CIRCUIT TYPE SN7510
DIFFERENTIAL VIDEO AMPLIFIER

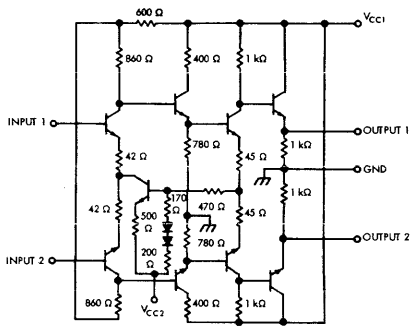
WIDE-BAND VIDEO AMPLIFIER
FEATURING
Flat Frequency Response with Low Phase-Shift from DC to 40 MHz

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.

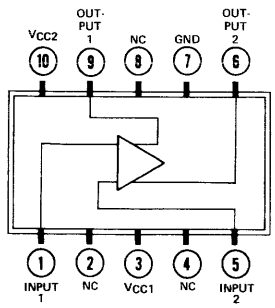
schematic



Component values shown are nominal.

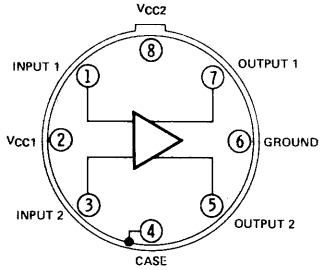
terminal assignments

F
FLAT PACKAGE (TOP VIEW)



THE CIRCUIT IS ELECTRICALLY INSULATED FROM THE CASE

L
PLUG-IN PACKAGE (TOP VIEW)



THE CIRCUIT IS ELECTRICALLY INSULATED FROM THE CASE

NC—No internal connection

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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.

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electrical characteristics, $T_A = 25°C$, $V_{CC1} = +6$ V, $V_{CC2} = -6$ 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	μA
I_{DI}	Differential-input offset current	1			5	30	μA
V_{OM}	Maximum peak-to-peak output voltage	2	Single-ended, load resistance = 5 kΩ, f = 100 kHz, V_{in} = 20 mV rms		4.5		V
D_S	Single-ended output distortion	2	Load resistance = 5 kΩ, input distortion < 0.2%, V_{out} = 1 V rms, f = 10 kHz		2		%
$V_{N(in)}$	Equivalent average input noise voltage	3	Single-ended, R_S = 0, f = 10 Hz to 500 kHz		5		μV
V_{CMIM}	Maximum common-mode input voltage				±1		V
A_{vs}	Small-signal voltage gain	2	Single-ended, load resistance = 5 kΩ, f = 100 kHz	60	90	120	
A_{vcm}	Common-mode-input voltage gain	4	Single-ended, load resistance = 5 kΩ, V_{in} = 0.3 V rms, f = 100 kHz		−40	−20	dB
CMRR	Common-mode rejection ratio	4	Load resistance = 5 kΩ, f = 100 kHz		85		dB
BW	Bandwidth (−3 dB)	2			40		MHz
r_{in}	Input resistance	5	f = 100 kHz		6		kΩ
C_{in}	Input capacitance	5	f = 100 kHz		7		pF
z_{out}	Output impedance	5	f = 100 kHz		35		Ω
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 mV		10	15	ns
t_f	Fall time	6	Single-ended, V_{in} = 5 mV		10	15	ns

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.
$V_{CMO(av)}$	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.

