M52307P/SP

3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

DESCRIPTION

The M52307P/SP are semiconductor integrated circuits that have three channels of built-in amplifiers in the broad-band video amplifier series (M51392P, M51399P, M51387P) having a band of 130MHz.

Every channel is provided with a broad-band amplifier, main/sub contrast control, and main/sub brightness control functions.

Accordingly, these ICs have an optional configuration for use in high-resolution color display monitors.

FEATURES

● The M52307P/SP use a new bi-polar wafer processing to realize low power dissipation so that three channels can be built in the amplifier. (Vcc = 12V, Icc = 63mA)

● Input : 0.7Vp-p(Typ.)
  Output : 4.5Vp-p(Max.)
  Frequency band: 130MHz (at 3Vp-p)

● The main control adjusts 3 channels of contrast and brightness at the same time, and the sub control adjusts each channel independently.

● Since the feedback circuit is built in the IC, a stable DC level is obtained at the output pins of the IC.

APPLICATION

CRT display

PIN CONFIGURATION (TOP VIEW)

	M52307P/SP	
Vcc(B) 1		28 B OUT
B IN 2		27 B HOLD
B SUB CONTRAST 3		26 B SUB BRIGHT
GND(B) 4		25 GND(B)
Vcc(G) 5		24 G OUT
G IN 6		23 G HOLD
G SUB CONTRAST 7		22 G SUB BRIGHT
GND(G) 8		21 GND(G)
Vcc(R) 9		20 R OUT
R IN (Input R) 10		19 R HOLD
R SUB CONTRAST 11		18 R SUB BRIGHT
GND(R) 12		17 GND(R)
CONTRAST 13		16 Vcc
CLAMP PULSE 14		15 BRIGHT
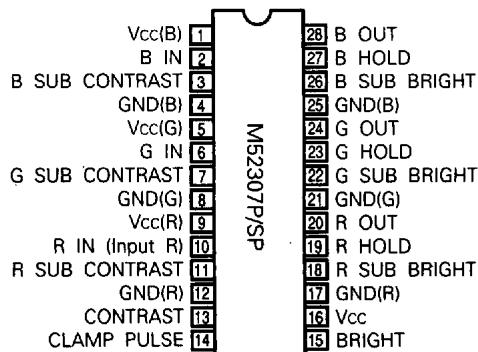
Outline 28P4(P)
28P4B(SP)

RECOMMENDED OPERATING CONDITION

Supply Voltage range ....11.5~12.5V
Rated Supply Voltage 12.0V

BLOCK DIAGRAM
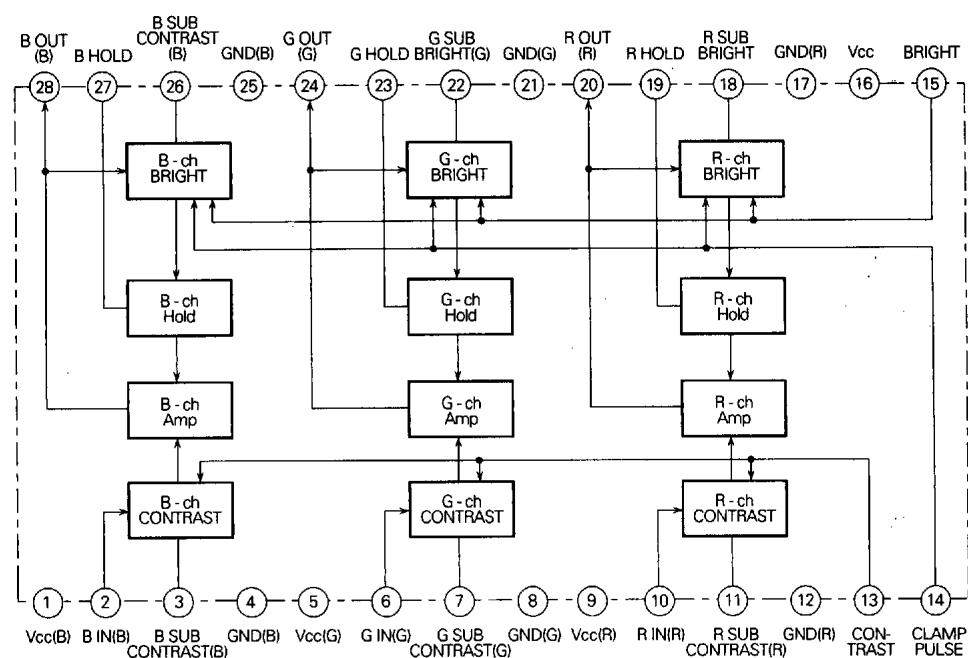
3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	13.0	V
P_d	Power dissipation	2000	mW
T_{opr}	Operating temperature	−20~85	°C
T_{stg}	Strage temperature	−40~150	°C
V_{opr}	Recommended operating supply voltage	12.0	V
V_{opr}'	Recommended operating supply voltage range	11.5~12.5	V
Surge	Electrostatic discharge	±200	V

ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Test point	Input SW10 R-ch	SW6 G-ch	SW2 B-ch	V3	V13	V15	V26	SW14	Min.	Typ.	Max.	Unit
I_{CC}	Circuit current	A	a −	a −	a −	12.0	12.0	5.0	−	b SG6	45	72	110	mA
V_{omax-}	Output dynamic range	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	12.0	Variable	−	a −	5.8	6.8	9.0	Vp-p
V_{imax}	Maximum input voltage	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	6.0	Variable	−	a −	1.9	2.4	2.9	Vp-p
G_V	Maximum gain	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	12.0	V_T	−	a −	13.0	17.0	20.0	dB
ΔG_V	Relative maximum gain	−	−	−	−	−	−	−	−	−	0.8	1.0	1.2	−
V_{CR1}	Contrast control characteristics (standard)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	6.0	V_T	−	a −	4.1	7.4	10	dB
ΔV_{CR1}	Relative contrast control characteristics (standard)	−	−	−	−	−	−	−	−	−	0.8	1.0	1.2	−
V_{CR2}	Contrast control characteristics (minimum)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	3.5	V_T	−	a −	5	30.0	70.0	mVp-p
ΔV_{CR2}	Relative contrast control characteristics (minimum)	−	−	−	−	−	−	−	−	−	0.8	1.0	1.3	−
V_{SCR1}	Sub contrast control characteristics (standard)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	6.0	12.0	V_T	−	a −	10.0	14.0	18.0	dB
ΔV_{SCR1}	Relative sub contrast control characteristics (standard)	−	−	−	−	−	−	−	−	−	0.8	1.0	1.2	−
V_{SCR2}	Sub contrast control characteristics (minimum)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	3.0	12.0	V_T	−	a −	100.0	300.0	860.0	mVp-p
ΔV_{SCR2}	Relative contrast control characteristics (minimum)	−	−	−	−	−	−	−	−	−	0.8	1.0	1.2	−
V_{CR3}	Contrast/sub contrast control characteristics (Standard for both contrast and sub contrast)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	6.0	6.0	V_T	−	a −	900	1300	1700	mVp-p
ΔV_{CR3}	Relative contrast/sub contrast control characteristics (Standard for both contrast and sub contrast)	−	−	−	−	−	−	−	−	−	0.8	1.0	1.2	−

