

# 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<sub>P-P</sub>)  
OSD.....50MHz
- Input: RGB.....0.7V<sub>P-P</sub> (Typ.)  
OSD.....more than 3V<sub>P-P</sub>  
(positive polarity)  
BLK (for OSD).....more than 3V<sub>P-P</sub>  
(positive polarity)  
Retrace line BLK.....more than 3V<sub>P-P</sub>  
(positive polarity)
- Output: RGB.....4.0V<sub>P-P</sub> (max.)  
OSD.....4.0V<sub>P-P</sub> (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.

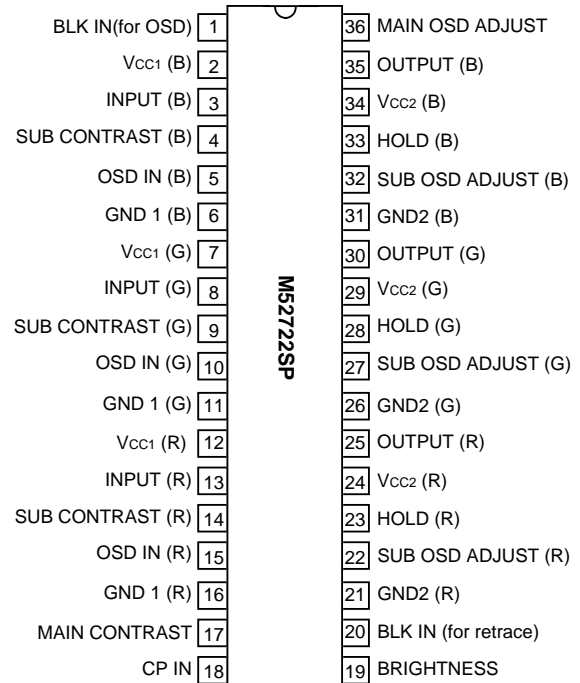
### APPLICATION

CRT display

### RECOMMENDED OPERATING CONDITION

Supply voltage range.....V<sub>cc</sub>=11.5 to 12.5V  
Rated supply voltage.....V<sub>cc</sub>=12.0V

