

M52337SP

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

DESCRIPTION

M52337SP is a video preamplifier provided with OSD mixing function, and a semi-conductor IC having three channels of a built-in amplifier in the 110MHz band.

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

FEATURES

- Frequency band: RGB110MHz (at 3VP-P)
OSD.....50MHz
- Input : RGB.....0.7VP-P (Typ.)
OSD.....3.0 to 5.0 VP-P (positive polarity)
BLK.....4.0 VP-P or more (positive polarity)
- Output : RGB.....4.0 VP-P (max.)
OSD.....3.5 VP-P (max., black level=2V)
- Each control of contrast and brightness includes a main which allows three 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.
- Pin arrangement of M52337SP is the same as that of M52321SP.

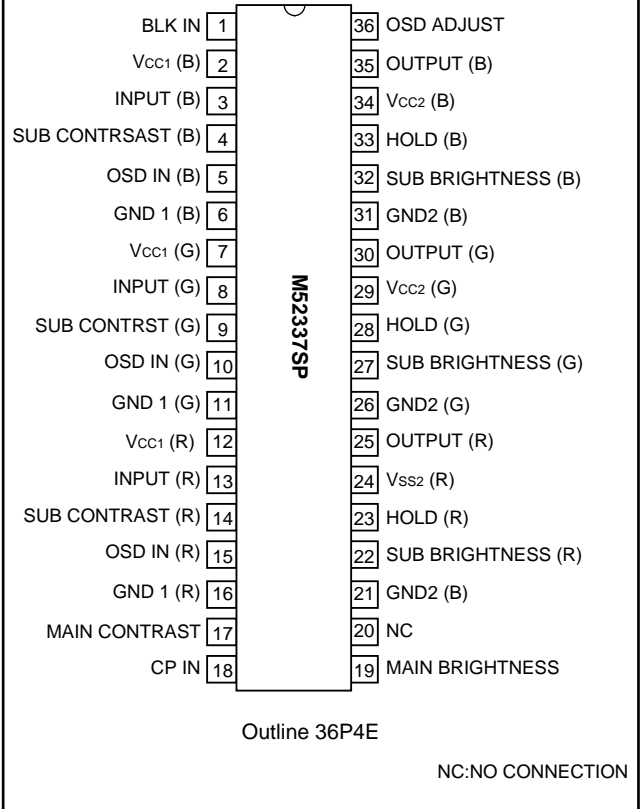
APPLICATION

CRT display

