

M52722SP

3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

DESCRIPTION

M52722SP is a video amplifier provided with OSD mixing function, and a semiconductor IC having three channels of a built-in wideband 180MHz amplifier.

Each channel has the functions of OSD blanking, OSD mixing, retrace line blanking, wideband amplifier, main and sub contrast control, and main brightness. Accordingly, it is structured to best fit the OSD-provided high resolution display. .

FEATURES

- Frequency band : RGB.....180MHz (at 3V_{P-P})
 OSD.....50MHz
 Input: RGB.....0.7V_{P-P} (Typ.)
 OSD.....more than 3V_{P-P} (positive polarity)
 BLK (for OSD).....more than 3V_{P-P} (positive polarity)
 Retrace line BLK.....more than 3V_{P-P} (positive polarity)
 Output: RGB.....4.0V_{P-P} (max.)
 OSD.....4.0V_{P-P} (max.)
- Each control of contrast and OSD adjustment includes a main which allows 3 channels to be variable simultaneously, and a sub which allows each channel to be variable independently. Each control pin can be controlled within a range of 0 to 5V.
- A built-in feedback circuit inside IC provides a stable DC level at IC output pins.

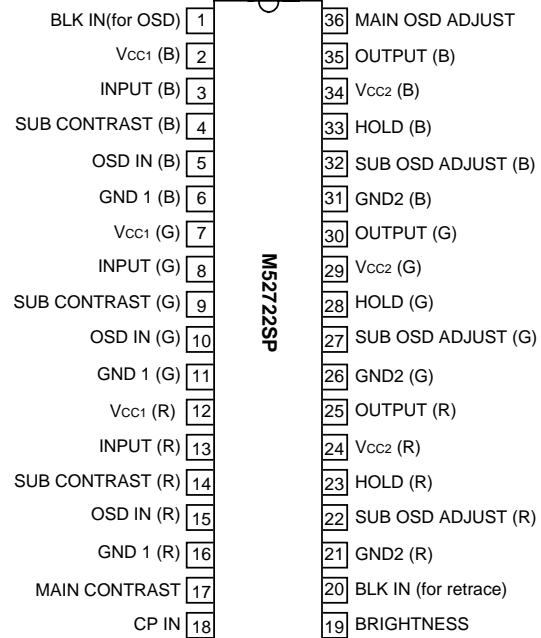
APPLICATION

CRT display

RECOMMENDED OPERATING CONDITION

Supply voltage range.....V_{CC}=11.5 to 12.5V
 Rated supply voltage.....V_{CC}=12.0V

PIN CONFIGURATION (TOP VIEW)

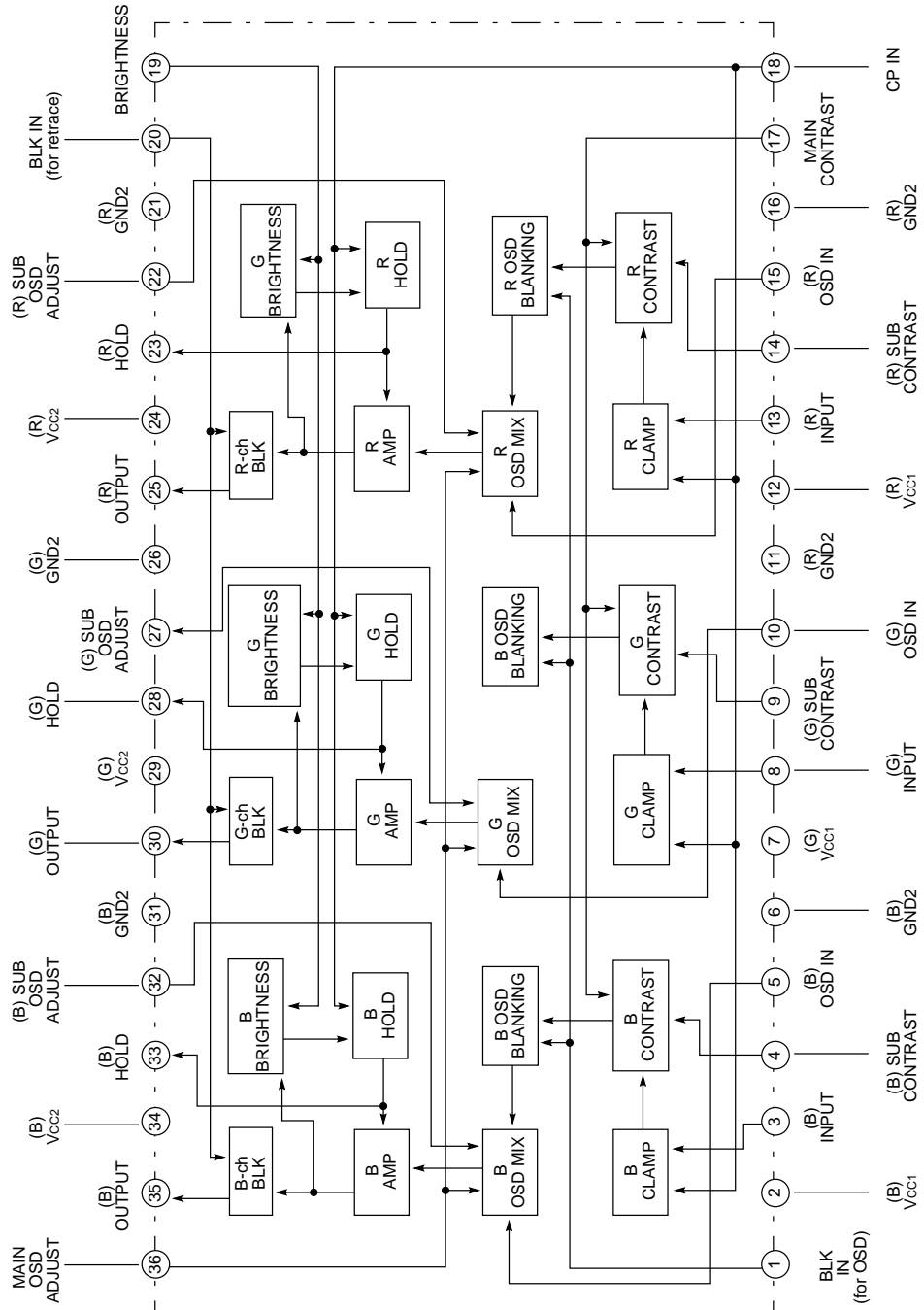


Outline 36P4E

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BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
Vcc	Supply voltage	13.0	V
Pd	Power dissipation	2403	mW
Topr	Operating temperature	-20 to +85	°C
Tstg'	Storage temperature	-40 to +150	°C
Vopr	Recommended operating supply voltage	12.0	V
Vopr'	Recommended operating supply voltage range	11.5 to 12.5	V
Sarge	Surge pressure	±200	V