### PIN CONFIGURATION (TOP VIEW)

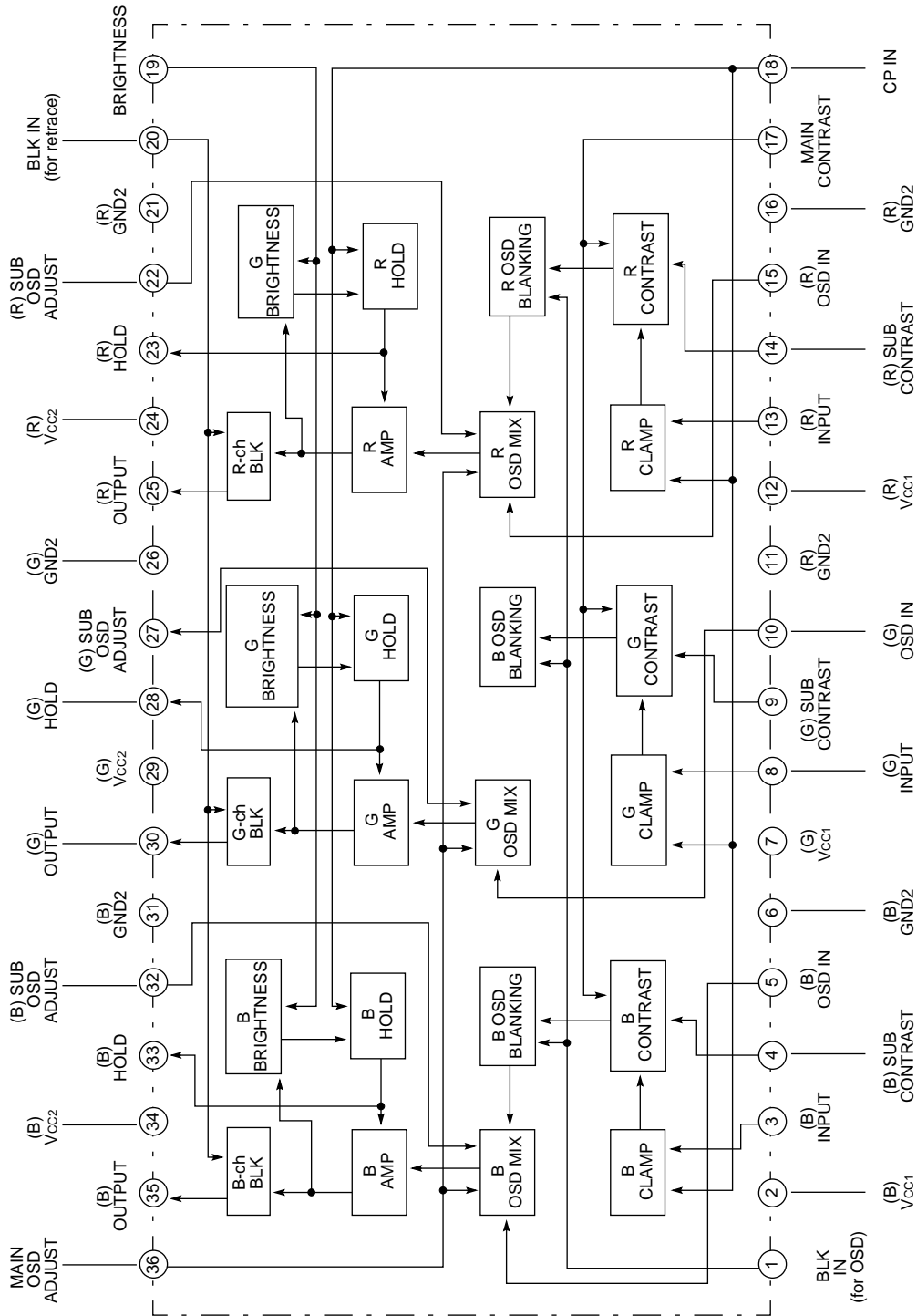


Outline 36P4E

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## BLOCK DIAGRAM



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### ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V <sub>CC</sub>	Supply voltage	13.0	V
P <sub>d</sub>	Power dissipation	2403	mW
T <sub>opr</sub>	Operating temperature	-20 to +85	°C
T <sub>stg</sub>	Storage temperature	-40 to +150	°C
V <sub>opr</sub>	Recommended operating supply voltage	12.0	V
V <sub>opr</sub> '	Recommended operating supply voltage range	11.5 to 12.5	V
S <sub>arge</sub>	Surge pressure	±200	V

### ELECTRICAL CHARACTERISTICS (V<sub>CC</sub>=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.	
I <sub>CC</sub>	Circuit current	A	a	a	a	5	5	5	5	2	b SG4	a	a	70	100	140	mA
V <sub>omax</sub>	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	V <sub>P-P</sub>
V <sub>imax</sub>	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	-	V <sub>P-P</sub>
G <sub>v</sub>	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
ΔG <sub>v</sub>	Relative maximum gain	Take the ratio of the above test values											0.8	1	1.2	-	
V <sub>CR1</sub>	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
ΔV <sub>CR1</sub>	Relative contrast control characteristics (at typ.)	Take the ratio of the above test values											0.8	1	1.2	-	
V <sub>CR2</sub>	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	V <sub>P-P</sub>
ΔV <sub>CR2</sub>	Relative contrast control characteristics (at min.)	Take the ratio of the above test values											0.8	1	1.2	-	
V <sub>SCR1</sub>	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
ΔV <sub>SCR1</sub>	Sub-contrast control characteristics (at typ.)	Take the ratio of the above test values											0.8	1	1.2	-	
V <sub>SCR2</sub>	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	V <sub>P-P</sub>
ΔV <sub>SCR2</sub>	Relative sub-contrast control characteristics (at min.)	Take the ratio of the above test values											0.8	1	1.2	-	
V <sub>SCR3</sub>	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	V <sub>P-P</sub>
ΔV <sub>SCR3</sub>	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	-	
V <sub>B1</sub>	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
ΔV <sub>B1</sub>	Relative brightness control characteristics (at max.)	Take the ratio of the above test values											-0.3	0	0.3	V	
V <sub>B2</sub>	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
ΔV <sub>B2</sub>	Relative brightness control characteristics (at typ.)	Take the ratio of the above test values											-0.3	0	0.3	V	
V <sub>B3</sub>	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
ΔV <sub>B3</sub>	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.	
FC1	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
ΔFC1	Relative frequency characteristics (f=50MHz at max.)	Take the ratio of the above test values											-1	0	1	-	
FC1'	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
ΔFC1'	Relative frequency characteristics (f=180MHz at max.)	Take the ratio of the above test values											-1	0	1	-	
FC2	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
ΔFC2	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	VDC
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
PDCH	Pedestal voltage temperature characteristics1	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	-0.3	0	0.3	VDC
PDCL	Pedestal voltage temperature characteristics2	T.P35 T.P30 T.P25	b SG5	b SG5	b SG5	5	5	2	-	-	b SG4	a	a	-0.3	0	0.3	VDC
OTr	OSD pulse characteristics 1	T.P35 T.P30 T.P25	a	a	a	5	5	Variable	5	Variable	b SG4	a	a	-	3	6	nsec
OTf	OSD pulse characteristics 2	T.P35 T.P30 T.P25	a	a	a	5	5	Variable	5	Variable	b SG4	a	a	-	3	6	nsec
Oaj1	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
ΔOaj1	Relative main OSD adjustment control characteristics (at max.)	Take the ratio of the above test values											0.8	1	1.2	-	
Oaj2	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
ΔOaj2	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	VDC
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	VDC