RECOMMENDED OPERATING CONDITION

Supply voltage range.....Vcc=11.5 to 12.5V
Rated supply voltage.....Vcc=12.0V

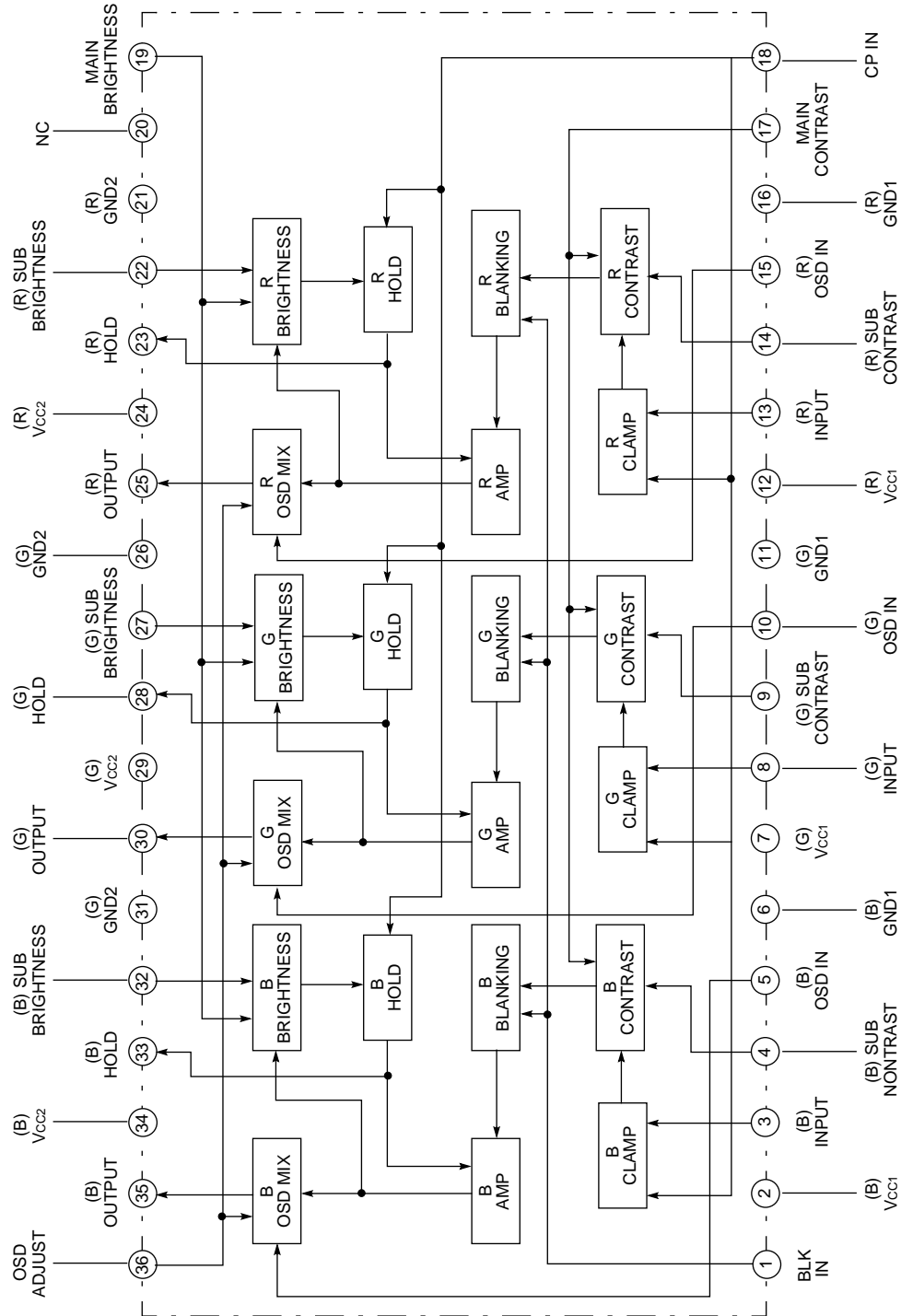
PIN CONFIGURATION (TOP VIEW)



M5237SP

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BLOCK DIAGRAM



M5237SP

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ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| Symbol | Parameter | Ratings | Unit |
|--------|----------------------------------|--------------|------|
| Vcc | Supply voltage | 13.0 | V |
| Pd | Power dissipation | 2016 | mW |
| Surge | Surge pressure | ±200 | V |
| Vopr | Recommended supply voltage | 12.0 | V |
| Vopr' | Recommended supply voltage range | 11.5 to 12.5 | V |
| Topr | Operating temperature | -20 to +85 | °C |
| Tstg | Storage temperature | -40 to +150 | °C |