ELECTRICAL CHARACTERISTICS (Vcc=12V, and Ta=25°C, unless otherwise noted)

Symbol	Parameter	Test point	Input			External power supply(v)					Pulse input			Limits			Unit
			SW3 R-ch	SW8 G-ch	SW13 B-ch	V4	V17	V19	V32	V36	SW18	SW15,10,15	SW20	Min.	Typ.	Max.	
Icc	Circuit current	A	a	a	a	5	5	5	5	2	b SG4	a	a	70	100	140	mA
Vomax	Output dynamic range	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	Variable	-	-	b SG4	a	a	6.0	7.5	9.0	Vp-P
Vimax	Maximum allowable input	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	2.5	2	-	-	b SG4	a	a	1	1.6	-	Vp-P
Gv	Maximum gain	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	15.4	17.4	20	dB
ΔGv	Relative maximum gain	Take the ratio of the above test values											0.8	1	1.2	-	
VCR1	Contrast control characteristics (at typ.)	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	4	2	-	-	b SG4	a	a	14.3	15.8	17.3	dB
ΔVCR1	Relative contrast control characteristics (at typ.)	Take the ratio of the above test values											0.8	1	1.2	-	
VCR2	Contrast control characteristics (at min.)	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	1	2	-	-	b SG4	a	a	0.4	0.7	1.0	Vp-P
ΔVCR2	Relative contrast control characteristics (at min.)	Take the ratio of the above test values											0.8	1	1.2	-	
VSCR1	Sub-contrast control characteristics (at typ.)	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	4	5	2	-	-	b SG4	a	a	14.3	15.8	17.3	dB
ΔVSCR1	Sub-contrast control characteristics (at typ.)	Take the ratio of the above test values											0.8	1	1.2	-	
VSCR2	Sub-contrast control characteristics (at min.)	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	1	5	2	-	-	b SG4	a	a	0.4	0.8	1.2	Vp-P
ΔVSCR2	Relative sub-contrast control characteristics (at min.)	Take the ratio of the above test values											0.8	1	1.2	-	
VSCR3	Contrast and sub-contrast control characteristics (both main and sub at typ.)	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	3	3	2	-	-	b SG4	a	a	1.1	1.8	2.5	Vp-P
ΔVSCR3	Relative contrast and sub-contrast control characteristics (both main and sub at typ.)	Take the ratio of the above test values											0.8	1	1.2	-	
VB1	Brightness control characteristics (at max.)	T.P35 T.P30 T.P25	a	a	a	5	5	4	-	-	b SG4	a	a	3.0	3.6	4.2	V
ΔVB1	Relative brightness control characteristics (at max.)	Take the ratio of the above test values											-0.3	0	0.3	V	
VB2	Brightness control characteristics (at typ.)	T.P35 T.P30 T.P25	a	a	a	5	5	2	-	-	b SG4	a	a	1.1	1.6	2.1	V
ΔVB2	Relative brightness control characteristics (at typ.)	Take the ratio of the above test values											-0.3	0	0.3	V	
VB3	Brightness control characteristics (at min.)	T.P35 T.P30 T.P25	a	a	a	5	5	1	-	-	b SG4	a	a	0.3	0.7	1.1	V
ΔVB3	Relative brightness control characteristics (at min.)	Take the ratio of the above test values											-0.3	0	0.3	V	

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input			External power supply(v)					Pulse input			Limits			Unit
			SW3 R-ch	SW8 G-ch	SW13 B-ch	V4	V17	V19	V32	V36	SW18	SW1 5,10,15	SW20	Min.	Typ.	Max.	
F _{C1}	Frequency characteristics (f=50MHz at max.)	T.P35 T.P30 T.P25	b SG1	b SG1	b SG1	5	Variable	-	-	-	c	a	a	-2	0	2.5	dB
ΔF _{C1}	Relative frequency characteristics (f=50MHz at max.)	Take the ratio of the above test values											-1	0	1	-	
F _{C1'}	Frequency characteristics (f=180MHz at max.)	T.P35 T.P30 T.P25	b SG2	b SG2	b SG2	5	Variable	-	-	-	c	a	a	-3	-2.3	3	dB
ΔF _{C1'}	Relative frequency characteristics (f=180MHz at max.)	Take the ratio of the above test values											-1	0	1	-	
F _{C2}	Frequency characteristics (f=180MHz at typ.)	T.P35 T.P30 T.P25	b SG2	b SG2	b SG2	5	Variable	-	-	-	c	a	a	-3	0	3	dB
ΔF _{C2}	Relative frequency characteristics (f=180MHz at typ.)	Take the ratio of the above test values											-1	0	1	-	
C.T.1	Crosstalk1(f=50MHz)	T.P35 T.P30 T.P25	b SG1	a	a	5	5	-	-	-	c	a	a	-	-30	-20	dB
C.T.1'	Crosstalk1(f=180MHz)	T.P35 T.P30 T.P25	b SG2	a	a	5	5	-	-	-	c	a	a	-	-20	-15	dB
C.T.2	Crosstalk2(f=50MHz)	T.P35 T.P30 T.P25	a	b SG1	a	5	5	-	-	-	c	a	a	-	-30	-20	dB
C.T.2'	Crosstalk2(f=180MHz)	T.P35 T.P30 T.P25	a	b SG2	a	5	5	-	-	-	c	a	a	-	-20	-15	dB
C.T.3	Crosstalk3(f=50MHz)	T.P35 T.P30 T.P25	a	a	b SG1	5	5	-	-	-	c	a	a	-	-30	-20	dB
C.T.3'	Crosstalk3(f=180MHz)	T.P35 T.P30 T.P25	a	a	b SG2	5	5	-	-	-	c	a	a	-	-20	-15	dB
Tr	Pulse characteristics 1	T.P35 T.P30 T.P25	b SG3	b SG3	b SG3	5	Variable	Variable	-	-	b SG4	a	a	-	2	-	nsec
Tf	Pulse characteristics 2	T.P35 T.P30 T.P25	b SG3	b SG5	b SG5	5	Variable	Variable	-	-	b SG4	a	a	-	2	-	nsec
V14th	Clamping pulse threshold voltage	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	1.0	1.5	2.5	Vbc
W14	Clamping pulse operation min. width	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	0.2	0.5	-	μsec
P _{DCH}	Pedestal voltage temperature characteristics 1	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	-0.3	0	0.3	Vbc
P _{DCL}	Pedestal voltage temperature characteristics 2	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	-0.3	0	0.3	Vbc
O _{Tr}	OSD pulse characteristics 1	T.P35 T.P30 T.P25	a	a	a	5	5	Variable	5	Variable	b SG4	SW1 is a, and others b. SG6	a	-	3	6	nsec
O _{Tf}	OSD pulse characteristics 2	T.P35 T.P30 T.P25	a	a	a	5	5	Variable	5	Variable	b SG4	SW1 is a, and others b. SG6	a	-	3	6	nsec
O _{aj1}	Main OSD adjustment control characteristics (at max.)	T.P35 T.P30 T.P25	a	a	a	5	5	2	5	4	b SG4	b SG6	a	3.7	4.3	5.0	Vp-P
ΔO _{aj1}	Relative main OSD adjustment control characteristics (at max.)	Take the ratio of the above test values											0.8	1	1.2	-	
O _{aj2}	Main OSD adjustment control characteristics (at min.)	T.P35 T.P30 T.P25	a	a	a	5	5	2	5	0	b SG4	b SG6	a	-	0	0.5	Vp-P
ΔO _{aj2}	Relative main OSD adjustment control characteristics (at min.)	Take the ratio of the above test values											0.8	1	1.2	-	
OSDth	OSD input threshold voltage	T.P35 T.P30 T.P25	a	a	a	5	5	2	5	5	b SG4	SW1 is a, and others b. SG6	a	1.7	2.5	3.5	Vbc
V1th	BLK input threshold voltage	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	5	5	b SG4	SW1 is a, and others b. SG6	a	1.7	2.5	3.5	Vbc