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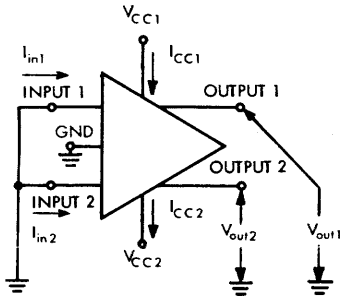
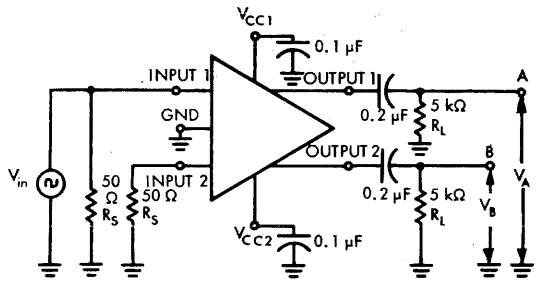
PARAMETER MEASUREMENT INFORMATION

test circuits



1. $V_{DO} = |V_{out1} - V_{out2}|$
2. $V_{CMO(av)} = \dfrac{V_{out1} + V_{out2}}{2}$
3. $I_{DI} = |I_{in1} - I_{in2}|$
4. $P_T = |V_{CC1} \bullet I_{CC1}| + |V_{CC2} \bullet I_{CC2}|$

FIGURE 1



1. Single-ended output distortion is measured at A or B with V_A or V_B = 1 V rms, input distortion < 0.2%, and f = 10 kHz.
2. $A_{VS} = \left|\dfrac{V_A \text{ or } V_B}{V_{in}}\right|$
   where: V_{in} = 1 mV rms and f = 100 kHz.
3. $V_{OM} = V_A$ or V_B

FIGURE 2

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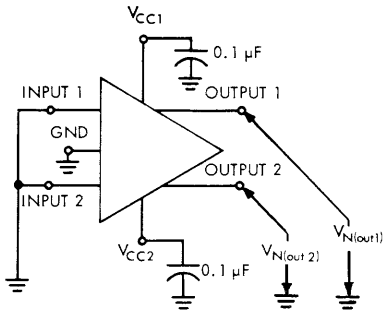
PARAMETER MEASUREMENT INFORMATION

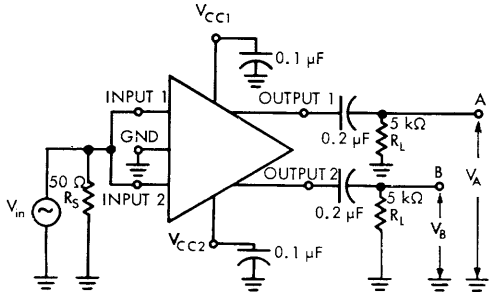
test circuits (continued)



1. $V_{\overline{N(in)}} = \frac{V_{\overline{N(out1)}} \text{ or } V_{\overline{N(out2)}}}{A_{VS}}$

where: $V_{\overline{N(out)}}$ = true rms broad-band noise voltage from 10 Hz to 500 kHz.

FIGURE 3



1. $A_{vcm} = 20 \text{ Log} \left| \frac{V_A \text{ or } V_B}{V_{in}} \right|$

where: V_{in} = 0.3 V rms and f = 100 kHz.

2. CMRR = 20 Log $A_{VS} - A_{vcm}$

FIGURE 4

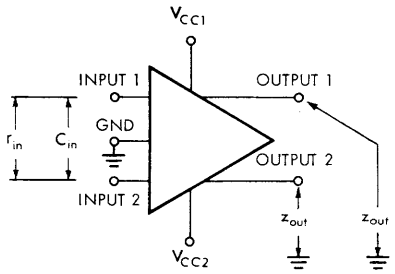
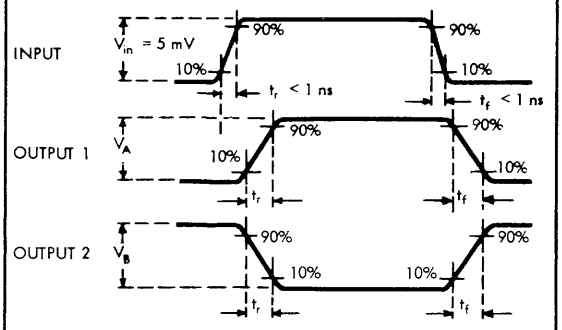