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input			Test conditions					Limits			Unit
			SW10 R-ch	SW6 G-ch	SW2 B-ch	V3	V13	V15	V26	SW14	Min.	Typ.	Max.	
V$_{B1}$	Brightness control characteristics (maximum)	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	5.5	–	b SG6	3.7	4.3	4.9	V
ΔV$_{B1}$	Relative brightness control characteristics (maximum)	–	–	–	–	–	–	–	–	–	–100.0	0.0	100.0	mV
V$_{B2}$	Brightness control characteristics (standard)	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	5.0	–	b SG6	3.1	3.7	4.3	V
ΔV$_{B2}$	Relative brightness control characteristics (standard)	–	–	–	–	–	–	–	–	–	–100.0	0.0	100.0	mV
V$_{B3}$	Brightness control characteristics (minimum)	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	4.5	–	b SG6	2.6	3.2	3.9	V$_{DC}$
ΔV$_{B3}$	Relative brightness control characteristics (minimum)	–	–	–	–	–	–	–	–	–	–100.0	0.0	100.0	mV
V$_{SB1}$	Sub brightness control characteristics (maximum)	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	5.0	4.0	b SG6	2.4	3.1	3.8	V$_{DC}$
ΔV$_{SB1}$	Sub brightness control characteristics (minimum)	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	5.0	3.5	b SG6	2.3	3.0	3.7	V$_{DC}$
F$_{C1}$	Frequency characteristics I (f=50MHz Max.)	T.P20 T.P24 T.P28	b SG3	b SG3	b SG3	12.0	7.5	V$_T$	–	a –	–2	–1	3	dB
ΔF$_{C1}$	Relative frequency characteristics I (f=50MHz Max.)	–	–	–	–	–	–	–	–	–	–1.0	0.0	1.0	dB
F$_{C1'}$	Frequency characteristics I (f=130MHz Max.)	T.P20 T.P24 T.P28	b SG4	b SG4	b SG4	12.0	7.5	V$_T$	–	a –	–3	–2	3	dB
ΔF$_{C1'}$	Relative frequency characteristics I (f=130MHz Max.)	–	–	–	–	–	–	–	–	–	–1.0	0.0	1.0	dB
F$_{C2}$	Frequency characteristics II (f=50MHz standard)	T.P20 T.P24 T.P28	b SG3	b SG3	b SG3	12.0	6.5	V$_T$	–	a –	–1	0	3	dB
F$_{C2'}$	Frequency characteristics II (f=130MHz standard)	T.P20 T.P24 T.P28	b SG4	b SG4	b SG4	12.0	6.5	V$_T$	–	a –	–2.5	0	3	dB
F$_{C5}$	Frequency characteristics III (f=50MHz minimum)	T.P20 T.P24 T.P28	b SG3	b SG3	b SG3	12.0	5.0	V$_T$	–	a –	–0.5	0	2	dB
F$_{C5'}$	Frequency characteristics III (f=130MHz minimum)	T.P20 T.P24 T.P28	b SG4	b SG4	b SG4	12.0	5.0	V$_T$	–	a –	–0.5	0	2	dB
C.T.1	Crosstalk I (f=50MHz)	T.P20 T.P24 T.P28	b SG3	a –	a –	12.0	12.0	V$_T$	–	a –	–	–32	–20	dB
C.T.1'	Crosstalk I (f=130MHz)	T.P20 T.P24 T.P28	b SG4	a –	a –	12.0	12.0	V$_T$	–	a –	–	–22	–15	dB
C.T.2	Crosstalk II (f=50MHz)	T.P20 T.P24 T.P28	a –	b SG3	a –	12.0	12.0	V$_T$	–	a –	–	–32	–20	dB
C.T.2'	Crosstalk II (f=130MHz)	T.P20 T.P24 T.P28	a –	b SG4	a –	12.0	12.0	V$_T$	–	a –	–	–22	–15	dB

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input			Test conditions					Limits			Unit
			SW10 R-ch	SW6 G-ch	SW2 B-ch	V3	V13	V15	V26	SW14	Min.	Typ.	Max.	
C.T.3	Crosstalk III (f=50MHz)	T.P20 T.P24 T.P28	a –	a –	b SG3	12.0	12.0	V_T	–	a –	–	–32	–20	dB
C.T.3'	Crosstalk III (f=130MHz)	T.P20 T.P24 T.P28	a –	a –	b SG4	12.0	12.0	V_T	–	a –	–	–22	–15	dB
Tr	Pulse characteristics I	T.P20 T.P24 T.P28	b SG5	b SG5	b SG5	12.0	7.0	3.0	–	b SG6	–	2	4	nsec
Tf	Pulse characteristics II	T.P20 T.P24 T.P28	b SG5	b SG5	b SG5	12.0	7.0	3.0	–	b SG6	–	3	6	nsec
$V_{14}th$	Clamp pulse threshold voltage	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	3.0	–	b SG6	0.7	1.5	2.5	V_{DC}
W_{14}	Clamp pulse minimum width	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	3.0	–	b SG6	–	0.3	1.0	μsec
V_{27}	Hold voltage	T.P19 T.P23 T.P27	a –	a –	a –	12.0	12.0	3.0	–	b SG6	4.6	5.2	5.8	V_{DC}
P_{DCH}	Pedestal voltage temperature characteristics 1	T.P20 T.P24 T.P28	b SG7	b SG7	b SG7	12.0	12.0	3.5	–	b SG6	–0.3	0	0.3	V_{DC}
P_{DCL}	Pedestal voltage temperature characteristics 2	T.P20 T.P24 T.P28	b SG7	b SG7	b SG7	12.0	12.0	3.5	–	b SG6	–0.3	0	0.3	V_{DC}

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ELECTRICAL CHARACTERISTICS TEST METHOD

Note1. The switch (SW) numbers for the signal input pin and pulse input pin have already been given in Attached Table 1; therefore, only the switch numbers for the external power supply will be given in the following notes.