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input			External power supply(v)					Pulse input			Limits			Unit
			SW3 R-ch	SW8 G-ch	SW13 B-ch	V4	V17	V19	V32	V36	SW18	SW15,10,15	SW20	Min.	Typ.	Max.	
SOaj1	SUB OSD adjustment control characteristics (at typ.)	T.P35 T.P30 T.P25	a	a	a	5	5	2	2	5	b SG4	b SG6	a	1.6	2.2	2.6	V _{P-P}
SOaj2	SUB OSD adjustment control characteristics (at min.)	T.P35 T.P30 T.P25	a	a	a	5	5	2	0	5	b SG4	b SG6	a	-	0	0.5	V _{P-P}
HBLK	Retrace line BLK characteristics	T.P35 T.P30 T.P25	a	a	a	5	5	2	0	0	a	a	b SG7	-	0.2	0.5	V _{DC}
HVth	Retrace line BLK input threshold value	T.P35 T.P30 T.P25	a	a	a	5	5	2	0	0	a	a	b SG7	0.5	1.5	2.5	V _{DC}

ELECTRICAL CHARACTERISTICS TEST METHOD

Note: SW/NO of signal input pin and SW/NO of pulse input pin, which have already been described in the electrical characteristics table, are omitted, and SW/NO of external power supply will only be described as follows:

Sub-OSD adjustment voltages, V32, V27 and V22, which are always set to the identical value, are represented by V32 in the electrical characteristics table. In addition, sub-contrast voltages, V4, V9 and V14, which are also set to the identical value, are represented by V4 in the electrical characteristics table.

Icc circuit current

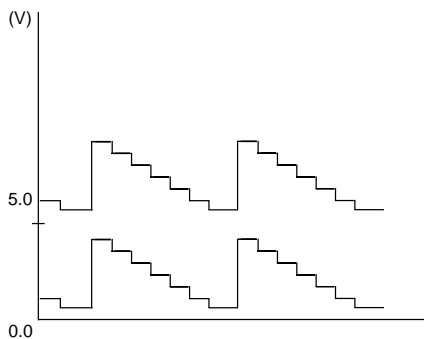
Conditions shall be as specified in the electrical characteristics table, and take measurements with ammeter A when SWA is turned to the b side.

Vomax output dynamic range

Follow the following procedure to set V19.

1. Input SG5 to pin ⑬ (pin ⑧ or pin ③), gradually reduce V19, and read the lower part voltage when the lower part of input waveform of T.P25 (T.P30 or T.P35) is distorted to let the reading be VOLR (VOLG or VOLB).
2. Then, gradually raise V19, and read the upper part voltage when the upper part of output waveform of T.P25 (T.P30 or T.P35) is distorted to let the reading be VOHR (VOHG or VOHB).
3. Vomax is found by:

$$Vomax = VOHR(VOHG, VOHB) - VOLR(VOLG, VOLB)$$



T.P25 output waveform (T.P30 and T.P35 are also the same)

Vimax maximum allowable input

Change V17 to 2.5V, gradually increase input signal amplitude from 700m V_{P-P}, and read input signal amplitude when output signal starts to be distorted.

Gv and ΔGv maximum gain and relative maximum gain

1. Input SG5 to pin ⑬ (pin ⑧ or pin ③), and read the output amplitude of T.P25 (T.P30 or T.P35) at this time to let the reading be VOR1 (VOG1 or VOB1).
2. Maximum gain Gv is found by:

$$GV = 20 \text{LOG} \frac{VOR1(VOG1, VOB1)}{0.7} \frac{[VP-P]}{[VP-P]}$$

3. Relative maximum gain ΔG is found by $\Delta GV = VOR1/VOG1, VOG1/VOB1, VOB1/VOR1$ through respective calculation.

VCR1 contrast control characteristics and

ΔVCR1 relative contrast control characteristics (at typ.)

1. Follow the electrical characteristics table except changing V17 to 4V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) at this time, and let the reading be VOR2 (VOG2 or VOB2).
3. Contrast control characteristics VCR1 and relative contrast control characteristics ΔVCR1 is found by

$$VCR1 = 20 \text{LOG} \frac{VOR2(VOG2, VOB2)}{0.7} \frac{[VP-P]}{[VP-P]}$$

$$\Delta VCR1 = VOR1/VOG1, VOG1/VOB1, VOB1/VOR1$$

through respective calculation.

VCR2 contrast control characteristics and

ΔVCR2 relative contrast control characteristics (at min.)

1. Follow the electrical characteristics table except changing V17 to 1.0V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) at this time to let the reading be VOR3 (VOG3 or VOB3). This value represents VCR2.
3. Relative contrast control characteristics ΔVCR2 is found by:

$$VOR2 = VOR3 / VOG3, VOG3 / VOB3, VOB3 / VOR3$$

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V_{SCR1} sub-contrast control characteristics and

ΔV_{SCR1} relative sub-contrast control characteristics (at typ.)

