M51392P/M51399P

WIDEBAND VIDEO AMPLIFIER

DESCRIPTION

The M51392P and M51399P are semiconductor integrated circuits developed for a high-resolution display, which are video amplifiers having a broad band of 100MHz (50MHz for M51392P).

These ICs have outstanding functions available, including a video amplifier, clamp, gain and luminance (brightness) controls, and the band is as wide as 100MHz (at input $1V_{P-P}$ and output $3V_{P-P}$). The maximum gain is 16dB, and the output of $6V_{P-P}$ is transmitted at $1V_{P-P}$ input.

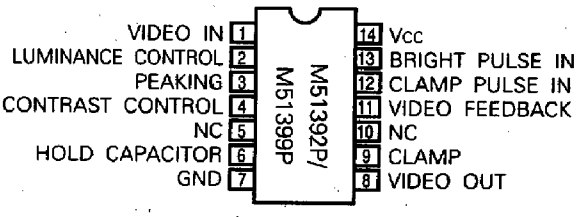
For a black & white display, a single IC is used per set, and for a color display, a single IC is used at each channel of R.G.B; therefore, three ICs are used per set.

FEATURES

- Band ..... 100MHz [50MHz] (at $3V_{P-P}$ output)
- Maximum gain ..... 16dB (standard)
- Low power dissipation
  ..... Vcc =12V, Icc = 43mA (standard)
- Rise & fall time
  ..... 2.5nsec [3nsec] standard (at $3V_{P-P}$ output)

[ ]For M51392P

PIN CONFIGURATION (TOP VIEW)



Outline 14P4

NC:No connection

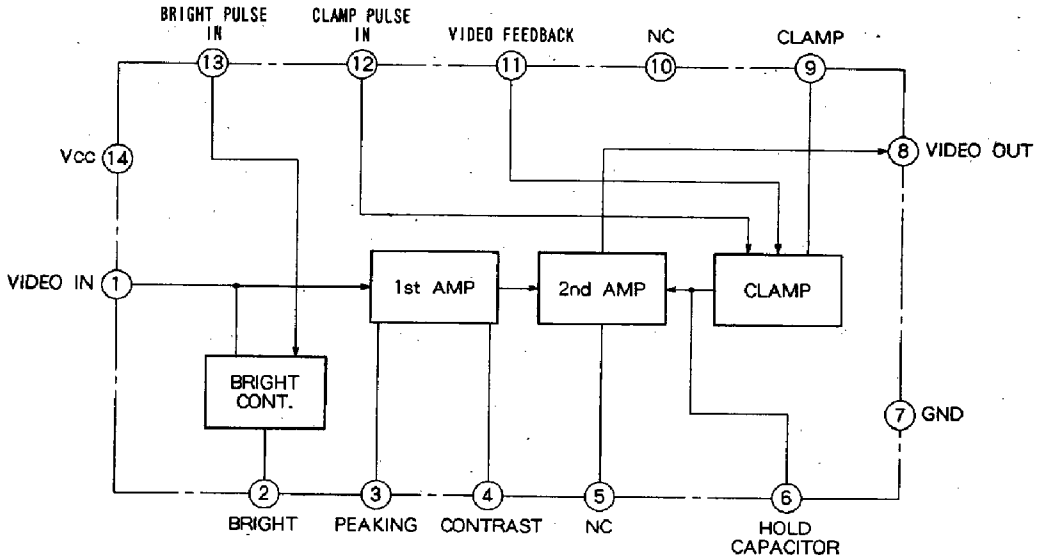
APPLICATION

Analog input high-resolution display, broad-band amplifier and high-definition TV

RECOMMENDED OPERATING CONDITION

Supply voltage range ..... 10.0 ~ 13.5 V
Rated supply voltage ..... 12.0 V

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	14.4	V
P_d	Internal power dissipation	1.2	W
T_{opr}	Operating temperature	−20~75	℃
T_{stg}	Storage temperature	−40~125	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted)