FIGURE 5



1. Test circuit is identical to that shown in Figure 2.

FIGURE 6 — t_r and t_f VOLTAGE WAVEFORMS

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TYPICAL CHARACTERISTICS†

AVERAGE COMMON-MODE OUTPUT OFFSET VOLTAGE
vs
FREE-AIR TEMPERATURE

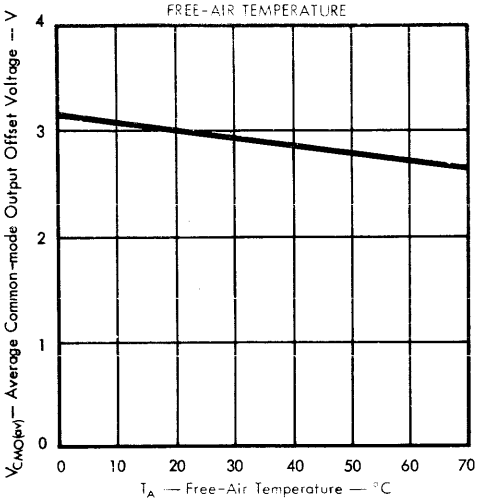

FIGURE 7

INPUT CURRENT
vs
FREE-AIR TEMPERATURE

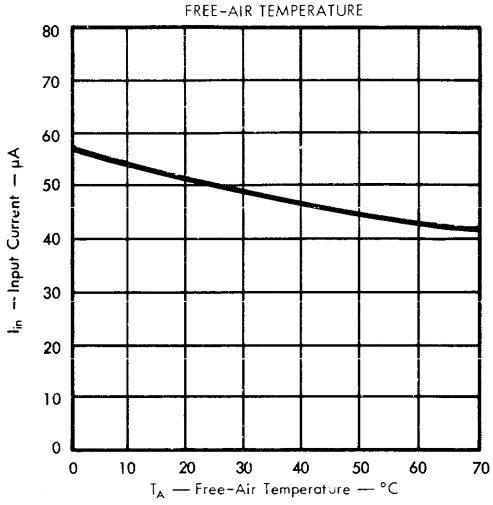

FIGURE 8

PEAK-TO-PEAK OUTPUT VOLTAGE
vs
LOAD RESISTANCE

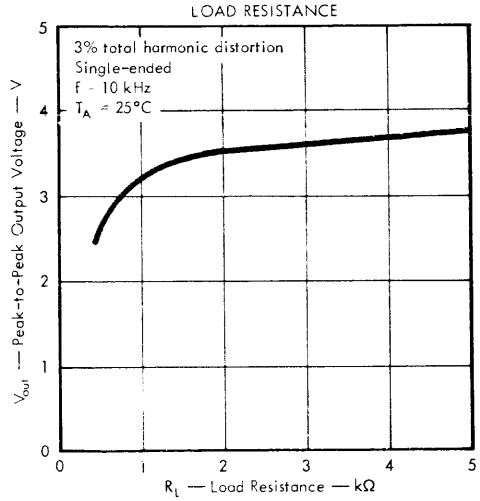

FIGURE 9

PEAK-TO-PEAK OUTPUT VOLTAGE
vs
FREQUENCY

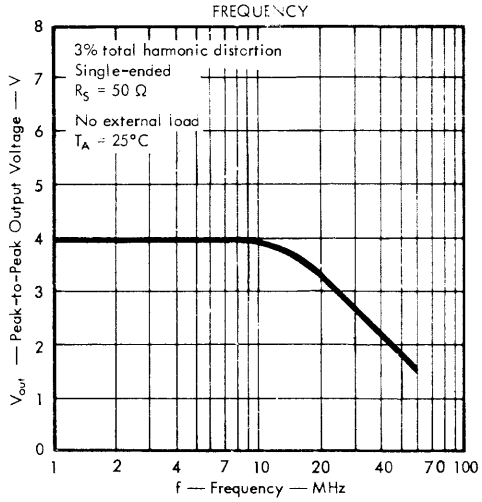

FIGURE 10

† Unless otherwise noted V_{CC1} = +6 V, V_{CC2} = −6 V.