Note2. SUB BRIGHT voltages V18, V22, V26 are normally set at the same value, which are represented by V26 in Attached Table 1.

SUB CONTRAST voltages V3, V7, V11 are also set at the same value, which are represented by V3 in Attached Table 1.

Icc 1 Fix SW18, SW22, SW26 on side "b."

    2 The other conditions are as shown in Attached Table1 When SW1 is fixed on side "a," Icc is measured, using ampere meter A.

Vomax

    1 Fix SW18, SW22, SW26 on side "b."

    2 V15 is set up in the following order:

      a) SG1 is input to pin ⑩ (pins ⑥, ②). V15 voltage is gradually increased, and when the upper side of the TP20 (TP24 and TP28) output waveform becomes distorted, V15 is read, which is taken as V_{TR1} (V_{TG1}, V_{TB1}).

      In contrast to the above, when voltage V15 is gradually reduced, and the bottom side of TP20 (TP24, TP28) output waveform becomes distorted, V15 is read, which is taken as V_{TR2} (V_{TG2}, V_{TB2}).

      TP20 output waveform (This is also the same with TP24 and TP28.).
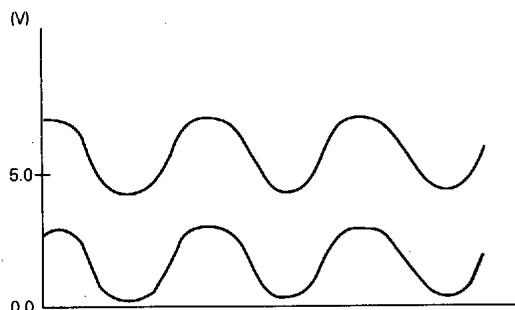
T.P20 Output Waveform
(This is also the same with T.P24 and T.P28.)

      b) Accordingly, V_T (V_{TR}, V_{TG}, V_{TB}) is found by the following:

$$V_{TR}(V_{TG}, V_{TB}) = \frac{V_{TR1}(V_{TG1}, V_{TB1}) + (V_{TR2}(V_{TG1}, V_{TB1})}{2}$$

This equation should be used properly, depending on the output pin.

When TP20 is measured, V_{TR1} should be used, and when TP24 and TP28 are measured, V_{TG1} and V_{TB} should be used respectively.

3 After V_{TR} (V_{TG}, V_{TB}) is set, gradually increase the amplitude of SG1 from 700mV, and measure the amplitude of the output waveform when the upper/lower output waveforms of TP20 (TP24, TP28) start distortion at the same time.

Vimax From the condition in NOTE 2 above, change V13 to 6.0V as given in Attached Table 1, gradually increase the amplitude of the input signal from 700 mVp-p, and read the input signal amplitude when the output signal starts to be distorted.

Gv ∆Gv

    1 Fix SW18, SW22 and SW26 on side "b," and also set the conditions as shown in Attached Table 1.

    2 Input SG1 to pin10 (Pin ⑥, Pin ②) and read the amplitude of TP20 (TP24, TP28) output at this time: it should be taken as V_{OR1} (V_{OG1}, V_{OB1}).

    3 The maximum gain GV is determined by:

$$GV = 20 \ LOG \ \frac{V_{OR1}(V_{OG1}, V_{OB1}) \ [V_{P-P}]}{0.7 \ [V_{P-P}]}$$

    4 The relative maximum gain ∆Gv is calculated as follows:

$$∆Gv = V_{OR1}/V_{OG1}, \ V_{OG1}/V_{OB1}, \ V_{OB1}/V_{OR1}$$

V_{CR1} ∆V_{CR1}

    1 The conditions are the same as in Attached Table 1 except that V13 is set at 6.0V.

    2 Read the amplitude of TP20 (TP24, TP28) output at this time: it should be taken as V_{OR2} (V_{OG2}, V_{OB2}).

    3 The contrast control characteristics V_{CR1} and relative contrast control characteristics ∆VCR1 are calculated as follows:

$$VCR1 = 20 \ LOG \ \frac{V_{OR1}(V_{OG1}, V_{OB1}) \ [V_{P-P}]}{0.7 \ [V_{P-P}]}$$

$$∆V_{CR1} = V_{OR2}/V_{OG2}, \ V_{OG2}/V_{OB2}, \ V_{OB2}/V_{OR2}$$

V_{CR2} ∆V_{CR2}

    1 The conditions are the same as in Attached Table I except that V13 is set at 3.0V.

    2 Read the amplitude of TP20 (TP24, TP28) output at this time: it should be taken as VOR3 (VOG3, VOB3), which shall be VCR2.

    3 The relative contrast control characteristics ∆VCR2 is:

$$∆V_{CR2} = V_{OR3}/V_{OG3}, \ V_{OG3}/V_{OB3}, \ V_{OB3}/V_{OR3}$$

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V_{SCR1} ΔV_{SCR1}

1 The conditions are the same as in Attached Table 1 except that V3, V7 and V11 are set at 6.0V.

2 Read the amplitude of TP20 (TP24, TP28) output at this time: it should be taken as V_{OR4} (V_{OG4}, V_{OB4}).

3 The sub contrast control characteristics V_{SCR1} and relative sub contrast control characteristics ΔV_{SCR1} are found by:

$$V_{SCR1} = 20 \ LOG \ \frac{V_{OR4}(V_{OG4}, \ V_{OB4}) \ [V_{P-P}]}{0.7 \quad [V_{P-P}]}$$

$$\Delta V_{CR4} = V_{OR4}/V_{OG4}, \ V_{OG4}/V_{OB4}, \ V_{OB4}/V_{OR4}$$

V_{SCR2} ΔV_{SCR2}

1 The conditions are the same as in Attached Table 1 except that V3, V7 and V11 are set at 3.0 V.

2 Read the amplitude of TP20 (TP24, TP28) output at this time: it should be taken as V_{OR5} (V_{OG5}, V_{OB5}), which shall be V_{SCR2}.