Symbol	Parameter	Test Point	Test Conditions: Input VIDEO	Input PULSE	External Supply Voltage V_2	V_4	V_6	V_9	Switch Setting S_1	S_2	See Note	Limits (See NOTE) Min.	Typ.	Max.	Unit
I_{CC1}	Circuit current I	A	−	SG1	0	9	−	7	2	1	(Note)1	33	42	50	mA
I_{CC2}	Circuit current II	A	−	−	0	9	4	7	2	2		30	38	46	mA
V_{omax}	Output dynamic range	TP2	SG2	−	0	9	Variable	7	1	2	(Note)2	6.5	7.5		V_{P-P}
V_{inmax}	Maximum allowable input	TP2	SG2	−	0	9	Variable	7	1	2	(Note)3	1.05	1.26		V_{P-P}
G_V	Maximum gain	TP2	SG3	−	0	9	V_T	7	1	2	(Note)4	14	16	18	dB
V_{CR-1}	Contrast control characteristics	TP2	SG3	−	0	6	V_T	7	1	2	(Note)5	−8.5	−6.3	−4	dB
V_{CR-2}						0							−56	−46	dB
F_{C-1}	Frequency characteristics	TP2	SG4	−	0	6	V_T	7	1	2	(Note)6	−1	1	4	dB
F_{C-2}												−2	4(2.5)	7(6)	dB
F_{C-3}												−2	5(4)	9(7)	dB
V_{B-1}	Bright control characteristics	TP2	−	SG1	12	9	−	7.7	1	1	(Note)7	5.8	6.6	7.4	V
V_{B-2}					6							4.9	5.6	6.3	V
V_{B-3}					0							4.0	4.6	5.2	V
V_{CL-1}	Clamping control characteristics	TP2	−	SG1	0	9	−	7.7	1	1	(Note)8	4.0	4.6	5.2	V
V_{CL-2}								6.3				5.4	6.0	6.6	V
V_{6-1}	Hold voltage	TP1	−	SG1	0	9	−	7.7	1	1	(Note)8	3.7	4.4	5.1	V
V_{6-2}								6.3				4.1	4.8	5.5	V
T_r	Pulse characteristics	TP2	SG5	−	0	6	V_T	7	1	2	(Note)10		2.5(3)	4(6)	nsec
T_f													2.5(3)	4(6)	nsec

Note : ( ) : For M51392P

ELECTRICAL CHARACTERISTICS TEST METHOD

Note1: In all measurements of PULSE IN, fix the variable resistor at pin ⑪ where the TP2 output becomes maximum.

Note2: Output dynamic range "Vomax"

a. Input SG2 to pin ①.

b. Set V4 voltage to 9V, and observe the output waveform on TP2 at this time, then adjust V6 for voltage at which uniform distortion starts. (Approx. 4.7V)

c. Increase the input field and read the peak-to-peak value at which the TP2 output waveform starts to be distorted.

Note3: Maximum allowable input "Vinmax"

a. The input level at which the TP2 output waveform starts to be distorted in the condition given in NOTE 1 above should be the maximum allowable input.

Note4: Maximum gain "Gv"

a. Input SG3 to pin ①.

b. Adjust V_4 = 9V and V_6 for voltage at which the TP2 output amplitude becomes the maximum point: it should be VT.

c. Read the output on TP2 at this time, and take it as V1, then calculate the ratio between this output and input.

$$G_V = 20 \log \frac{V_I\ (V_{P-P})}{0.5\ (V_{P-P})}$$

d. The maximum gain G_V is defined as follows:

Note5: Contrast control characteristics "V_{CR-1}, V_{CR-2}"

a. Read the outputs on TP2 when V_4 voltage is V_6, 0V in the condition given in NOTE 4 above and take them as V_2 and V_3, then read the ratio between V_2, V_3 and V_1 in NOTE 4.

The contrast control characteristics V_{CR-1}, V_{CR-2} are defined as follows:

b. $$V_{CR-1} = 20 \log \frac{V_2\ (V_{P-P})}{V_1\ (V_{P-P})}$$

$$V_{CR-2} = 20 \log \frac{V_3\ (V_{P-P})}{V_1\ (V_{P-P})}$$

Note6: Frequency characteristics "Fc-1, Fc-2, Fc-3"

a. Input SG4 to pin ①.

b. Set V_4 and V_6 to 6V and V_T respectively, and measure 3 MHz point of SG4 with a spectrum analyzer: it should be taken as f_1.

c. Next, measure the 50, 100 (75) and 150 (100)MHz points, and take the measurements as f_2, f_3 and f_4 respectively.