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TYPICAL CHARACTERISTICS†

SMALL-SIGNAL VOLTAGE GAIN
vs
FREE-AIR TEMPERATURE

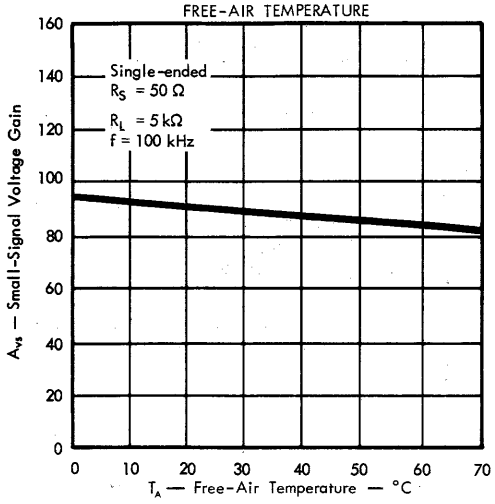

FIGURE 11

SMALL-SIGNAL VOLTAGE GAIN VARIATION
vs
SUPPLY VOLTAGE

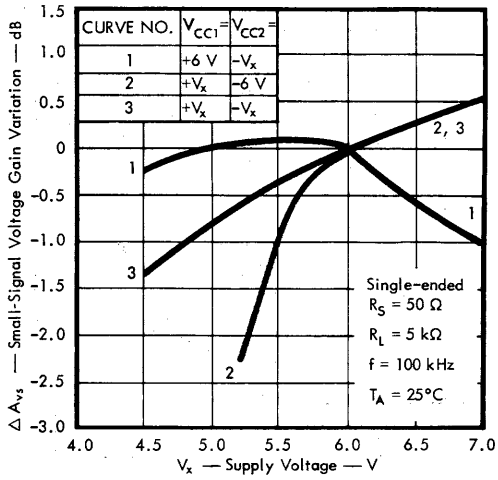

FIGURE 12

SMALL-SIGNAL VOLTAGE GAIN
vs
FREQUENCY

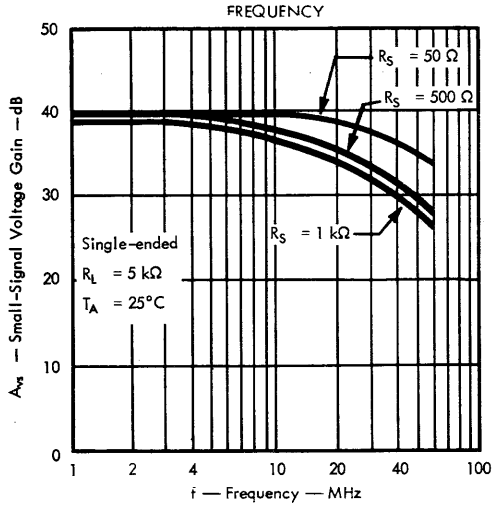

FIGURE 13

SMALL-SIGNAL VOLTAGE GAIN
vs
FREQUENCY

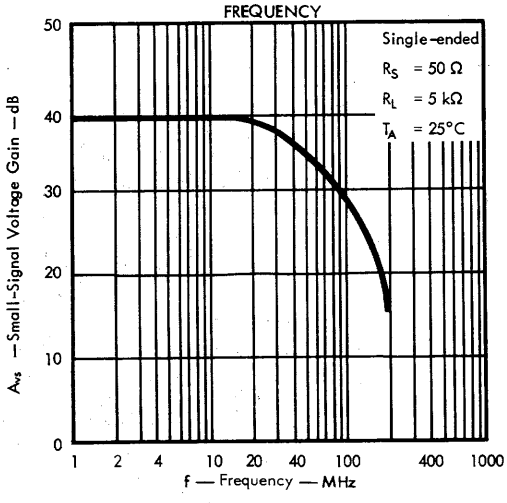