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

| Symbol | Parameter | Test point | Input | | | External power supply(V) | | | | | Pulse input | | Limits | | | Unit |
|--------|--|-------------------------|------------------------------------|-------------|--------------|--------------------------|-----|----------|-----|-----|-------------|----------------|--------|------|------|------|
| | | | SW13 R-ch | SW8 G-ch | SW13 B-ch | V4 | V17 | V19 | V32 | V36 | SW18 | SW1 5,10,15 | Min. | Typ. | Max. | |
| Icc | Circuit current | A | a | a | a | 5 | 5 | 5 | 5 | 2 | b SG6 | a | 65 | 95 | 125 | mA |
| Vomax | Output dynamic range | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 5 | 5 | Variable | 5 | - | a | a | 5.8 | 6.8 | 9.0 | VP-P |
| Vimax | Max. allowable input | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 5 | 2.5 | Variable | 5 | - | a | a | 1.7 | 2.4 | 2.9 | VP-P |
| Gv | Max. gain | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 5 | 5 | VT | 5 | - | a | a | 13 | 17 | 20 | dB |
| ΔGv | Relative max. gain | | Take the ratio of the above values | | | | | | | | | | 0.8 | 1 | 1.2 | - |
| VCR1 | Main contrast control characteristics (at typ.) | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 5 | 2 | VT | 5 | - | a | a | 5 | 8 | 11 | dB |
| ΔVCR1 | Relative main contrast control characteristics (at typ.) | | Take the ratio of the above values | | | | | | | | | | 0.8 | 1 | 1.2 | - |
| VCR2 | Main contrast control characteristics (at min.) | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 5 | 1 | VT | 5 | - | a | a | 0.5 | 0.8 | 1.1 | VP-P |
| ΔVCR2 | Relative main contrast control characteristics (at min.) | | Take the ratio of the above values | | | | | | | | | | 0.8 | 1 | 1.2 | - |
| VSCR1 | Sub-contrast control characteristics (at typ.) | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 2 | 5 | VT | 5 | - | a | a | 5 | 8 | 11 | dB |
| ΔVSCR1 | Relative sub-contrast control characteristics (at typ.) | | Take the ratio of the above values | | | | | | | | | | 0.8 | 1 | 1.2 | - |
| VSCR2 | Sub-contrast control characteristics (at min.) | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 1 | 5 | VT | 5 | - | a | a | 0.5 | 0.8 | 1.1 | VP-P |
| ΔVSCR2 | Relative sub-contrast control characteristics (at min.) | | Take the ratio of the above values | | | | | | | | | | 0.8 | 1 | 1.2 | - |
| VSCR3 | Main and sub brightness control characteristics (both main and sub at typ.) | T.P35 T.P30 T.P25 | b SG1 | b SG1 | b SG1 | 3 | 3 | VT | 5 | - | a | a | 0.8 | 1.5 | 2.2 | VP-P |
| ΔVSCR3 | Relative main and sub brightness control characteristics (both main and sub at typ.) | | Take the ratio of the above values | | | | | | | | | | 0.8 | 1 | 1.2 | - |
| VB1 | Main brightness control characteristics (at max.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 4 | 5 | - | b SG6 | a | 3.0 | 3.6 | 4.2 | V |
| ΔVB1 | Relative main brightness control characteristics (at max.) | | Take the ratio of the above values | | | | | | | | | | -0.3 | 0 | 0.3 | V |
| VB2 | Main brightness control characteristics (at typ.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2.5 | 5 | - | b SG6 | a | 1.6 | 2.2 | 2.8 | V |
| ΔVB2 | Relative main brightness control characteristics (at typ.) | | Take the ratio of the above values | | | | | | | | | | -0.3 | 0 | 0.3 | V |
| VB3 | Main brightness control characteristics (at min.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 1 | 5 | - | b SG6 | a | 0.8 | 1.2 | 1.6 | Vdc |
| ΔVB3 | Relative main brightness control characteristics (at min.) | | Take the ratio of the above values | | | | | | | | | | -0.3 | 0 | 0.3 | V |

M5237SP**3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION
FOR HIGH-RESOLUTION COLOR DISPLAYS****ELECTRICAL CHARACTERISTICS (cont.)**