3 The relative sub contrast control characteristics ΔV_{CR2} is:

$$\Delta V_{CR2} = V_{OR5}/V_{OG5}, \ V_{OG5}/V_{OB5}, \ V_{OB5}/V_{OR5}$$

V_{CR3} ΔV_{CR3}

1 The conditions are the same as in Attached Table 1 except that V13, V3, V7 and V11 are set at 6.0 V.

2 Read the amplitude of TP20 (TP24, TP28) output at this time: it should be taken as V_{OR6} (V_{OG6}, V_{OB6}).

3 The gain and relative gain when the contrast and sub contrast are standard are determined by:

$$V_{SCR1} = 20 \ LOG \ \frac{V_{OR4}(V_{OG4}, \ V_{OB4}) \ [V_{P-P}]}{0.7 \quad [V_{P-P}]}$$

$$\Delta V_{SCR1} = V_{OR4}/V_{OG4}, \ V_{OG4}/V_{OB4}, \ V_{OB4}/V_{OR4}$$

1 Fix SW18, SW22 and SW26 on side "b," and set the conditions as given in Attached Table 1.

2 Measure the output of TP20 (TP24, TP28) at this time with a voltmeter: it should be taken as V_{OR7} (V_{OG7}, V_{OB7}). This value is VB1.

3 Also calculate the difference between each channel from V_{OR7}, V_{OG7} and V_{OB7}.
The relative brightness control characteristics VB1 is found by:

$$\Delta V_{B1} = V_{OR7} - V_{OG7} \qquad [mV]$$
$$= V_{OG7} - V_{OB7}$$
$$= V_{OB7} - V_{OR7}$$

V_{B2} ΔV_{B2}

1 Fix SW18, SW22 and SW26 on side "b," and set the conditions as given in Attached Table1.

2 Measure the output of TP20 (TP24, TP28) at this time, using a voltmeter: it should be taken as V_{OR7}' (V_{OG7}', V_{OB7}'). This value is V_{B2}.

3 Also calculate the difference between each channel from V_{OR7}', V_{OG7}' and V_{OB7}'.
The relative brightness control characteristics $\Delta VB2$ is:

$$\Delta V_{B2} = V_{OR7}' - V_{OG7}' \qquad [mV]$$
$$= V_{OG7}' - V_{OB7}'$$
$$= V_{OB7}' - V_{OR7}'$$

V_{B3} ΔV_{B3}

1 Fix SW18, SW22 and SW26 on side "b" and set the conditions as given in Attached Table 1.

2 Measure the output of TP20 (TP24, TP28) at this time with a voltmeter: it should be taken as V_{OR7}'' (V_{OG7}'', V_{OB7}''). This value is V_{B3}.

3 Also calculate the difference between each channel from V_{OR7}'', V_{OG7}'' and V_{OB7}''.
The relative brightness control characteristics $\Delta VB3$ is found by:

$$\Delta V_{B3} = V_{OR7}'' - V_{OG7}'' \qquad [mV]$$
$$= V_{OG7}'' - V_{OB7}''$$
$$= V_{OB7}'' - V_{OR7}''$$

V_{SB1} ΔV_{SB1}

The conditions are the same as in NOTE10 above except that SW18, SW22 and SW26 are fixed on side "a" and SUB BRIGHT (V18, V22, V26) is set at 4.0V or 3.5V.
However, NOTE10-(3) above is excluded.

$F_{C1}\Delta F_{C1}$ $F_{C1}'\Delta F_{C1}'$

1 Fix SW18, SW22 and SW26 on side "b" and set the conditions as given in Attached Table 1.

2 Use SG3 and SG4. According to the procedure shown in NOTE 4 above, however, measure the amplitude of output waveform on TP20 (TP24, TP28).

3 When these measured amplitudes are output amplitudes VOR1, (VOG1, VOB1), VOR8 (VOG8, VOB8) and VOR9 (VOG9, VOB9) at SG1, SG3 and SG4 inputs respectively, the frequency characteristics FC1, FC1' are calculated as follows:

$$F_{C1} = 20 \ LOG \ \frac{V_{OR8}(V_{OG8}, \ V_{OB8}) \ [V_{P-P}]}{V_{OR1}(V_{OG1}, \ V_{OB1}) \ [V_{P-P}]}$$

$$F_{C1'} = 20 \ LOG \ \frac{V_{OR9}(V_{OG9}, \ V_{OB9}) \ [V_{P-P}]}{V_{OR1}(V_{OG1}, \ V_{OB1}) \ [V_{P-P}]}$$

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4 For relative frequency characteristics ΔFC1, ΔFC1', calculate the difference between FC1 and FC1' for each channel.

Fc₂Fc₂' The conditions are the same as given in NOTE 14 above except that CONTRAST (V13) is reduced to 6.5V.

Fc₅Fc₅' The conditions are the same as given in NOTE 14 above except that CONTRAST (V13) is reduced to 4.5 V.

C.T.1 C.T.1'

1 Fix SW18, SW22, and SW26 on side "b" and set the conditions as given in Attached Table 1.

2 Input SG2 (or SG4) to pin 10 (R-ch) only and measure the amplitude of output waveforms on TP20 (TP24, TP28) at that time: these measurements should be taken as VOR, VOG and VOB.

3 The crosstalk CTI is determined by:

$$C.T.1 = 20\ LOG\ \frac{V_{OG}\ or\ V_{OB}\quad [V_{P-P}]}{V_{OR}\quad [V_{P-P}]}\ [dB]$$
(C.T.1')

C.T.2 C.T.2'

1 Change the input pin from pin ⑩ (R-ch) to pin 6 (G-ch), and read the output in the same manner as in NOTE 17 above.

2 The crosstalk C.T.2 is determined by:

$$C.T.2 = 20\ LOG\ \frac{V_{OR}\ or\ V_{OB}\quad [V_{P-P}]}{V_{OG}\quad [V_{P-P}]}\ [dB]$$
(C.T.2')

C.T.3 C.T.3'

1 Change the input pin from pin ⑩ (R-ch) to pin 2 (B-ch), and read the output in the same manner as in NOTE 17.

$$C.T.3 = 20\ LOG\ \frac{V_{OR}\ or\ V_{OG}\quad [V_{P-P}]}{V_{OB}\quad [V_{P-P}]}\ [dB]$$
(C.T.3')

Tr Tf

1 Fix SW18, SW22 and SW26 on side "b" and set the conditions as given in Attached Table 1.

2 Measure the rise time Tf1 and fall time Tf1 between 10 and 90% of the input pulse with an active probe.

3 Next, measure the rise time Tr2 and fall time Tf2 between 10 and 90% of the output pulse with an active probe.

4 The pulse characteristics Tr, Tf are found by:

$$Tr\ (nsec) = \sqrt{(Tr_2)^2 - (Tr_1)^2}$$

$$Tf\ (nsec) = \sqrt{(Tf_2)^2 - (Tf_1)^2}$$
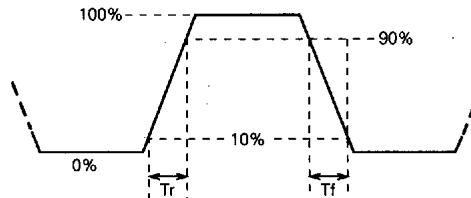
V₁₄th.