FIGURE 14

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

TYPICAL CHARACTERISTICS†

PHASE SHIFT
vs
FREQUENCY

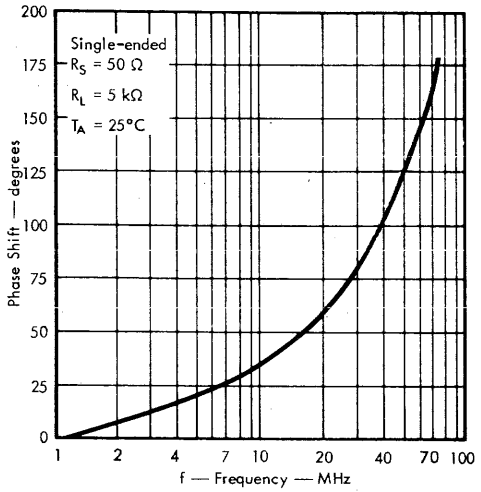

FIGURE 15

COMMON-MODE REJECTION RATIO
vs
FREQUENCY

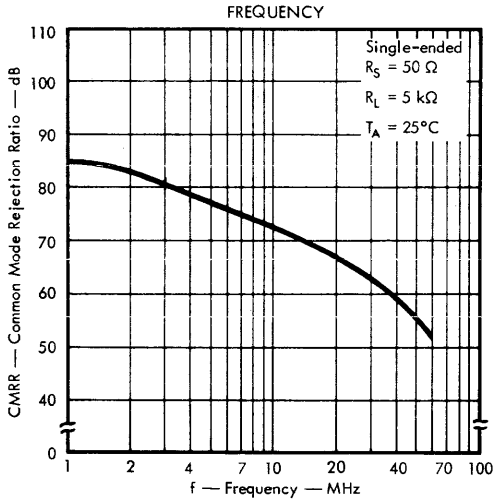

FIGURE 16

† V_{CC1} = +6 V and V_{CC2} = −6 V.

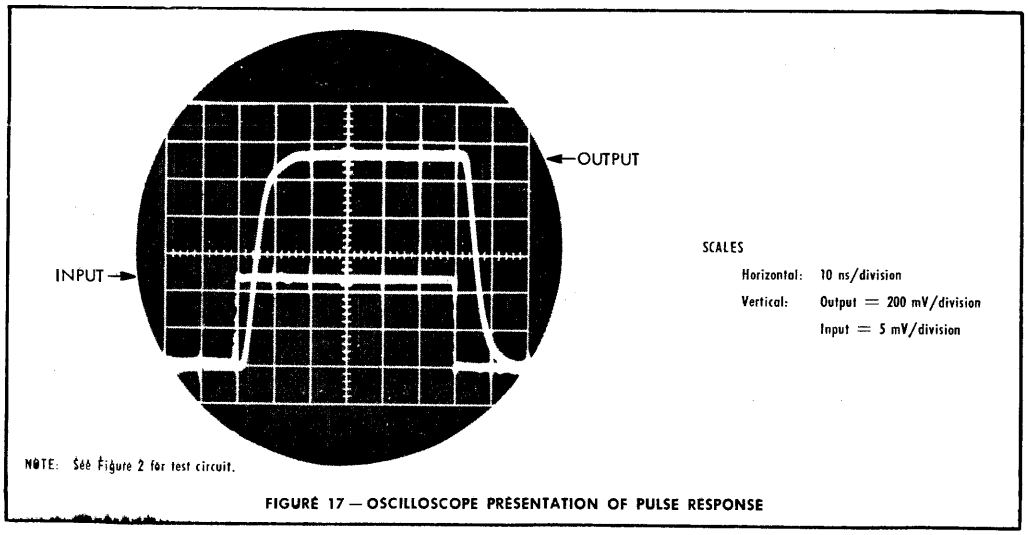

FIGURE 17 — OSCILLOSCOPE PRESENTATION OF PULSE RESPONSE

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