| Symbol | Parameter | Test point | Input | | | External power supply(V) | | | | | Pulse input | | Limits | | | Unit |
|-------------------|---|-------------------------|------------------------------------|-------------|--------------|--------------------------|-----|-----|-----|-----|-------------|----------------|--------|------|------|------------------|
| | | | SW13 R-ch | SW8 G-ch | SW13 B-ch | V4 | V17 | V19 | V32 | V36 | SW18 | SW1 5,10,15 | Min. | Typ. | Max. | |
| V _{SB1} | Sub-brightness control characteristics (at max.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | - | b SG6 | a | 1.3 | 1.8 | 2.4 | V _{DC} |
| V _{SB1} | Sub-brightness control characteristics (at min.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 0 | - | b SG6 | a | 0.8 | 1.2 | 1.6 | V _{DC} |
| FC ₁ | Frequency characteristics 1 (f=50MHz at max.) | T.P35 T.P30 T.P25 | b SG3 | b SG3 | b SG3 | 5 | 3 | VT | - | - | a | a | -2.5 | -1 | 3 | dB |
| FC ₁ | Relative frequency characteristics 1 (f=50MHz at max.) | | Take the ratio of the above values | | | | | | | | | -1 | 0 | 1 | dB | |
| FC _{1'} | Frequency characteristics 1 (f=110MHz at max.) | T.P35 T.P30 T.P25 | b SG4 | b SG4 | b SG4 | 5 | 3 | VT | - | - | a | a | -3 | -2 | 3 | dB |
| FC _{1'} | Relative frequency characteristics (f=110MHz at max.) | | Take the ratio of the above values | | | | | | | | | -2 | 0 | 2 | dB | |
| FC ₂ | Frequency characteristics 2 (f=110MHz at typ.) | T.P35 T.P30 T.P25 | b SG3 | b SG3 | b SG3 | 5 | 2 | VT | - | - | a | a | -3 | -2 | 3 | dB |
| V _{C2'} | Relative frequency characteristics 2 (f=110MHz at typ.) | T.P35 T.P30 T.P25 | b SG4 | b SG4 | b SG4 | 5 | 2 | VT | - | - | a | a | -2 | 0 | 2 | dB |
| FC ₃ | Frequency characteristics 3 (f=110MHz at min.) | T.P35 T.P30 T.P25 | b SG3 | b SG3 | b SG3 | 5 | 1 | VT | - | - | a | a | -3 | -2 | 3 | dB |
| FC _{3'} | Relative frequency characteristics 3 (f=110MHz at min.) | T.P35 T.P30 T.P25 | b SG4 | b SG4 | b SG4 | 5 | 1 | VT | - | - | a | a | -2 | 0 | 2 | dB |
| C.T.1 | Crosstalk1(f=50MHz) | T.P35 T.P30 T.P25 | b SG3 | a | a | 5 | 5 | VT | 5 | - | a | a | - | -30 | -20 | dB |
| C.T.1' | Crosstalk1(f=110MHz) | T.P35 T.P30 T.P25 | b SG4 | a | a | 5 | 5 | VT | 5 | - | a | a | - | -20 | -15 | dB |
| C.T.2 | Crosstalk2(f=50MHz) | T.P35 T.P30 T.P25 | a | b SG3 | a | 5 | 5 | VT | 5 | - | a | a | - | -30 | -20 | dB |
| C.T.2' | Crosstalk2(f=110MHz) | T.P35 T.P30 T.P25 | a | b SG4 | a | 5 | 5 | VT | 5 | - | a | a | - | -20 | -15 | dB |
| C.T.3 | Crosstalk3(f=50MHz) | T.P35 T.P30 T.P25 | a | a | b SG3 | 5 | 5 | VT | 5 | - | a | a | - | -30 | -20 | dB |
| C.T.3' | Crosstalk2(f=110MHz) | T.P35 T.P30 T.P25 | a | a | b SG4 | 5 | 5 | VT | 5 | - | a | a | - | -20 | -15 | dB |
| Tr | Pulse characteristics 1 | T.P35 T.P30 T.P25 | b SG5 | b SG5 | b SG5 | 5 | 3.3 | 2 | 5 | - | b SG6 | a | - | 4 | 7 | nsec |
| Tf | Pulse characteristics 2 | T.P35 T.P30 T.P25 | b SG5 | b SG5 | b SG5 | 5 | 3.3 | 2 | 5 | - | b SG6 | a | - | 7 | 9 | nsec |
| V _{14th} | Clamping pulse threshold voltage | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | - | b SG6 | a | 0.7 | 1.5 | 2.5 | V _{DC} |
| W ₁₄ | Clamping pulse min. operating width | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | - | b SG6 | a | - | 0.3 | 1.0 | μsec |
| OTr | OSD pulse characteristics 1 | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | 4.5 | b SG6 | b SG8 | - | 5 | 10 | nsec |
| OTf | OSD pulse characteristics 2 | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | 4.5 | b SG6 | b SG8 | - | 5 | 10 | nsec |
| Oaj1 | OSD adjustment control characteristics (at max.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | 4.5 | b SG6 | b SG8 | 2.5 | 3.1 | 3.6 | V _{P-P} |
| ΔOaj1 | Relative OSD adjustment control characteristics (at max.) | | Take the ratio of the above values | | | | | | | | | 0.8 | 1 | 1.2 | - | |
| Oaj2 | OSD adjustment Control characteristics (at min.) | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | 0 | b SG6 | b SG8 | -0.5 | 0 | 0.5 | V _{P-P} |
| ΔOaj2 | Relative OSD adjustment Control characteristics (at min.) | | Take the ratio of the above values | | | | | | | | | 0.8 | 1 | 1.2 | - | |

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

ELECTRICAL CHARACTERISTICS (cont.)