1 Fix SW18, SW22 and SW26 on side "b" and set the conditions as given in Attached Table 1.

2 While monitoring the output (approx. 2VDC) at this time, lower the SG6 level gradually and measure the SG6 level when the output reaches 0V.

W₁₄. While monitoring the output under the conditions given in NOTE 21 above, decrease the SG6 pulse width gradually.

Also measure the SG6 pulse width when the output becomes 0V.

W₂₇.

1 Fix SW18, SW22 and SW26 on side "b."

2 Read TP19, TP23 and TP27 with a voltmeter.

P_DCH. P_DCL.

1 Fix SW18, SW22 and SW26 on side "b" and set the conditions as given in Attached Table1.

2 Measure the pedestal voltage at a room temperature: it should be taken as P_DC1.

3 Next, measure the pedestal voltage at -20 and 85°C: these voltages should be taken as P_DC2 and P_DC3.

4 $P_{DCH} = P_{DC1} - P_{DC2}$
$P_{DCL} = P_{DC1} - P_{DC3}$

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INPUT SIGNAL

SG No.	Signals
SG1	Sine wave with amplitude 0.7Vp-p (100kHz, amplitude partially variable*) 0.7VP-P
SG2	Sine wave with amplitude 0.7Vp-p (f=10MHz)
SG3	Sine wave with amplitude 0.7Vp-p (f=50MHz)
SG4	Sine wave with amplitude 0.7Vp-p (f=130MHz)
SG5	Square wave with amplitude 0.7Vp-p (f=1MHz, duty=50%) 0.7VP-P
SG6	Pulse with amplitude 2.0Vp-p and pulse width 3.0μs synchronous with the pedestal part of standard video stepped wave 2.0VP-P 0V 3.0μS 3.0μS
SG7 Standard video stepped wave	
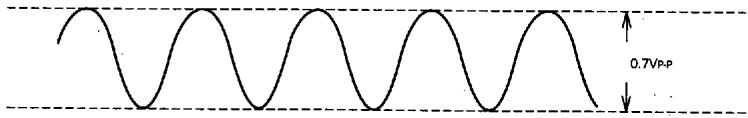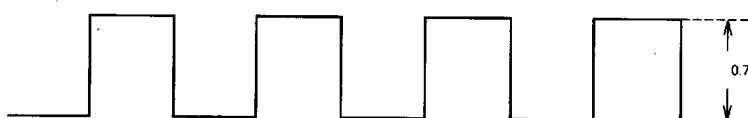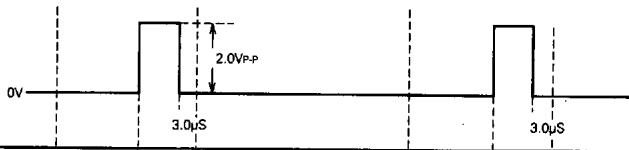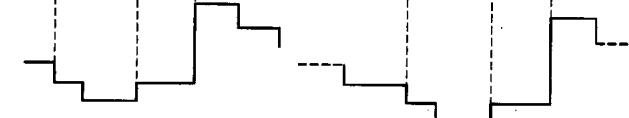
* Refer to the "NOTE" paragraph.

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3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

TEST CIRCUIT
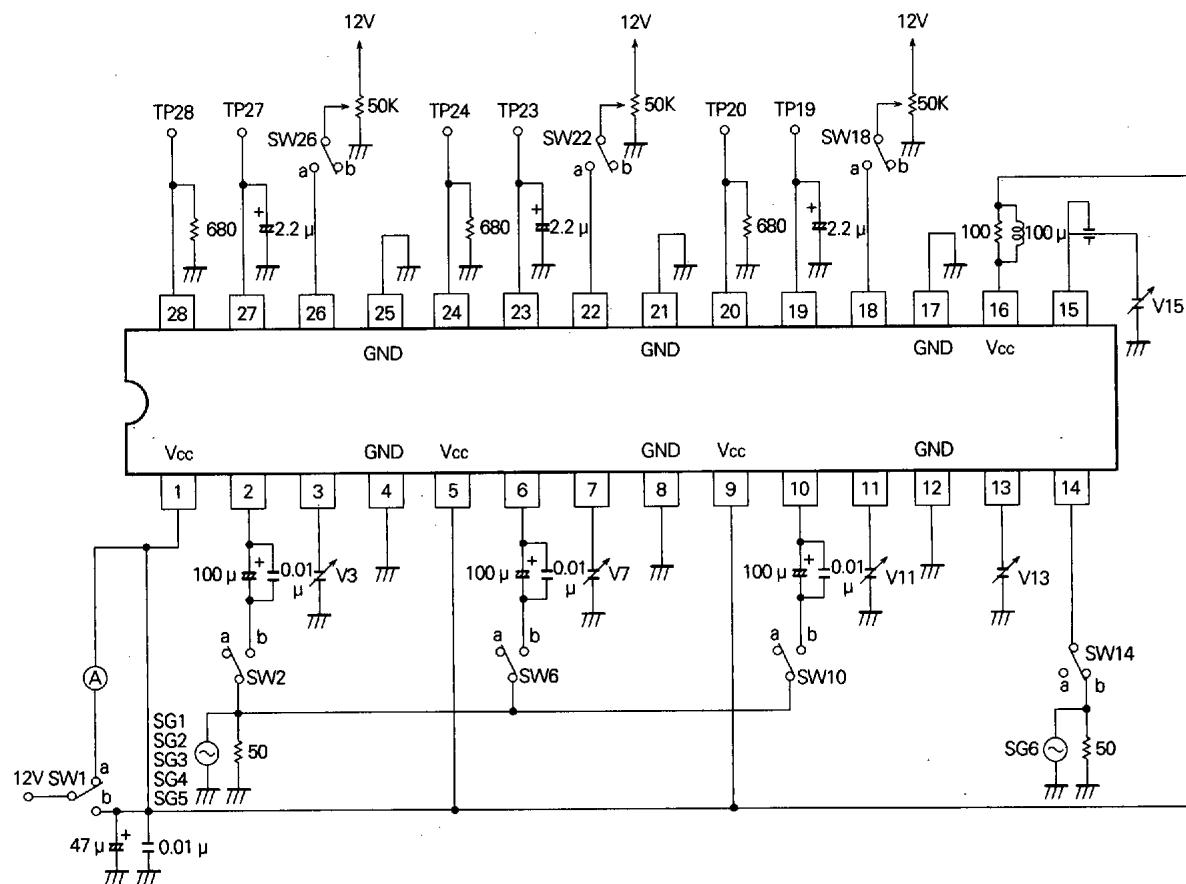
Units Resistance: Ω
Capacitance: F