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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 <sub>P-P</sub>
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 <sub>P-P</sub>
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 <sub>DC</sub>
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 <sub>DC</sub>

### 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

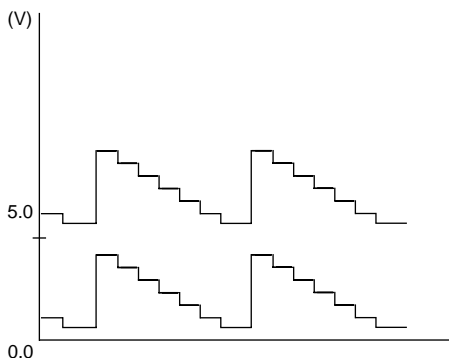
Conditions shall be as specified in the electrical characteristics table, and take measurements with ammeter A when SWA is turned to the b side.

#### 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:

$$V_{omax} = V_{OHR}(V_{OHG}, V_{OHB}) - V_{OLR}(V_{OLG}, V_{OLB})$$



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<sub>P-P</sub>, 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 V<sub>OR1</sub> (V<sub>OG1</sub> or V<sub>OB1</sub>).
2. Maximum gain G<sub>v</sub> is found by:

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

3. Relative maximum gain ΔG is found by

$$\Delta G_v = V_{OR1}/V_{OG1}, V_{OG1}/V_{OB1}, V_{OB1}/V_{OR1}$$

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 V<sub>OR2</sub> (V<sub>OG2</sub> or V<sub>OB2</sub>).
3. Contrast control characteristics VCR1 and relative contrast control characteristics ΔVCR1 is found by

$$V_{CR1} = 20 \text{LOG} \frac{V_{OR2}(V_{OG2}, V_{OB2})}{0.7} \frac{[V_{P-P}]}{[V_{P-P}]}$$

$$\Delta V_{CR1} = V_{OR1}/V_{OG1}, V_{OG1}/V_{OB1}, V_{OB1}/V_{OR1}$$

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 V<sub>OR3</sub> (V<sub>OG3</sub> or V<sub>OB3</sub>). This value represents VCR2.
3. Relative contrast control characteristics ΔVCR2 is found by:

$$V_{OR2} = V_{OR3}/V_{OG3}, V_{OG3}/V_{OB3}, V_{OB3}/V_{OR3}$$

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### V<sub>SCR1</sub> sub-contrast control characteristics and

#### ΔV<sub>SCR1</sub> 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<sub>OR4</sub> (V<sub>OG4</sub> or V<sub>OB4</sub>).
3. Sub-contrast control characteristics V<sub>SCR1</sub> and relative sub-contrast control characteristics ΔV<sub>SCR1</sub> 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<sub>SCR2</sub> sub-contrast control characteristics and

#### ΔV<sub>SCR2</sub> 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<sub>OR5</sub> (V<sub>OG5</sub> or V<sub>OB5</sub>). This value represents V<sub>SCR2</sub>.
3. Relative sub-contrast control characteristics ΔV<sub>SCR2</sub> is found by:

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

### V<sub>SCR3</sub> contrast and sub-contrast control characteristics and

#### ΔV<sub>SCR3</sub> 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<sub>OR6</sub> (V<sub>OG6</sub> or V<sub>OB6</sub>). This value represents V<sub>SCR3</sub>.
3. Relative sub-contrast control characteristics ΔV<sub>SCR3</sub> is found by:

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

### V<sub>B1</sub> brightness control characteristics and

#### ΔV<sub>B1</sub> 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<sub>OR7</sub> (V<sub>OG7</sub> or V<sub>OB7</sub>) to let it be V<sub>B1</sub>, respectively.
3. For relative control characteristics, further, measure difference between channels from V<sub>OR7</sub>, V<sub>OG7</sub> or V<sub>OB7</sub>.