1. Follow the electrical characteristics table except changing V4, V9 and V14 to 4.0V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) to let the reading be V_{OR4} (V_{OG4} or V_{OB4}).
3. Sub-contrast control characteristics V_{SCR1} and relative sub-contrast control characteristics ΔV_{SCR1} are found by

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

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

through respective calculation.

V_{SCR2} sub-contrast control characteristics and

ΔV_{SCR2} relative sub-contrast control characteristics (at min.)

1. Follow the electrical characteristics table except changing V4, V9 and V14 to 1.0V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) at this time to let the reading be V_{OR5} (V_{OG5} or V_{OB5}). This value represents V_{SCR2}.
3. Relative sub-contrast control characteristics ΔV_{SCR2} is found by:

$$\Delta V_{SCR2} = V_{OR5}/V_{OG5}, V_{OG5}/V_{OB5}, V_{OB5}/V_{OR5}$$

V_{SCR3} contrast and sub-contrast control characteristics and ΔV_{SCR3} relative contrast and sub-contrast control characteristics (at typ.)

1. Follow the electrical characteristics table except changing V17 to 3.0V, and V4, V9 and V14 to 3.0V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) at this time, and let the reading be V_{OR6} (V_{OG6} or V_{OB6}). This value represents V_{SCR3}.
3. Relative sub-contrast control characteristics ΔV_{SCR3} is found by:

$$\Delta V_{SCR3} = V_{OR6}/V_{OG6}, V_{OG6}/V_{OB6}, V_{OB6}/V_{OR6}$$

V_{B1} brightness control characteristics and

ΔV_{B1} relative brightness characteristics (at max.)

1. The conditions shall be as specified in the electrical characteristics table.
2. Measure the output of T.P25 (T.P30 or T.P35) at this time with an ammeter, and let it be V_{OR7} (V_{OG7} or V_{OB7}) to let it be V_{B1}, respectively.
3. For relative control characteristics, further, measure difference between channels from V_{OR7}, V_{OG7} or V_{OB7}.

$$\begin{aligned} \Delta V_{B1} &= V_{OR7} - V_{OG7} & [V] \\ &= V_{OG7} - V_{OB7} \\ &= V_{OB7} - V_{OR7} \end{aligned}$$

V_{B2} brightness control characteristics and

ΔV_{B2} relative brightness control characteristics (at typ.)

1. The conditions shall be as specified in the electrical characteristics table.
2. Use an ammeter to measure the output of T.P25 (T.P30 or T.P35) at this time to let the value be V_{OR7} (V_{OG7} or V_{OB7}). This value represents V_{B2}.

3. For relative brightness control characteristics ΔV_{B2}, further, calculate difference between channels from V_{OR7}, V_{OG7} or V_{OB7}.

$$\begin{aligned} \Delta V_{B2} &= V_{OR7} - V_{OG7} & [V] \\ &= V_{OG7} - V_{OB7} \\ &= V_{OB7} - V_{OR7} \end{aligned}$$

V_{B3} brightness control characteristics and

ΔV_{B3} relative brightness control characteristics (at min.):

1. The conditions shall be as specified in the electrical characteristics table.
2. Use an ammeter to measure the output of T.P25 (T.P30 or T.P35) at this time to let the value be V_{OR7'} (V_{OG7'} or V_{OB7'}). This value represents V_{B3}.
3. For relative control characteristics ΔV_{B3}, further, calculate difference between channels from V_{OR7'}, V_{OG7'} or V_{OB7'}.

$$\begin{aligned} \Delta V_{B3} &= V_{OR7'} - V_{OG7'} & [V] \\ &= V_{OG7'} - V_{OB7'} \\ &= V_{OB7'} - V_{OR7'} \end{aligned}$$

F_{C1} and ΔF_{C1} frequency characteristics 1 and relative frequency characteristics (f=50MHz at max.) and F_{C1'} and ΔF_{C1'} frequency characteristics 1 and relative frequency characteristics (f=180MHz at max.)

1. The conditions shall be as specified in the electrical characteristics table.
2. Whilst SG1 and SG2 are used, input SGA first, apply voltage to the input pin (pin ③, pin ⑧ or pin ⑬) through about 2kΩ of resistor so as to provide 2.5V on the lower side of input signal. In addition, apply voltage to the hold pin (pin ⑬, pin ⑲ or pin ⑳) to ensure that the output wave of T.P25 (T.P30 or T.P35) will not be jammed so as to allow the lower side of the sine wave, an output signal to be 2V. Adjust the main contrast voltage (17V) at this time to allow the output amplitude to be 4.0V_{P-P}. Then, change the input signal to SG1 or SG2 to measure each output amplitude.

3. Now, when letting this test value be

$\left\{ \begin{array}{l} \text{output amplitude } 4.0V_{P-P} \text{ when SGA is input,} \\ \text{output amplitude } V_{OR8} \text{ (V}_{OG8} \text{ or V}_{OB8}) \\ \text{when SG1 is input, and} \\ \text{output amplitude } V_{OR9} \text{ (V}_{OG9} \text{ or V}_{OB9}), \end{array} \right.$
 frequency characteristics F_{C1} or F_{C1'} is calculated from:

$$\begin{aligned} F_{C1} &= 20 \text{LOG} \frac{V_{OR8}(V_{OG8}, V_{OB8})}{4.0} \frac{[V_{P-P}]}{[V_{P-P}]} \\ F_{C1'} &= 20 \text{LOG} \frac{V_{OR9}(V_{OG9}, V_{OB9})}{4.0} \frac{[V_{P-P}]}{[V_{P-P}]} \end{aligned}$$

4. For relative frequency bands ΔF_{C1} and ΔF_{C1'}, calculate difference in F_{C1} and F_{C1'} for each channel.

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FC₂ and ΔFC₂ frequency characteristics 2 and relative frequency characteristics 2 (f=180MHz at typ.)

The same as for FC₁, ΔFC₁ and ΔFC₁' applies except adjusting the main contrast voltage (V17) and allowing the amplitude of output signal when SGA is input to be 1.0V_{P-P}.

