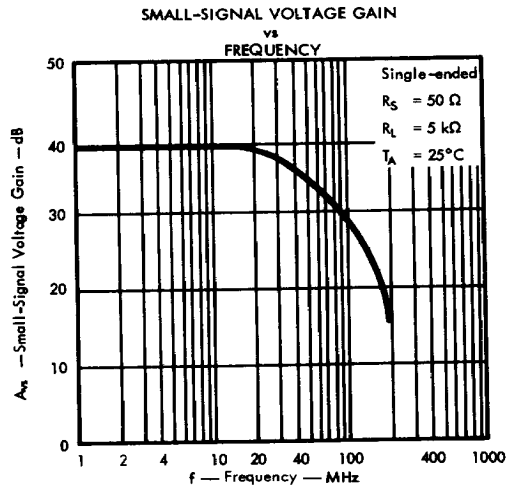


FIGURE 14

† Unless otherwise noted  $V_{CC1} = +6 \text{ V}$ ,  $V_{CC2} = -6 \text{ V}$ .

# TYPE SN7510 DIFFERENTIAL VIDEO AMPLIFIER

## TYPICAL CHARACTERISTICS†

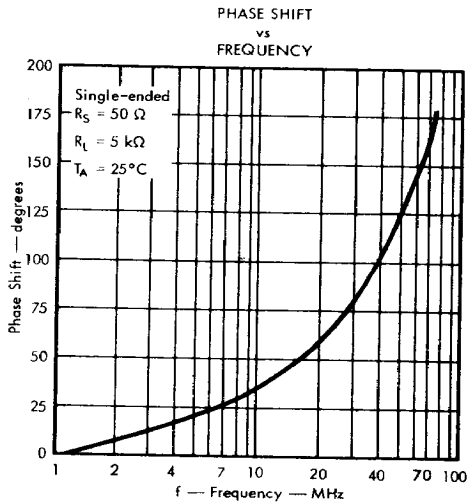


FIGURE 15

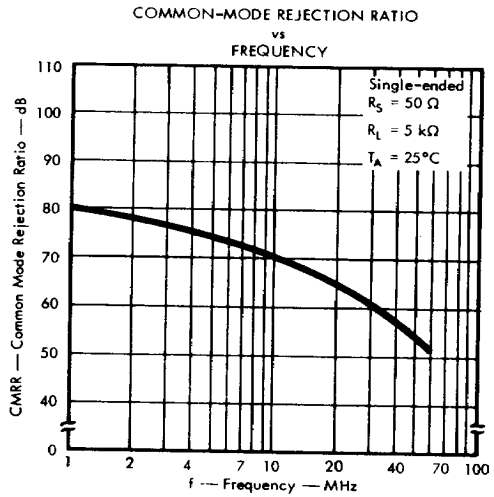


FIGURE 16

†  $V_{CC1} = +6 \text{ V}$  and  $V_{CC2} = -6 \text{ V}$ .

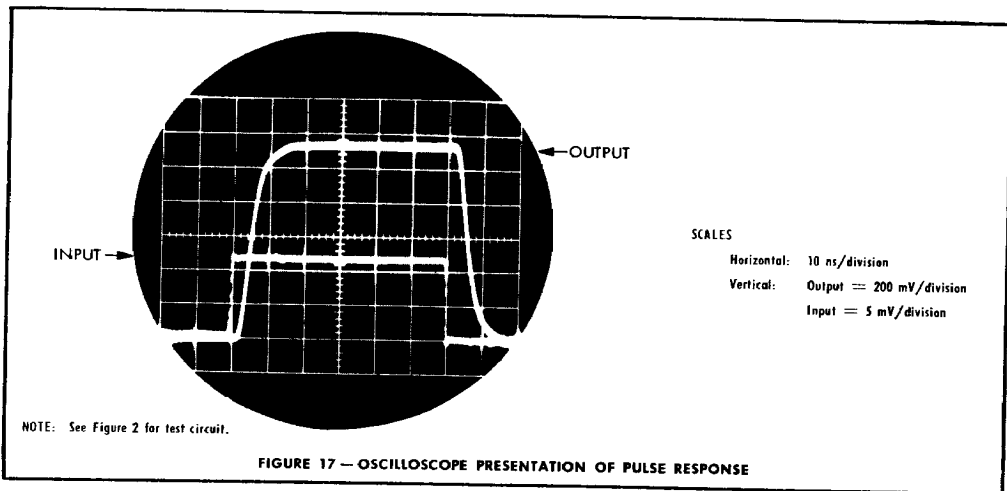


FIGURE 17 — OSCILLOSCOPE PRESENTATION OF PULSE RESPONSE