| Symbol | Parameter | Test point | Input | | | External power supply(V) | | | | | Pulse input | | Limits | | | Unit |
|--------|-----------------------------|-------------------------|--------------|-------------|--------------|--------------------------|-----|-----|-----|-----|-------------|----------------------|--------|------|------|-----------------|
| | | | SW13 R-ch | SW8 G-ch | SW13 B-ch | V4 | V17 | V19 | V32 | V36 | SW18 | SW1 5,10,15 | Min. | Typ. | Max. | |
| OSDth | OSD input threshold voltage | T.P35 T.P30 T.P25 | a | a | a | 5 | 5 | 2 | 5 | 1.7 | b SG6 | b SG8 | 1.7 | 2.5 | 3.5 | V _{DC} |
| V1th | BLK input threshold voltage | T.P35 T.P30 T.P25 | b SG7 | b SG7 | b SG7 | 5 | 5 | 2 | 5 | - | b SG6 | SW1 only b SG8 | 1.7 | 2.5 | 3.5 | V _{DC} |

ELECTRICAL CHARACTERISTICS TEST METHOD

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

Icc circuit current

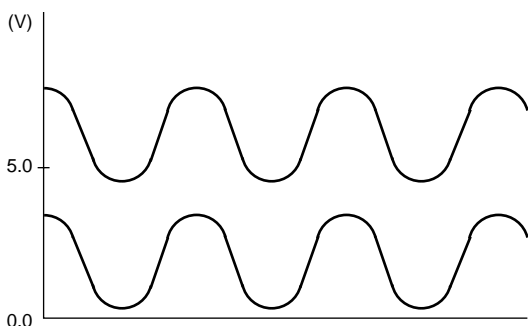
Conditions shall be as specified in the electrical characteristic table, and take measurements with ammeter A when SW1 is turned to the b side.

Vomax output dynamic range

Follow the following procedure to set V19.

1. Input SG1 to pin ⑬ (pin ⑭ or pin ⑮), gradually raise V19, and read V19 voltage when the upper part of the output waveform of T.P25 (T.P30 or T.P35) is distorted to let the reading be VTR1 (VTG1 or VTB1).

In addition, gradually reduce V19 conversely, and read V19 voltage when the lower part of the output waveform of T.P35 (T.P30 or T.P25) is distorted to let the reading be VTR2 (VTG2 or VTB2).



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

2. From the above, V_T (V_{TR}, V_{TG} or V_{TB}) is found by

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

which should be used properly depending upon output pins.

In measuring, use .P25 → V_{TR1}, T.P30 → V_{TG1} and T.P35 → V_{TB1}.

3. After setting V_{TR} (V_{TG} or V_{TB}), gradually increase SG1 amplitude from 700mV, and take measurements of output amplitude at a point where the upper and lower parts of T.P25 (T.P30 or T.P35) output waveform start to be distorted simultaneously.

Vimax max. allowable input

From the status of Vomax, change V17 into 2.5V as specified in the electrical characteristics table, gradually increase input signal amplitude from 700m V_{P-P}, and read input signal amplitude at a point where output signal starts to be distorted.

GV and ΔGV max gain and relative max. gain

1. Input SG1 to pin ⑬ (pin ⑭ or pin ⑮), read the output amplitude of T.P25 (T.P30 or T.P35) to let the reading be VOR1 (VOG1 or VOB1).
2. Max. gain GV is found by:

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

3. Relative max. gain ΔG is found by
ΔGV = VOR1/VOG1, VOG1/VOB1, VOB1/VOR1
through respective calculation.

VCR1 main contrast control characteristics (at typ.) and

ΔVCR1 relative main contrast control characteristics (at typ.)

1. Follow the electrical characteristic table except changing V17 to 2.0V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) at this time to let the reading be VOR2 (VOG2 or VOB2).
3. Contrast control characteristics VCR1 and relative contrast control characteristics ΔVCR1 are found by

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

$$\Delta V_{OR1} = V_{CR2}/V_{OG2}, V_{OG2}/V_{OB2}, V_{OB2}/V_{OR2}$$

through respective calculation.

VCR2 main contrast control characteristics (at min.) and

ΔVCR2 relative main contrast control characteristics (at min.)