C.T.1 crosstalk 1 (f=50MHz) and

C.T.1' crosstalk 1 (f=180MHz)

1. The conditions shall be as specified in the electrical characteristics. (Set the input pin and hold pin as in the case of FC₁, ΔFC₁, FC₁' and ΔFC₁'.)
2. Input SG1 (or SG2) to pin ③ (R-ch) only, measure the output waveform amplitude of T.P25 (T.P30 or T.P35) to be V_{OR}, V_{OG} or V_{OB}.
3. Crosstalk C.T.1 (C.T.1')

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

C.T.2 crosstalk 2 (f=50MHz) and

C.T.2' crosstalk 2 (f=180MHz)

1. Change the input pin to pin ⑧ (G-ch), and read the output as in the case of C.T.1 or C.T.1'.
2. Crosstalk C.T.2 (C.T.2') is found by:

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

C.T.3 crosstalk 3 (f=50MHz) and

C.T.3' crosstalk 3 (f=180MHz)

1. Change the input pin to pin ③ (B-ch), and read the output as in the case of C.T.1 or C.T.1'.
2. Crosstalk C.T.3 (C.T.3') is found by:

$$C.T.3 = 20 \log \frac{V_{OR} \text{ or } V_{OG} [V_{P-P}]}{V_{OB} [V_{P-P}]} \text{ [dB]} \\ (C.T.2')$$

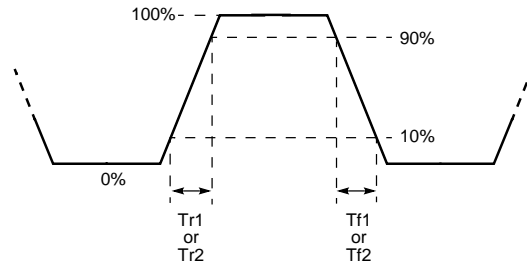
Tr and Tf, Pulse characteristics 1 and pulse characteristics 2

1. The conditions shall be as specified in the electrical characteristics table. Adjust the main contrast voltage (V17) and brightness voltage (V19), and allow the output signal amplitude to be 4.0V_{p-p}, and the black level 2.0V.
2. Use an active probe to measure rise Tr₁ and fall Tf₁ at 10% to 90% of input pulse.
3. Then, use an active probe to measure rise Tr₂ and fall Tf₂ at 10% to 90% of output pulse.

4. Pulse characteristics Tr and Tf:

$$Tr \text{ (nsec)} = \sqrt{(Tr2)^2 - (Tr1)^2}$$

$$Tf \text{ (nsec)} = \sqrt{(Tf2)^2 - (Tf1)^2}$$



V14th clamping pulse threshold voltage

1. The conditions shall be as specified in the electrical characteristic table.
2. Gradually reduce SG4 level at this time, while monitoring the output signal (pedestal voltage: about 1.8V), and measure SG4 top level when the pedestal voltage of output signal is not stabilized and starts to fall.

W14 minimum clamping pulse operation width

Gradually reduce SG4 pulse width, and measure SG4 pulse width (1.5V from GND) when the pedestal voltage of output signal is not stabilized and starts to fall.

PDCH and PDCL, pedestal voltage temperature characteristics 1 and pedestal voltage temperature characteristics 2

1. The conditions shall be as specified in the electrical characteristics table.
2. Measure pedestal voltage at room temperature to let the value be PDC₁.
3. Then, measure pedestal voltage at -20°C and 85°C to let the value be PDC₂ or PDC₃.
4. PDCH = PDC₁ - PDC₂
PDCL = PDC₁ - PDC₃

OTr and OTf, OSD pulse characteristics 1 and OSD pulse characteristics 2

1. The conditions shall be as specified in the electrical characteristics table. Adjust main OSD adjustment voltage (V36) and brightness voltage (V19) to allow output signal amplitude to become 3.0V_{p-p}, and black level 2.0.
2. Use an active probe to measure rise OTr₁ and fall OTf₁ at 10% to 90% of input pulse.
3. Use an active probe to measure rise OTr₂ and fall OTf₂ at 10% to 90% of output pulse.
4. OSD pulse characteristics OTr and OTf are found by:

$$OTr \text{ (nsec)} = \sqrt{(OTr2)^2 - (OTr1)^2}$$

$$OTf \text{ (nsec)} = \sqrt{(OTf2)^2 - (OTf1)^2}$$

**3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX
AND RETRACE LINE BLK FOR HIGH-RESOLUTION**

**Oaj1 main OSD adjustment control characteristics (at max.)
and**

ΔOaj1 relative main OSD adjustment control characteristics (at max.)

1. The conditions shall be as specified in the electrical characteristics table.
2. Let output signal pedestal voltage of T.P25 (T.P30 or T.P35) be V_{LRA} (V_{LGA} or V_{LBA}) and voltage in the OSD area be V_{HRA} (V_{HGA} or V_{HBA}).
3. If letting Oaj1 be V_{ORA} (V_{OGA} or V_{OBA}),

$$Oaj1 = V_{ORA} (V_{OGA}, V_{OBA}) = V_{HRA} - V_{LRA}$$

$$(V_{HGA} - V_{LGA}, V_{HBA} - V_{LBA})$$
4. Relative OSD adjustment control characteristics $\Delta Oaj1$:

$$\Delta Oaj1 = V_{ORA}/V_{OGA}, V_{OGA}/V_{OBA}, V_{OBA}/V_{ORA}$$

**Oaj2 main OSD adjustment control characteristics (at min.)
and**

ΔOaj2 relative main OSD adjustment control characteristics (at min.)

Change V36 to 0V, and obtain Oaj2 or $\Delta Oaj2$ as in the case of Oaj1 or $\Delta Oaj1$.

OSDth OSD input threshold voltage

1. The conditions shall be as specified in the electrical characteristics table.
2. Gradually reduce SG6 level at this time, while monitoring the output, and measure top SG6 level when output is stopped to let the value be OSDth.

V1th BLK input threshold voltage

1. The conditions shall be as specified in the electrical characteristics table.
2. Verify at this time that no signal is output with a timing in which output is synchronized with SG6.
(OSD blanking period)
3. Gradually reduce SG6 level at this time, while monitoring the output, and measure top SG level when OSD blanking period expires to let the value be V1th.

**Soaj1 SUB OSD adjustment control characteristics (at typ.)
and**

Soaj2 SUB OSD adjustment control characteristics (at min.)

1. The conditions shall be as specified in the electrical characteristics table.
2. Read output amplitude of T.P25 (T.P30 or T.P35) at this time, and let the reading be V_{ORC} (V_{OGC} or V_{OBC}) to let it be Soaj1 or Soaj2.

HBLK retrace line BLK characteristics

1. The conditions shall be as specified in the electrical characteristics table.
2. Monitor output at this time, and read trace line blanking level to let the reading be HBLK.