d. The frequency characteristics Fc-1, Fc-2, Fc-3 are defined as follows:

$Fc_{-1} = f_2 - f_1$ (dB)

$Fc_{-2} = f_3 - f_1$ (dB)

$Fc_{-3} = f_4 - f_1$ (dB)

Note7: Luminance control characteristics "V_{b-1}, V_{b-2}, V_{b-3}"

a. Input SG1 to pins ⑫, ⑬.

b. Set V_4 voltage to 9V, and V_9 voltage to 7.7V.

c. Read TP2 black level voltage when V_2 voltage is 12, 6 and 0V: each voltage shall be V_{b-1}, V_{b-2} and V_{b-3}.

Note8: Clamp control characteristics "V_{CL-1}, V_{CL-2}"

a. Input SG1 to pins ⑫, ⑬.

b. Set V_2 and V_4 to 0 and 9V respectively.

c. Read TP2 black level voltage when V_9 voltage is 7.7V, 6.3V: each voltage shall be V_{CL-1} and V_{CL-2}.

Note9: Hold voltage "V_{6-1}, V_{6-2}"

a. Read TP1 voltage when V_9 voltage is 7.7V, 6.3V in the condition given in NOTE 8 above: each voltage shall be V_{6-1} and V_{6-2}.

Note10: Pulse characteristics "Tr, Tf"

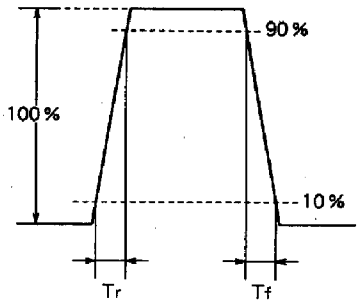
a. Input SG5 to pin ①.

b. Set V_4 and V_6 to 6V and V_T respectively, and measure the rise T_{r1} and fall T_{f1} between 10 and 90% of the input pulse, using an active probe.

c. Next, measure the rise T_{r2} and fall T_{f2} between 10 and 90% of the output pulse on TP2 with an active probe, and define pulse characteristics Tr, Tf as follows:

Tr (nsec) $= \sqrt{(T_{r2})^2 - (T_{r1})^2}$

Tf (nsec) $= \sqrt{(T_{f2})^2 - (T_{f1})^2}$



INPUT SIGNAL

SG No.	Signal (50 Ω termination)
SG1	Pulse of 5 Vp-p synchronous with the standard video stepped wave pedestal
SG2	f_0 = 100kHz, $V_i = 0.9V_{P-P}$ (110dB μ)
SG3	f_0 = 100kHz, $V_i = 0.5V_{P-P}$ (105dB μ)
SG4	f_0 = 0~150MHz, $V_i = 1V_{P-P}$
SG5	f_0 = 25MHz pulse waveform, $V_i = 1V_{P-P}$