1. Follow the electrical characteristic table except changing V17 to 1.0V.
2. Read the output amplitude of T.P25 (T.SP30 or T.P35) to let the reading be VOR3 (VOG3 or VOB3) to let it be VCR2, respective
3. Relative contrast control characteristic ΔVCR2 is found by:
ΔVCR2 = VOR3/VOG3, VOG3/VOB3, VOB3/VOR3

M5237SP**3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION
FOR HIGH-RESOLUTION COLOR DISPLAYS****V_{SCR1} sub-contrast control characteristics (at typ.) and****ΔV_{SCR1} relative sub-contrast control characteristics (at typ.)**

- Follow the electrical characteristics table except changing V4, V9 and V14 to 2.0V.
- Read the output amplitude of T.P25 (T.P30 or T.P35) at this time to let the reading be V_{OR4} (V_{OG4} or V_{OB4}).
- Sub-contrast control characteristic V_{SCR1} and relative sub-contrast control characteristics ΔV_{SCR1} is found by:

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

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

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

- Follow the electrical characteristics table except changing V4, V9 and V14 to 1.0V.
- Read the output amplitude of T.P25 (T.P30 or T.P35) at this time, and let it be V_{OR5} (V_{OG5} or V_{OB5}).
- Relative sub-contrast control characteristics V_{CR2} is found by:

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

V_{SCR3} main and sub-brightness control characteristics (both main and sub at typ.) and**ΔV_{SCR3} relative main and sub-brightness control characteristics (both main and sub at typ.)**

- Follow the electrical characteristics table except changing V7 to 3.0V and V4, V9 and V14 to 3.0V.
- Read the output amplitude of T.P25 (T.P30 or T.P35) at this time to let the reading be V_{OR6} (V_{OG6} or V_{OB6}).

$$V_{CR3} = 20 \log \frac{V_{OR6}(V_{OG6}, V_{OB6})}{0.7} \frac{[VP-P]}{[VP-P]}$$

$$\Delta V_{CR3} = V_{OR6}/V_{OG6}, V_{OG6}/V_{OB6}, V_{OB6}/V_{OR6}$$

V_{B1} main brightness control characteristics (at max.) and**ΔV_{B1} relative main brightness control characteristics (at max.)**

- The conditions shall be as specified in the electrical characteristics table.
- 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_{B1}.
- For relative brightness control characteristics, further, calculate difference between channels from V_{OR7}, V_{OG7} or V_{OB7}.

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

$$V_{OG7} - V_{OB7}$$

$$V_{OG7} - V_{OB7}$$

V_{B2} main brightness control characteristics (at typ.) and**ΔV_{B2} relative main brightness control characteristics (at typ.)**

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

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

$$\Delta V_{B2} = V_{OR7} - V_{OG7} \quad [mV]$$

$$= V_{OG7} - V_{OB7}$$

$$= V_{OB7} - V_{OR7}$$

V_{B3} main brightness control characteristics (at min.) and**ΔV_{B3} relative main brightness control characteristics (at min.)**

- The conditions shall be as specified in the electrical characteristics table.
- 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} and V_{OB7}).

This value represents V_{B3}.

- For relative brightness control characteristics ΔV_{B3}, further, calculate difference between channels from V_{OR7}, V_{OG7} and V_{OB7}.

$$\Delta V_{B3} = V_{OR7} - V_{OG7} \quad [mV]$$

$$= V_{OG7} - V_{OB7}$$

$$= V_{OB7} - V_{OR7}$$

V_{B1} sub-brightness control characteristics (at max.) and (at min.)

Same as V_{B1} and ΔV_{B1} except changing sub-brightness (V32, V27 and V22) to 5.0V or 0V. However, exclude 3. of V_{B1} and ΔV_{B1}.

F_{C1} frequency characteristics 1 (f=50MHz at max.),**Relative frequency characteristics 1 (F=50MHz at max.),****F_{C1}' frequency characteristics 1 (f=110MHz at max.), and****Relative frequency characteristics (f=110MHz at max.)**

- The conditions shall be as specified in the electrical characteristics table.
- Whilst SG3 and SG4 are used, measure the output waveform amplitude of T.P25 (T.P30 or T.P35) as given in G_v and ΔG_v.
- Now, when letting this value be:

$\left\{ \begin{array}{l} \text{output amplitude } V_{OR1} (V_{OG1} \text{ or } V_{OB1}) \text{ when SG1 is input,} \\ \text{output amplitude } V_{OR8} (V_{OG8} \text{ or } V_{OB8}) \text{ when SG3 is input, or} \\ \text{output amplitude } V_{OR9} (V_{OG9} \text{ or } V_{OB9}) \text{ when SG4 is input,} \end{array} \right.$
 frequency characteristics F_{C1} or F_{C1}' is calculated from:

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

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

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

F_{C2} frequency characteristics 2 (f=110MHz at typ.) and**F_{C2}' relative frequency characteristics 2 (f=110MHz at typ.)**

Same as F_{C1} or F_{C1}' except reducing CONTRAST (V17) to 2.0V.