HVth retrace line BLK input threshold voltage

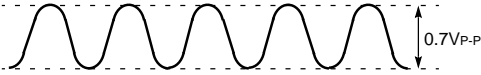
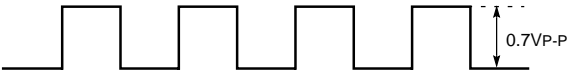
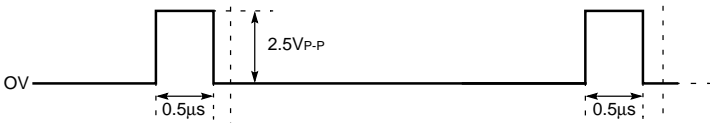
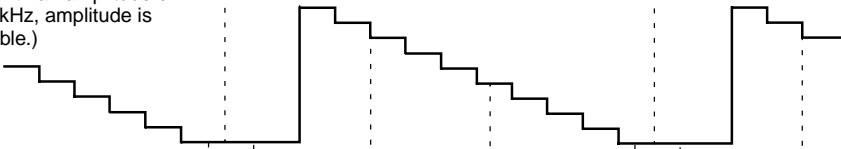
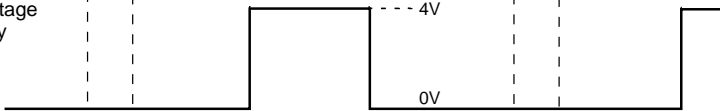

1. The conditions shall be as specified in the electrical characteristics table.
2. Verify that blanking is performed with a timing in which output is synchronized with SG7. Gradually reduce SG7 level, while

monitoring the output, and measure top SG7 level when blanking period expires to let the reading be HVth.

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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

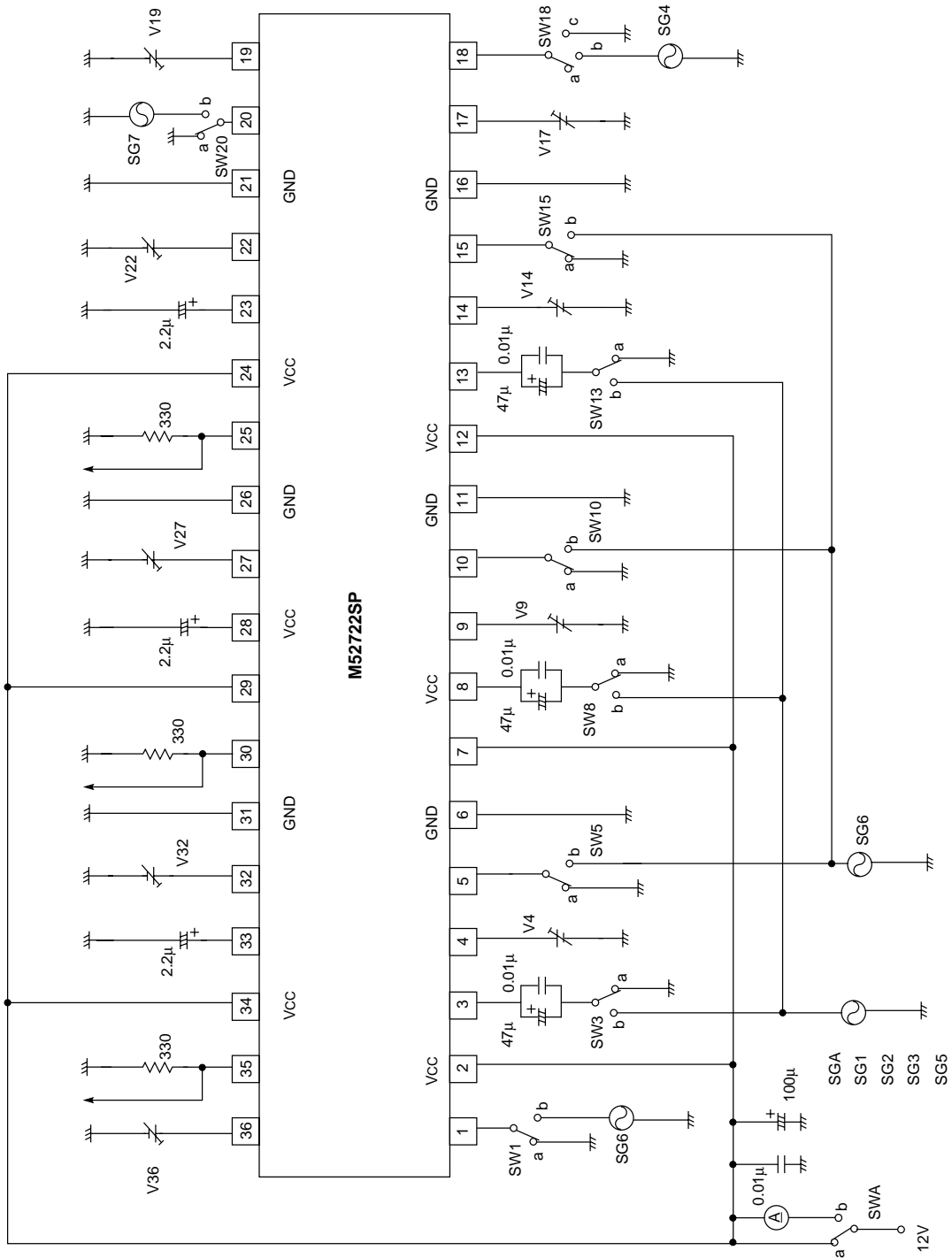
INPUT SIGNAL

SG No.	Signals
SGA	Sine wave with an amplitude of 0.7V _{P-P} 
SG1	Sine wave with an amplitude of 0.7V _{P-P} (f = 50MHz)
SG2	Sine wave with an amplitude of 0.7V _{P-P} (f = 180MHz)
SG3	Video signal with an amplitude of 0.7V _{P-P} (f = 1MHz, duty = 50%) Lo section shall be synchronized with SG4 pulse. 
SG4	Pulse with an amplitude of 2.5V _{P-P} and a pulse width of 0.5μs (Pulse width, amplitude and frequency are variable) synchronized with the pedestal section of standard video stage wave 
Video stage wave	Video signal with an amplitude of 0.7V _{P-P} (f=30kHz, amplitude is partially variable.) 
BLK (for OSD) OSD signal	Pulse with an amplitude of 4.0V _{P-P} and a pulse width of 15μs synchronized with the image section of standard video stage wave. (Amplitude is partially variable.) 
Retrace line BKL signal	Pulse with an amplitude of 4.0V _{P-P} and a pulse width of 15μs synchronized with the image section of standard video stage wave. (Amplitude is partially variable.) 