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

### V<sub>B2</sub> brightness control characteristics and

#### ΔV<sub>B2</sub> 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<sub>OR7</sub> (V<sub>OG7</sub> or V<sub>OB7</sub>). This value represents V<sub>B2</sub>.

3. For relative brightness control characteristics ΔV<sub>B2</sub>, further, calculate difference between channels from V<sub>OR7</sub>, V<sub>OG7</sub> or V<sub>OB7</sub>.

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

### V<sub>B3</sub> brightness control characteristics and

#### ΔV<sub>B3</sub> 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<sub>OR7''</sub> (V<sub>OG7''</sub> or V<sub>OB7''</sub>). This value represents V<sub>B3</sub>.
3. For relative control characteristics ΔV<sub>B3</sub>, further, calculate difference between channels from V<sub>OR7''</sub>, V<sub>OG7''</sub> or V<sub>OB7''</sub>.

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

### F<sub>C1</sub> and ΔF<sub>C1</sub> frequency characteristics 1 and relative

#### frequency characteristics (f=50MHz at max.) and

#### F<sub>C1'</sub> and ΔF<sub>C1'</sub> 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 ⑥ 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 ⑳, pin ㉑ or pin ㉓) 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<sub>P-P</sub>. Then, change the input signal to SG1 or SG2 to measure each output amplitude.
3. Now, when letting this test value be

$\left\{ \begin{array}{l} \text{output amplitude } 4.0V_{P-P} \text{ when SGA is input,} \\ \text{output amplitude } V_{OR8} \text{ (V}_{OG8} \text{ or V}_{OB8}) \\ \qquad \qquad \qquad \text{when SG1 is input, and} \\ \text{output amplitude } V_{OR9} \text{ (V}_{OG9} \text{ or V}_{OB9}), \end{array} \right.$ 
 frequency characteristics F<sub>C1</sub> or F<sub>C1'</sub> 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<sub>C1</sub> and ΔF<sub>C1'</sub>, calculate difference in F<sub>C1</sub> and F<sub>C1'</sub> 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<sub>P-P</sub>.

#### C.T.1 crosstalk 1 (f=50MHz) and C.T.1' crosstalk 1 (f=180MHz)

- 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')
- 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<sub>OR</sub>, V<sub>OG</sub> or V<sub>OB</sub>.
- Crosstalk C.T.1 (C.T.1')

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

#### C.T.2 crosstalk 2 (f=50MHz) and C.T.2' crosstalk 2 (f=180MHz)

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

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

#### C.T.3 crosstalk 3 (f=50MHz) and C.T.3' crosstalk 3 (f=180MHz)

- 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'.
- Crosstalk C.T.3 (C.T.3') is found by:

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

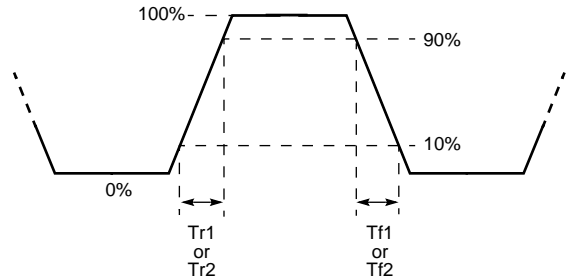
### Tr and Tf, Pulse characteristics 1 and pulse characteristics 2

- 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<sub>p-p</sub>, and the black level 2.0V.
- Use an active probe to measure rise Tr1 and fall Tf1 at 10% to 90% of input pulse.
- Then, use an active probe to measure rise Tr2 and fall Tf2 at 10% to 90% of output pulse.

- 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

- The conditions shall be as specified in the electrical characteristic table.
- 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

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

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

- 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<sub>p-p</sub>, and black level 2.0.
- Use an active probe to measure rise OTr1 and fall OTf1 at 10% to 90% of input pulse.
- Use an active probe to measure rise OTr2 and fall OTf2 at 10% to 90% of output pulse.
- OSD pulse characteristics OTr and OTf are found by:

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

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

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

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

**$\Delta$ Oaj1 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

**$\Delta$ Oaj2 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

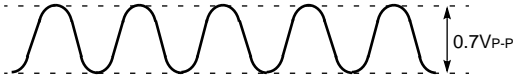
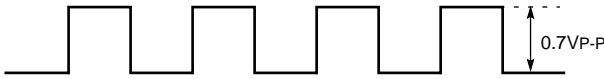
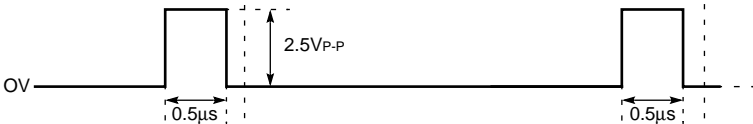
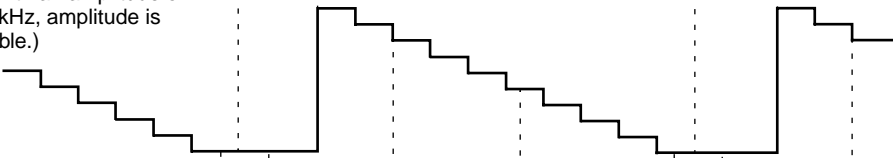
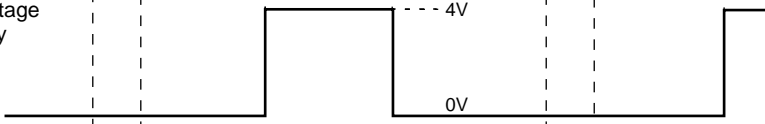

monitoring the output, and measure top SG7 level when blanking period expires to let the reading be HVth.



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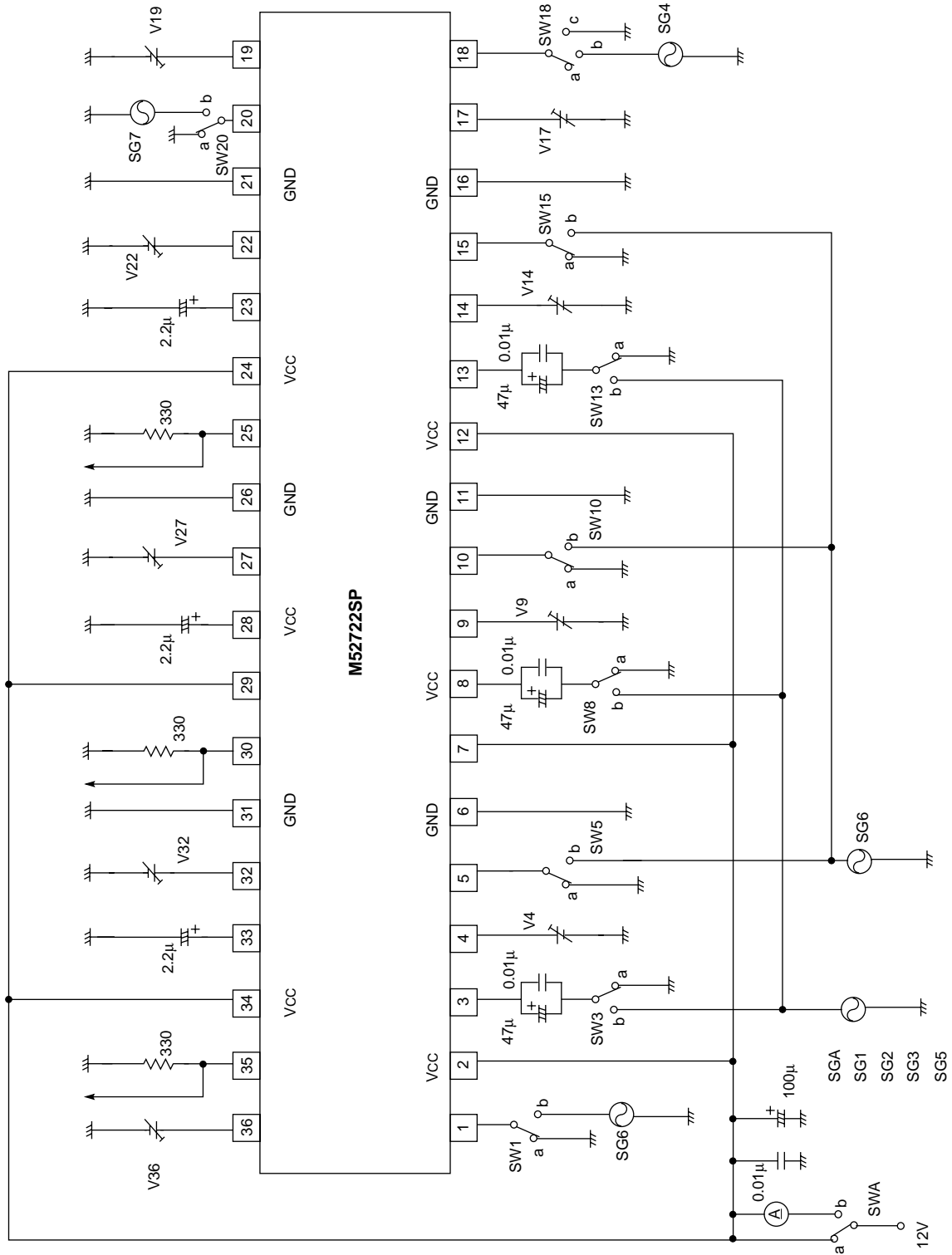
### INPUT SIGNAL