3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)

POWER DISSIPATION Pd (W)
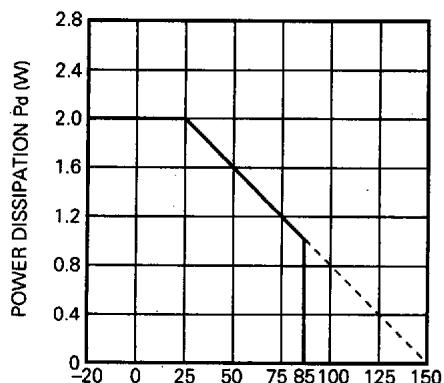
AMBIENT TEMPERATURE Ta (°C)

MAIN CONTRAST CHARACTERISTICS

OUTPUT LEVEL (Vp-p)
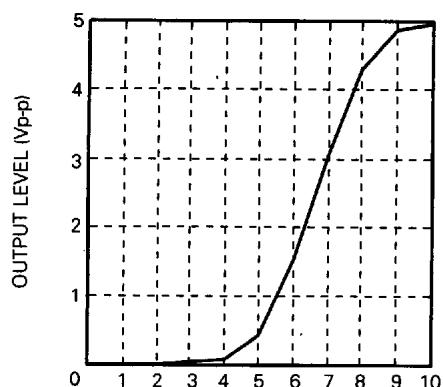
MAIN CONTRAST VOLTAGE (V)

Vcc 12V
Sub contrast   12V
Main Brightness 3.2V
Sub brightness   0V
Input signal level 0.7Vp-p

SUB CONTRAST CHARACTERISTICS

OUTPUT LEVEL (Vp-p)
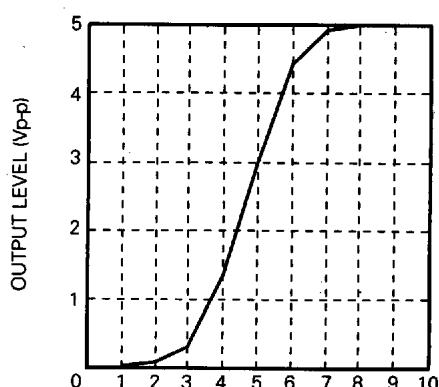
MAIN CONTRAST VOLTAGE (V)

Vcc 12V
Main contrast   12V
Main brightness   3.2V
Sub brightness   0V
Input signal level 0.7Vp-p

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3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

RISE TIME

117 (mV)

1 (nsec)   1.85 (nsec)
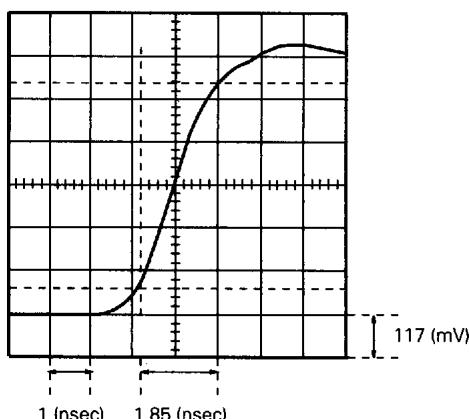
Input signal

Square wave
Input amplitude (level) 0.70 (Vpp)
Trin   1.85 (nsec)

FALL TIME

117 (mV)

1 (nsec)   1.75 (nsec)
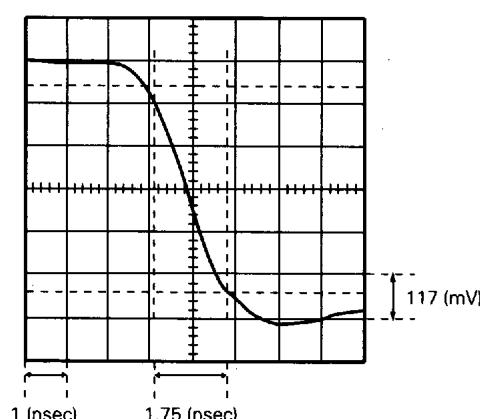
Input signal

Square wave
Input amplitude (level) 0.70 (Vpp)
Tfin   1.75 (nsec)

670 (mV)

1 (nsec)   2.65 (nsec)
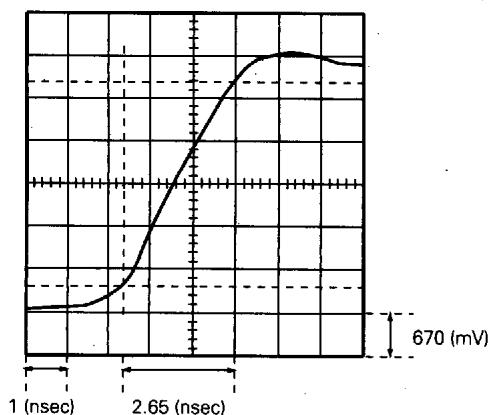
Output signal

Output amplitude (level) 4.0 (Vpp)
Trout   2.65 (nsec)
Vcc = 12V
Main contrast 7.5V
Sub contrast 12V
Main brightness 3.2V
Sub brightness – OPEN

Output pin
680
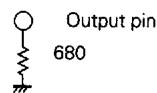
$Tr = \sqrt{(Trout)^2 - (Trin)^2}$

$= \sqrt{2.65^2 - 1.85^2}$

$\fallingdotseq 1.9$ (nsec)

670 (mV)

1 (nsec)   4.0 (nsec)
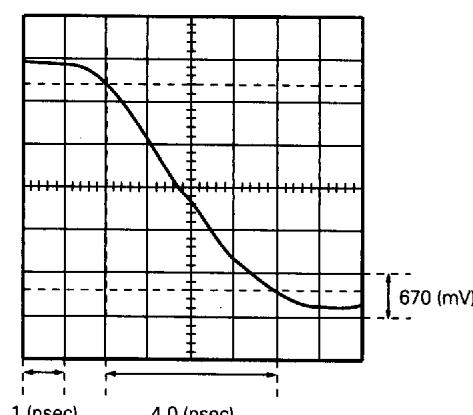
Output signal

Output amplitude (level) 4.0 (Vpp)
Tfout   4.0 (nsec)
Vcc = 12V
Main contrast   7.5V
Sub contrast   12V
Main brightness 3.2V
Sub brightness   OPEN