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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

TEST CIRCUIT

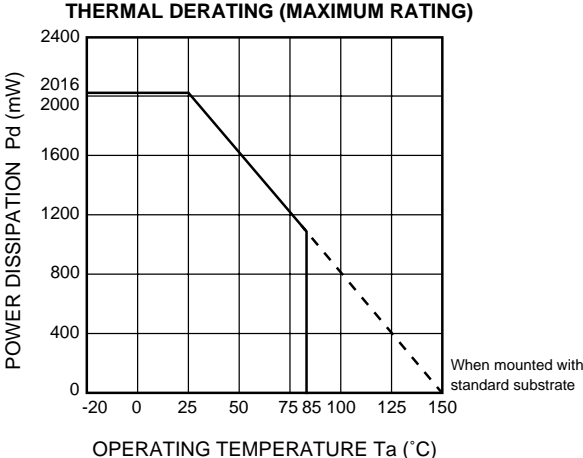


Units Resistance : Ω
Capacitance : F

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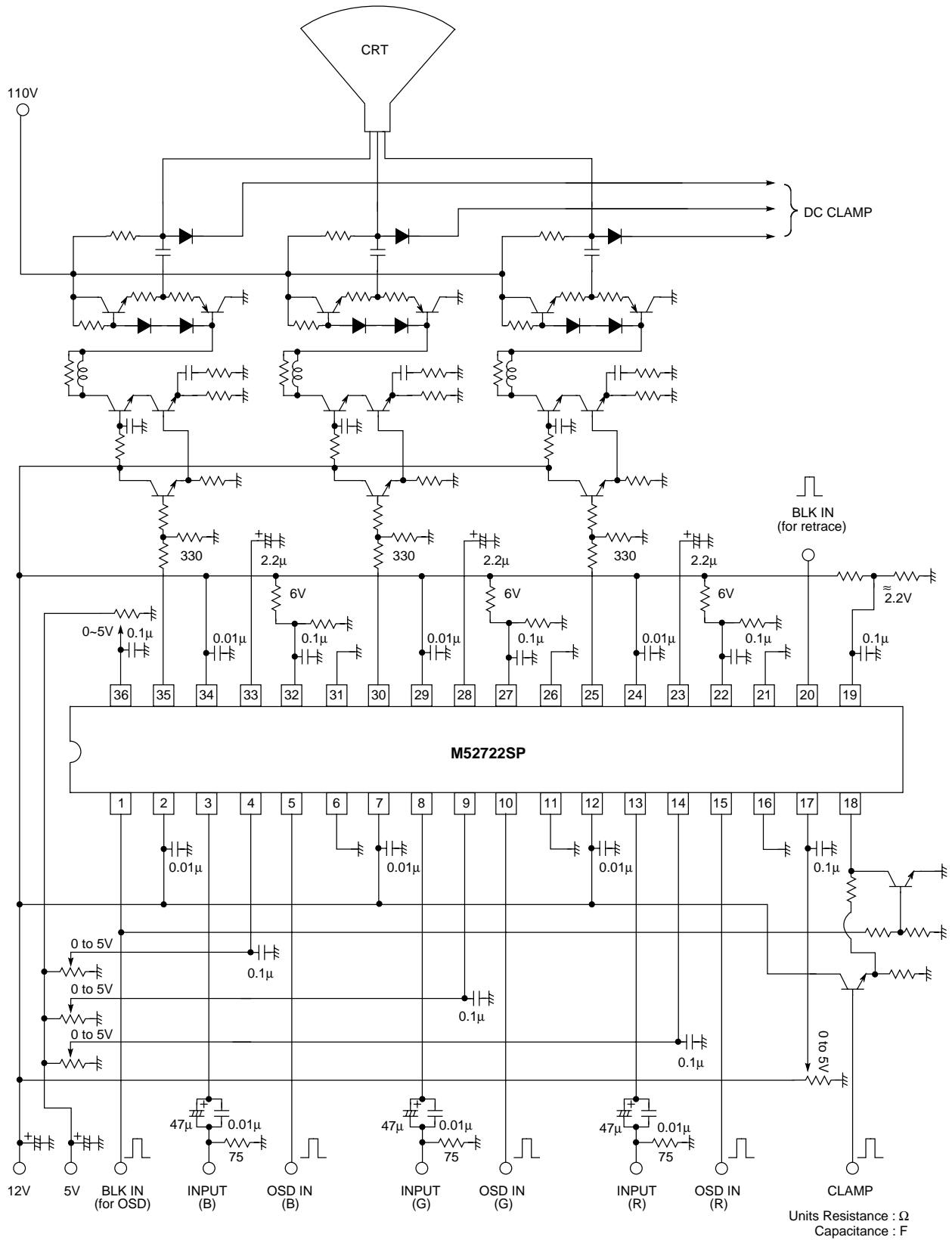
TYPICAL CHARACTERISTICS



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APPLICATION EXAMPLE



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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

DESCRIPTION OF PIN

Pin No.	Name	Peripheral circuit of pins	DC voltage	Description of function
①	BLK IN(for OSD)		-	<ul style="list-style-type: none"> • Input pulse between 3.5V and 5V. <ul style="list-style-type: none"> • Ground to GND when not in use.
② ⑦ ⑫	Vcc (B) Vcc (G) Vcc (R)		12	<ul style="list-style-type: none"> • Apply identical voltage to all 3 channels.
③ ⑧ ⑬	INPUT (B) INPUT (G) INPUT (R)		2.5	<ul style="list-style-type: none"> • Clamped to about 2.5V by clamping pulse at pin 18. Input at a low impedance.
④ ⑨ ⑭	SUB CONTRAST (B) SUB CONTRAST(G) SUB CONTRAST (R)		2.5	<ul style="list-style-type: none"> • Use at less than 5V to ensure stable operation.
⑤ ⑩ ⑮	OSD IN (B) OSD IN (G) OSD IN (R)		-	<ul style="list-style-type: none"> • Input pulse between 3.5V and 5V. <ul style="list-style-type: none"> • Ground to GND when not in use.

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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins	DC voltage	Description of function
⑥ ③① ⑪ ②⑥ ⑱ ②①	GND (B) GND (G) GND (R)		GND	
⑰	MAIN CONTRAST		2.5	<ul style="list-style-type: none"> Use at less than 5V to ensure stable operation.
⑱	CP IN		-	<ul style="list-style-type: none"> Input more than 2.5V of pulse. Input at a low impedance.
⑲	MAIN BRIGHTNESS		-	
⑳	BLK IN (for retrace)		-	<ul style="list-style-type: none"> Input pulse between 2.5V and 5V. Ground to GND when not in use.