SG No.	Signals
SGA	<p>Sine wave with an amplitude of <math>0.7V_{P-P}</math></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	<p>Video signal with an amplitude of <math>0.7V_{P-P}</math> (<math>f = 1MHz</math>, duty = 50%) Lo section shall be synchronized with SG4 pulse.</p> 
SG4	<p>Pulse with an amplitude of <math>2.5V_{P-P}</math> and a pulse width of <math>0.5\mu s</math> (Pulse width, amplitude and frequency are variable) synchronized with the pedestal section of standard video stage wave</p> 
Video stage wave	<p>Video signal with an amplitude of <math>0.7V_{P-P}</math> (<math>f=30kHz</math>, amplitude is partially variable.)</p> 
BLK (for OSD) OSD signal	<p>Pulse with an amplitude of <math>4.0V_{P-P}</math> and a pulse width of <math>15\mu s</math> synchronized with the image section of standard video stage wave. (Amplitude is partially variable.)</p> 
Retrace line BKL signal	<p>Pulse with an amplitude of <math>4.0V_{P-P}</math> and a pulse width of <math>15\mu s</math> synchronized with the image section of standard video stage wave. (Amplitude is partially variable.)</p> 

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## TEST CIRCUIT



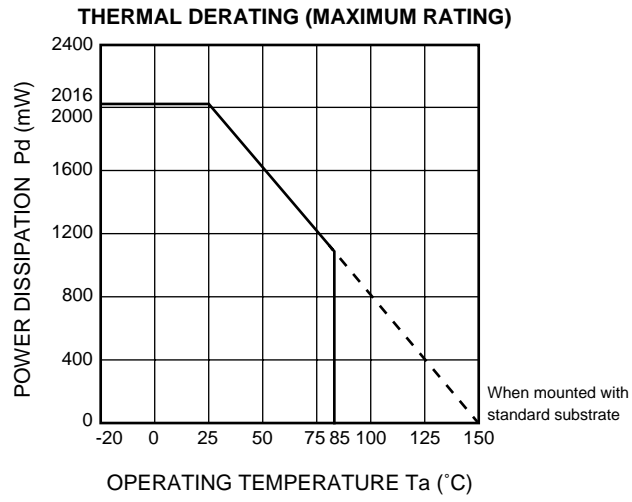
Units Resistance : Ω  
Capacitance : F

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3-CHANNEL VIDEO PREAMPLIFIER PROVIDED WITH OSD MIX  
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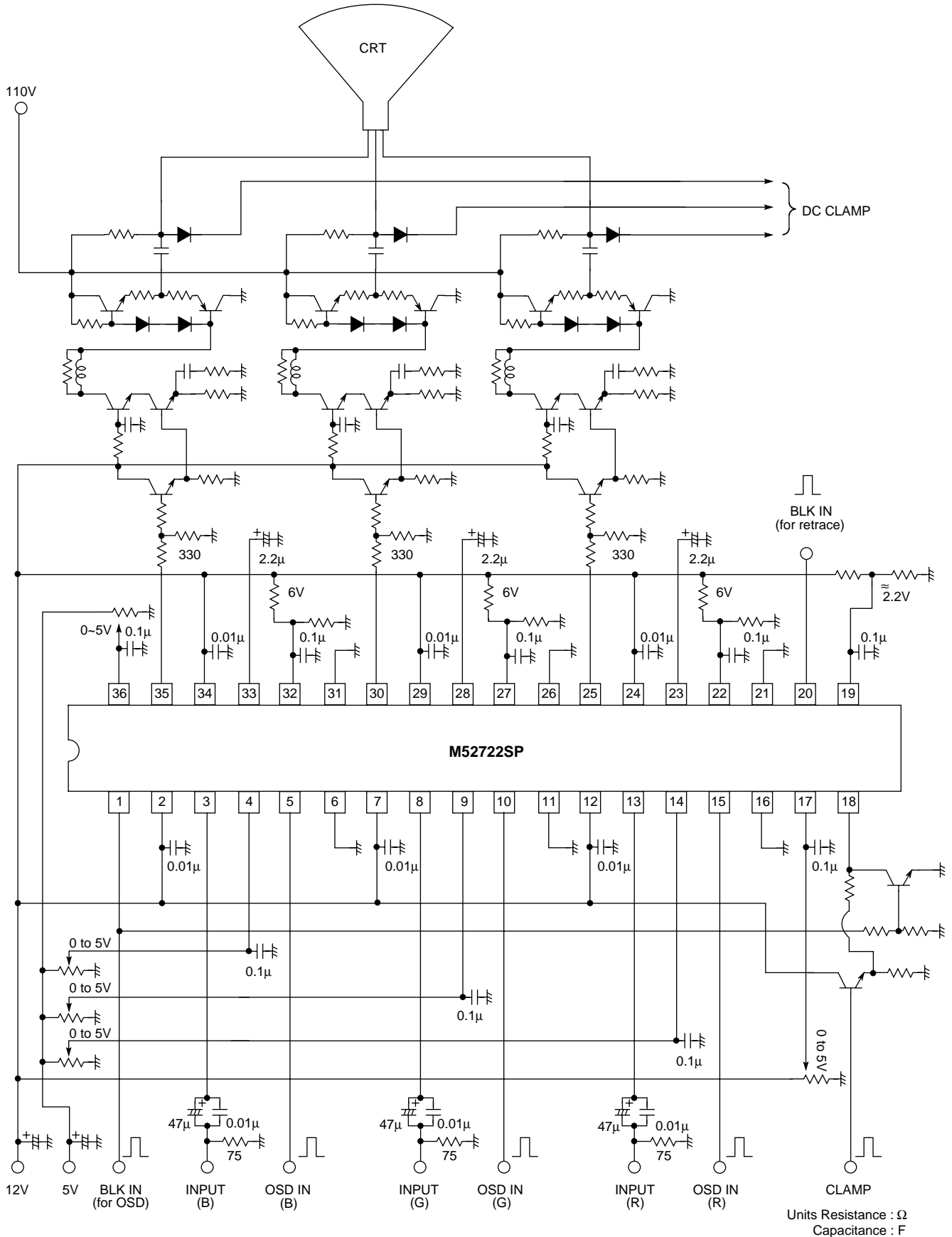