Output pin
680
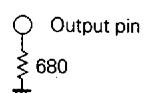
$Tf = \sqrt{(Tfout)^2 - (Tfin)^2}$

$= \sqrt{4^2 - 1.75^2}$

$\fallingdotseq 3.6$ (nsec)

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3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

APPLICATION EXAMPLE 1

Units Resistance: Ω
Capacitance: F

APPLICATION EXAMPLE 2
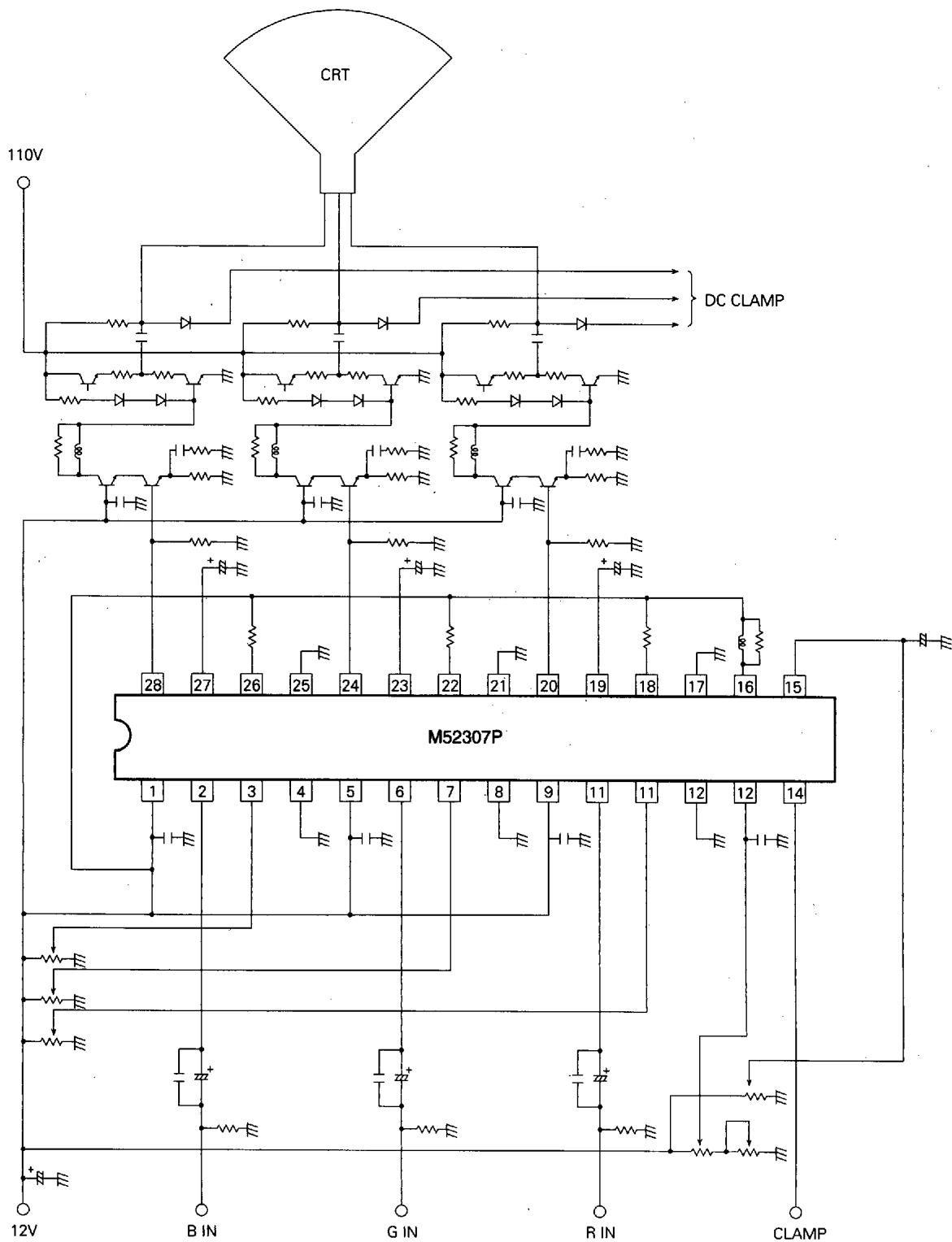
3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

DESCRIPTION OF PIN

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Remarks
① ⑤ ⑨	Vcc (B-ch) Vcc (G-ch) Vcc (R-ch)	12V	—	The voltages applied to three channels should be equal to each other.
② ⑥ ⑩	B-IN G-IN R-IN	2.9V		
③ ⑦ ⑪	B SUB CONTRAST G SUB CONTRAST R SUB CONTRAST	4.0V		
④, ㉕ ⑧, ㉑ ⑫, ⑰	GND (B-ch) GND (G-ch) GND (R-ch)	GND	—	
⑬	CONTRAST	6.9V		

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3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Remarks
⑭	CLAMP PULSE	———		
⑮	BRIGHT	———		
⑯	Vcc	12V	———	
⑱ ㉒ ㉖	R SUB BRIGHT G SUB BRIGHT B SUB BRIGHT	5.2V		
⑲ ㉓ ㉗	R HOLD G HOLD B HOLD	Variable		

3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Remarks
㉒ ㉔ ㉘	R OUT G OUT B OUT	Variable	Vcc 50	A resistor is required at the GND side. Choose any resistance value under 15mA according to the driving capability required.

PRECAUTIONS FOR APPLICATION
M52307P/SP Usage Information

1) Clamp Pulse Input

The circuit in the diagram on the right shows the configuration of the clamp pulse input.

The input is: V_{TH} = 2.2V – Diode x 1 = 1.5 V

2.2V or more voltage is limited by LIM.

Accordingly, the recommended voltage is as shown in the diagram on the right.

For the pulse width:

1.0μsec Min. at 15kHz

0.5μsec Min. at 30kHz

0.3μsec Min. at 64kHz

are recommended.
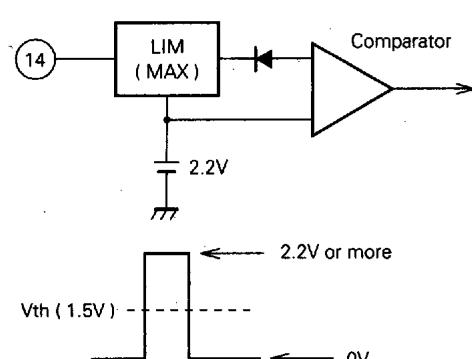
Note that in general, wiring inside the unit for the clamp pulse is long and it is often produced from the high voltage side or connected indirectly to an external pin; therefore, it is liably exposed to a strong surge input.