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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins	DC voltage	Description of function
②② ②⑦ ③②	SUB OSD ADJUST (R) SUB OSD ADJUST (G) SUB OSD ADJUST (B)		When open 5.5V	<ul style="list-style-type: none"> Open or pull up to Vcc when not in use.
②③ ②⑧ ③③	HOLD (R) HOLD (G) HOLD (B)		Variable.	<ul style="list-style-type: none"> Capacitance is required between GNDs.
②④ ②⑨ ③④	Vcc2 (R) Vcc2 (G) Vcc2 (B)		12 Apply	<ul style="list-style-type: none"> A power supply dedicated to output emitter follower. Apply identical voltage to all 3 channels.
②⑤ ③① ③⑤	OUTPUT (R) OUTPUT (G) OUTPUT (B)		Variable	<ul style="list-style-type: none"> Resistor is required on the GND side. Set arbitrarily to provide less than 15mA by drive capability required.
③⑥	MAIN OSD ADJUST		Apply 5.5V	<ul style="list-style-type: none"> Open or pull up to Vcc when not in use.

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M52722SP - INSTRUCTIONS FOR USE

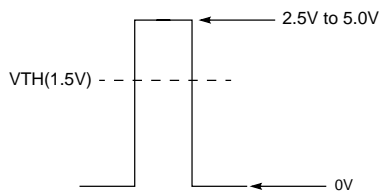
1) Clamping pulse input

Input positive polarity pulse.

Clamping pulse threshold voltage V_{TH} is calculated by the following equation, and voltages more than 2.2 V is subject to LIM:

$$V_{TH} = 2.2 \text{ V} - \text{Diode} \times 1 \\ = 1.5 \text{ V}$$

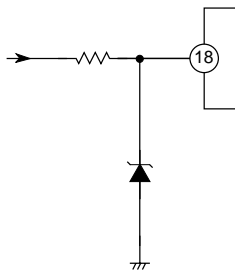
Recommended clamping pulse voltage is as given in the following diagram:



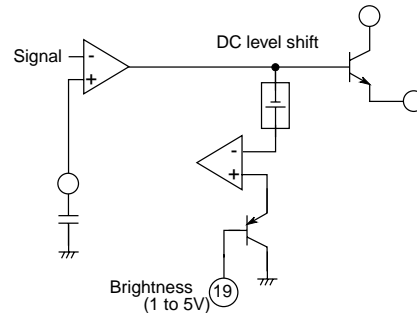
In addition, pulse width is recommended as follows:

- More than 1.0 μ sec at 15kHz,
- More than 0.5 μ sec at 30kHz, and
- More than 0.3 μ sec at 64kHz.

Clamping pulse wiring generally involves long stretched lines in the set, is made from the high pressure side, and often connected indirectly to external pins, causing strong surge input to tend to come into. Under such circumstances, protective circuit as given in the following diagram is recommended:



2) Brightness operation

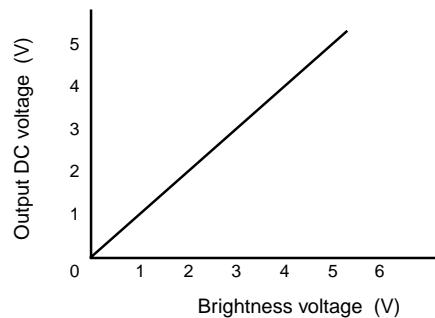


The above diagram represents its principle.

2-1) Brightness pins

Use within the range of 1V to 5V.

Control characteristics are as given in the following drawing:



2-2) Sub-brightness

This IC has no sub-brightness function.

2-3) Capacitance value of holding capacitor

Value necessary as IC is more than 0.01 μ F (when $f_H=15\text{kHz}$). However, this depends upon hold period (time other than for clamping), and the longer the hold time is, the greater the value is necessary.

In terms of application, the smaller the capacitance value, the quicker the response, and the greater the capacitance value, the more stable the behavior.

Accordingly, set freely depending upon signals and clamping pulse contents (especially pulse status in a vertically synchronized timing).

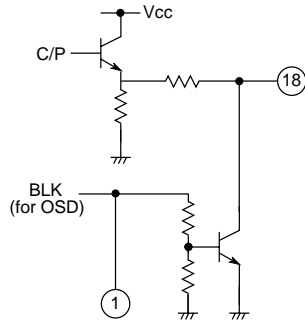
3) BLK (for OSD) and OSD input pins

- Input formula is on an open basis. (See page 2-1109.) Threshold voltage is 2.5V.
- Inputting OSD mix signal without inputting BLK pulse will cause abnormal operation. Input BLK pulse as well whenever inputting OSD Mix signal.
- Ensure that input pin is grounded when OSD Mix function is not used.

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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX AND RETRACE LINE BLK FOR HIGH-RESOLUTION

- OSD display period overlapped with clamping pulse period will cause abnormal operation. As measures against this, external circuit as given in the following diagram is recommended:

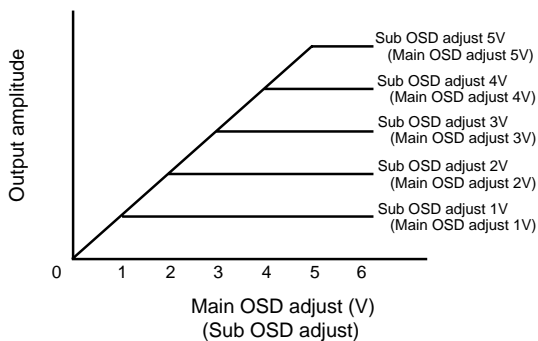


4) Retrace line BLK input pins

- Input formula is open.
(See page 2-1110.)
- Threshold voltage is 1.5V.
- Ensure that input pin is grounded when no retrace line BLK function is used.

5) Main, Sub OSD adjustment pins

- Use within the range of 0V-5V.
- Control characteristics are as given in the following drawing:
- Open if main OSD adjustment or sub OSD adjustment is not used.
- If, in application, wiring on the substrate causes interference wave to get into these pins, affecting even IC input, consider addition of such as bus controller.
- Ensure that main, sub OSD adjustment pins are open or grounded when no OSD Mix function is used.



PRECAUTIONS FOR APPLICATION

- Wire output pins to output pull-down resistors at a shortest distance.
- Voltage in the IC output signal pedestal area is recommended for use at about 2V.