## TYPICAL CHARACTERISTICS



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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"> <li>Input pulse between 3.5V and 5V.</li> </ul> <ul style="list-style-type: none"> <li>Ground to GND when not in use.</li> </ul>
② ⑦ ⑫	Vcc (B) Vcc (G) Vcc (R)		12	<ul style="list-style-type: none"> <li>Apply identical voltage to all 3 channels.</li> </ul>
③ ⑥ ⑬	INPUT (B) INPUT (G) INPUT (R)		2.5	<ul style="list-style-type: none"> <li>Clamped to about 2.5V by clamping pulse at pin 18. Input at a low impedance.</li> </ul>
④ ⑨ ⑭	SUB CONTRAST (B) SUB CONTRAST(G) SUB CONTRAST (R)		2.5	<ul style="list-style-type: none"> <li>Use at less than 5V to ensure stable operation.</li> </ul>
⑤ ⑩ ⑮	OSD IN (B) OSD IN (G) OSD IN (R)		-	<ul style="list-style-type: none"> <li>Input pulse between 3.5V and 5V.</li> </ul> <ul style="list-style-type: none"> <li>Ground to GND when not in use.</li> </ul>

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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"> <li>Use at less than 5V to ensure stable operation.</li> </ul>
⑱	CP IN		-	<ul style="list-style-type: none"> <li>Input more than 2.5V of pulse. </li> <li>Input at a low impedance.</li> </ul>
⑲	MAIN BRIGHTNESS		-	
⑳	BLK IN (for retrace)		-	<ul style="list-style-type: none"> <li>Input pulse between 2.5V and 5V. </li> <li>Ground to GND when not in use.</li> </ul>