A protective circuit as shown in the diagram on the right is therefore recommended.

2) Main/Sub Brightness Control

Main brightness (1~6V)   Sub brightness (18,22,26)
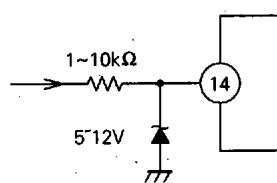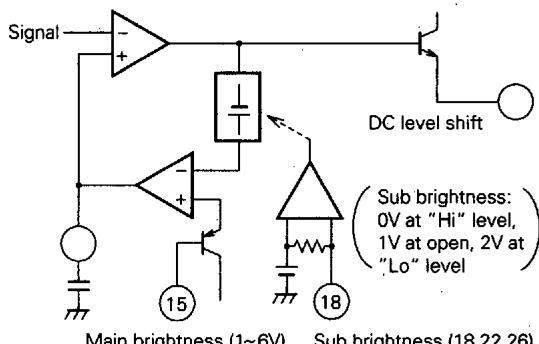
The diagram above shows the principle. The M51387P includes the sub brightness pin directly in the signal feedback loop; however, this IC incorporates the sub brightness pin indirectly, and no signal is produced on the sub brightness pin.

2-1) Main Brightness Pin

Use the main brightness pin within the range from 1V to 6 V.

This control characteristic is as shown in the chart below.

MAIN BRIGHTNESS CONTROL CHARACTERISTICS

OUTPUT DC VOLTAGE (V)

* Sub brightness Vcc
● Sub brightness OPEN
○ Sub brightness GND

MAIN BRIGHTNESS VOLTAGE (V)

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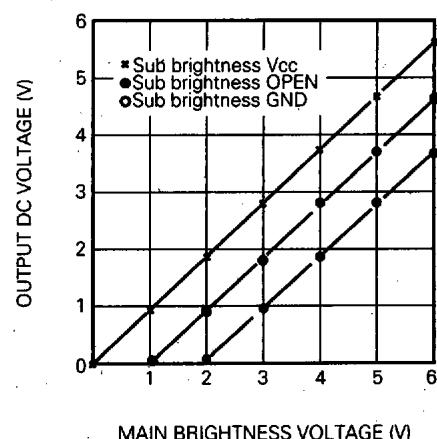
3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

2-2) Sub Brightness Pin

As described above, note that the internal circuit configuration of the sub brightness pin completely differs from that of the M51387P.

a) If SUB BRIGHTNESS is not changed:

Connect all control pins to VCC. However, if external disturbing voltage intrudes into this pin due to wiring on PC board for applications, which may adversely affect IC output, consider the use of an additional by-pass capacitor as well.

b) If SUB BRIGHTNESS is changed:

SUB BRIGHTNESS CONTROL CHARACTERISTICS

SUB BRIGHTNESS VOLTAGE (V)
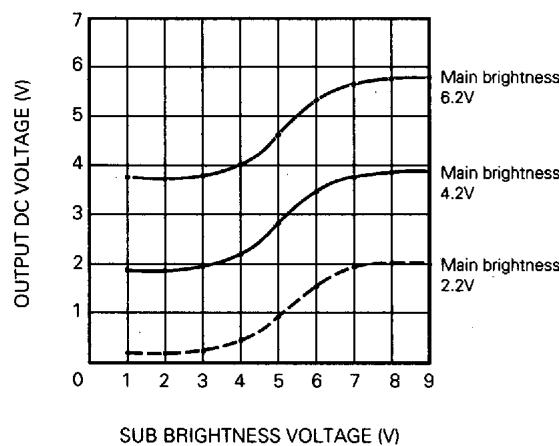
2-3) Holding Capacitor Capacitance

IC requires 1,000P or more (when fH = 15kHz). However, this capacitance varies, depending on the holding duration (time other than clamping): as the holding duration is longer, a larger capacitance is required.

In view of IC applications, the response is quicker as the capacitance is smaller, and as it is larger, the response will become more stable.

Consequently, set this capacitance optionally according to the signal or clamp pulse contents (pulse condition at vertical sync timing in particular).

M52307P Crosstalk

Testing Conditions:

Main contrast pin voltage	12V
Sub contrast pin voltage	12V
Main brightness pin voltage	5V
Sub brightness pin voltage	Open
Input signal 0.7Vp-p sine wave	

		Input Frequency				
		10MHz	50MHz	75MHz	100MHz	Unit
CT1	R→G	−45	−29	−23	−18	dB
	R→B	−60	−38	−30	−20	dB
CT2	G→R	−60	−34	−23	−18	dB
	G→B	−45	−26	−20	−18	dB
CT3	B→R	−65	−35	−23	−19	dB
	B→G	−60	−40	−29	−26	dB

For crosstalk CT1, input a signal only to pin 10(R-ch) and take the output waveform amplitudes at pins ㉟, ㉔, ㉘ at that time as V_{OR}, V_{OG} and V_{OB}.

$$CT1 = 20LOG_{10} \frac{V_{OG} \text{ or } V_{OB}}{V_{OR}} \text{ [dB]}$$

For crosstalk CT2, the conditions are the same as with CT1 above except that the input pin is changed to pin ⑥ (G-ch).

$$CT2 = 20LOG_{10} \frac{V_{OR} \text{ or } V_{OB}}{V_{OG}} \text{ [dB]}$$

For crosstalk CT3, the conditions are the same as CT1 above except that the input pin is changed to pin ② (B-ch).

$$CT3 = 20LOG_{10} \frac{V_{OR} \text{ or } V_{OG}}{V_{OB}} \text{ [dB]}$$

PC Board Fabricating Precautions

Since a broad-band amplifier is built in this IC and oscillation may occur due to the shape of PC board wiring, note the following points:

● Make the output pin and resistor wiring as short as possible.
● Make the output pin load capacitance as small as possible.
● Install a by-pass capacitor on the Vcc − GND, DC line near or around the pin.
● For Vcc, use a stable power supply. (Independent use of four units is more preferable.)
● Insertion of 10 or more Ω resistor between the output pin and circuit in the next stage makes it hard to oscillate.
● Insertion of a coil or resistor, such as to 16 pin Vcc produces an effect, depending on PC board.

● Also pay attention to a leak signal from the power amplifier.
● Make GND as wide as possible; basically, plane grounding is required.
● Also ground the hold capacitance to stable GND, which is as near to the pin as possible.

IC Operating Precautions

● It is recommended that the IC be used between pedestal voltage 2V and 3V. (Optimal distortion)
● Connect each input pin of this IC with a sufficiently low