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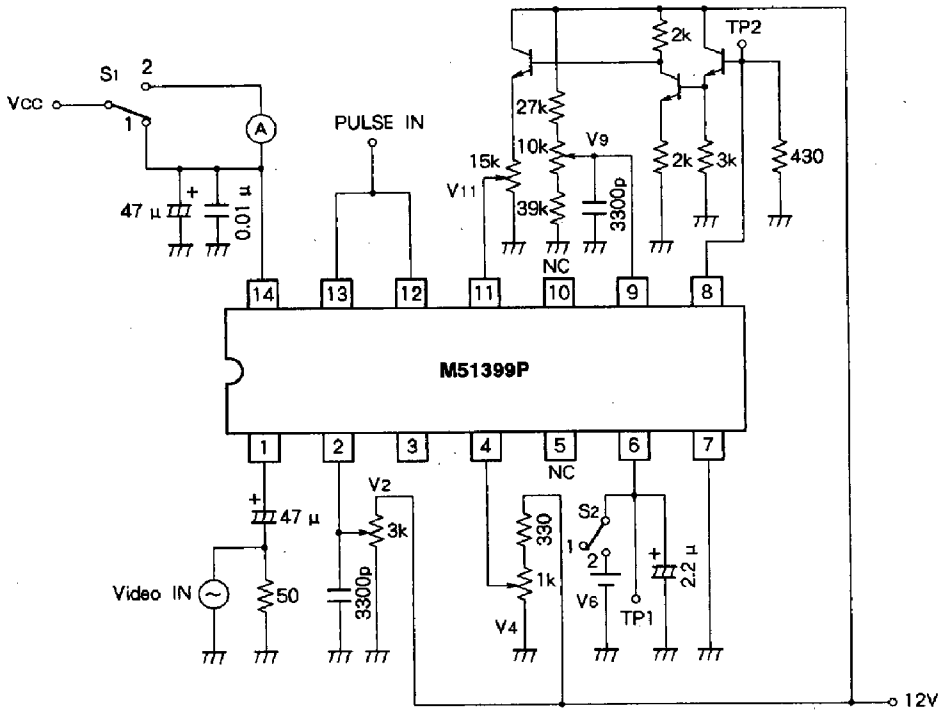
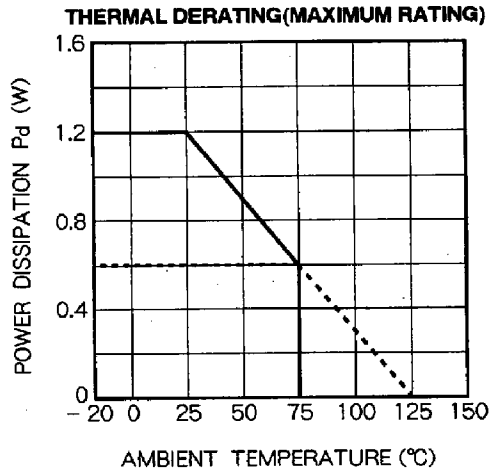
TEST CIRCUIT



Units Resistance: Ω
Capacitance: F

TYPICAL CHARACTERISTICS



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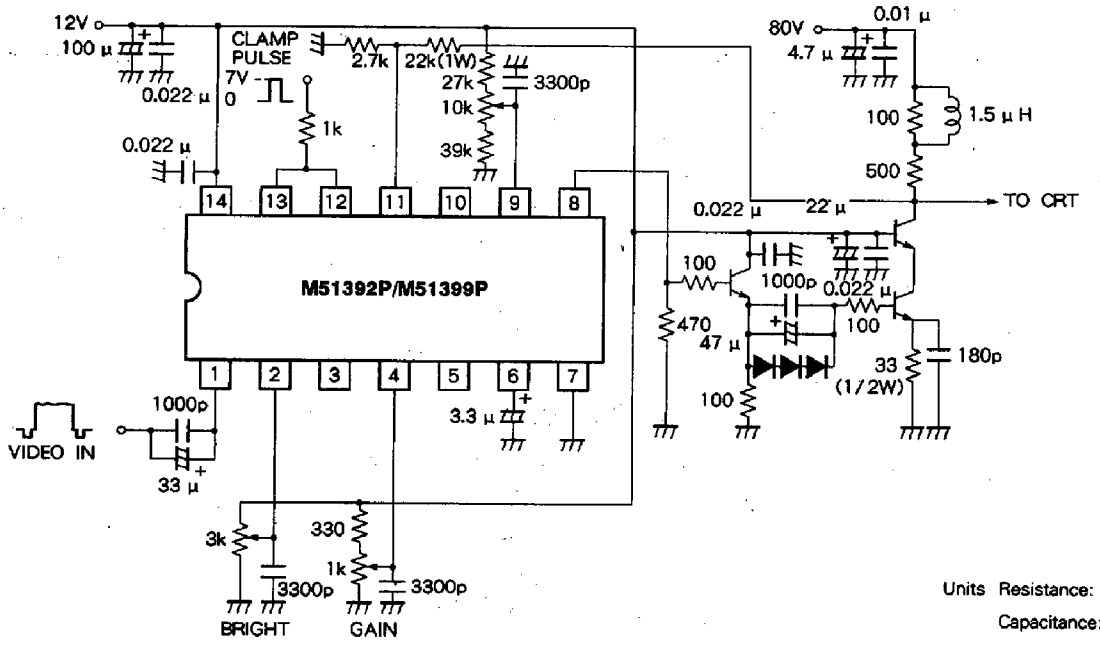
APPLICATION EXAMPLE



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