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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 SUB OSD ADJUST (R) ②⑦ SUB OSD ADJUST (G) ③② SUB OSD ADJUST (B)			When open 5.5V	<ul style="list-style-type: none"> <li>Open or pull up to Vcc when not in use.</li> </ul>
②③ HOLD (R) ②⑧ HOLD (G) ③③ HOLD (B)			Variable.	<ul style="list-style-type: none"> <li>Capacitance is required between GNDs.</li> </ul>
②④ Vcc2 (R) ②⑨ Vcc2 (G) ③④ Vcc2 (B)			12 Apply	<ul style="list-style-type: none"> <li>A power supply dedicated to output emitter follower. Apply identical voltage to all 3 channels.</li> </ul>
②⑤ OUTPUT (R) ③① OUTPUT (G) ③⑤ OUTPUT (B)			Variable	<ul style="list-style-type: none"> <li>Resistor is required on the GND side. Set arbitrarily to provide less than 15mA by drive capability required.</li> </ul>
③⑥ MAIN OSD ADJUST			Apply 5.5V	<ul style="list-style-type: none"> <li>Open or pull up to Vcc when not in use.</li> </ul>

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

### M52722SP - INSTRUCTIONS FOR USE

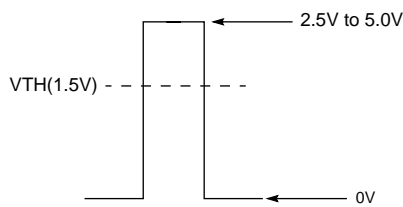
#### 1) Clamping pulse input

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:

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

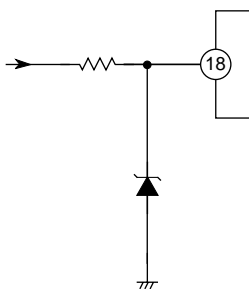
Recommended clamping pulse voltage is as given in the following diagram:



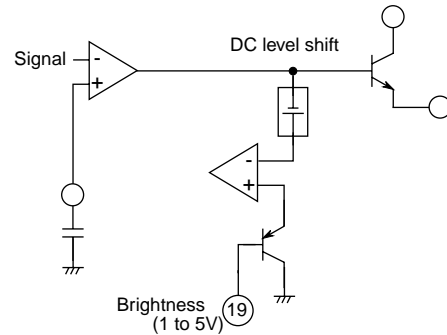
In addition, pulse width is recommended as follows:

- More than 1.0 $\mu$  sec at 15kHz,
- More than 0.5 $\mu$  sec at 30kHz, and
- More than 0.3 $\mu$  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

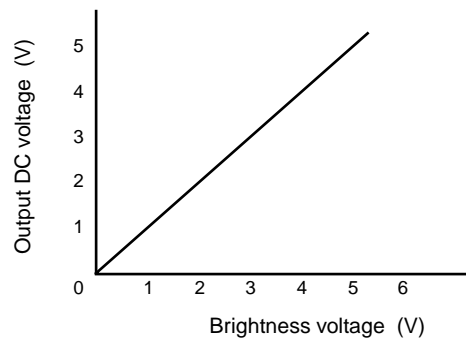


The above diagram represents its principle.

##### 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 $\mu$ 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

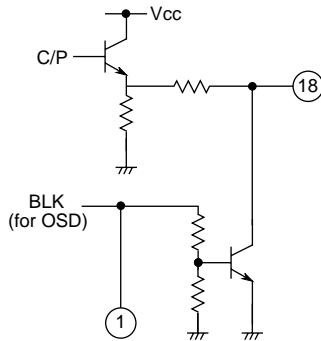
- Input formula is on an open basis. (See page 2-1109.) Threshold voltage is 2.5V.
- Inputting OSD mix signal without inputting BLK pulse will cause abnormal operation. Input BLK pulse as well whenever inputting OSD Mix signal.
- Ensure that input pin is grounded when OSD Mix function is not used.



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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:

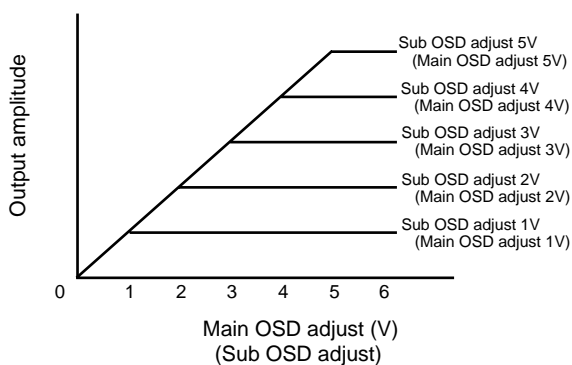


#### 4) Retrace line BLK input pins

- 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.