F_{C3} frequency characteristics 3 (f=110MHz at min.) and**F_{C3}' relative frequency characteristics 3 (f=110MHz at min.)**

Same as F_{C1} and F_{C1}' except reducing CONTRAST (V17) to 1.0V.

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C.T.1, and C.T.1' crosstalk 1 (f=50MHz) and (F=110 MHz)

1. The conditions shall be as specified in the electrical characteristics table.
2. Input SG3 (or SG4) to pin ⑬ (R-ch) only, measure the output waveform amplitude of T.P25 (T.P30 or T.P35) at this time to let the value be VOR, VOG or VOB.
3. Crosstalk C.T.1 is found by:

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

C.T.2 and C.T.2' crosstalk 2 (f=50MHz) and (f=110MHz)

1. Change input pin from pin ⑬ (R-ch) to pin ⑩ (G-ch), and read output in the same manner as in the case of C.T.1 and C.T.1'.
2. Crosstalk 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 and C.T.3' crosstalk 3 (f=50MHz) and (f=110MHz)

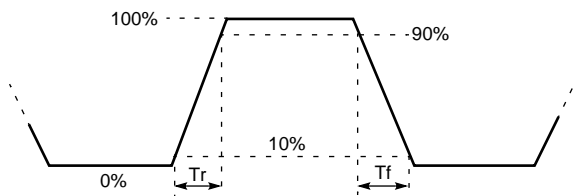
1. Change input pin from pin ⑬ (R-ch) to pin ③ (G-ch), and read output in the same manner as in the case of C.T.1 and C.T.1'.
2. Crosstalk C.T.3 is found by:

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

Tr and Tf pulse characteristics 1 and pulse characteristics 2

1. The conditions shall be as specified in the electrical characteristics table.
2. Use an active probe to measure rise Tr1 and fall Tf1 at 10 to 90% of input pulse.
3. Then, measure rise Tr2 and fall Tf2 at 10 to 90% of output pulse with an active probe.
4. Pulse characteristics Tr and Tf is found by:

$$Tr \text{ (nsec)} = \sqrt{(Tr2)^2 - (Tr1)^2} \\ Tf \text{ (nsec)} = \sqrt{(Tf2)^2 - (Tf1)^2}$$



V14th clamping pulse threshold voltage

1. The conditions shall be as specified in the electrical characteristics table.

2. Gradually reduce SG6 level at this time, while monitoring output (in a range of 2.0VDC), and measure SG6 level when output becomes 0V.

W14 clamping pulse operating min. width

- Gradually reduce SG6 pulse width while monitoring output this time under the conditions of V14th. In this case as well, measure SG6 pulse width when output becomes 0V.

OTr OSD pulse characteristics 1 and OTf OSD pulse characteristics 2

1. The conditions shall be as specified in the electrical characteristics table.
2. Use an active probe to measure rise OTr and fall OTf at 10 to 90% of output pulse.

Oaj1 OSD adjustment control characteristics (at max.) and ΔOaj1 relative OSD adjustment control characteristics (at max.)

1. The conditions shall be as specified in the electric characteristics table.
2. Read the output width of T.P25 (T.P30 or T.P35) at this time, and let the reading be VORA (VOGA or VOBA) to let it be Oaj1, respectively.
3. Relative OSD adjustment control characteristics ΔOaj1 is found by:

$$\Delta Oaj1 = VORA/VOGA, VOGA/VOBA, VOBA/VORA$$

Oaj2 OSD adjustment control characteristics (at min.) and ΔOaj2 relative OSD adjustment control characteristics (at min.)

1. Follow the electrical characteristics table except changing V36 to 0V.
2. Read the output amplitude of T.P25 (T.P30 or T.P35) at this time, and let the reading be VORB (VOGB or VOBB) to let it be Oaj2, respectively.
3. Relative OSD adjustment control characteristics ΔOaj2 is found by:

$$\Delta Oaj2 = VORA/VOGA, VOGA/VOBA, VOBA/VORA$$

OSDth OSD input threshold voltage

1. The conditions shall be as specified in the electrical characteristics table.
2. Gradually reduce SG8 level at this time, while monitoring output, and measure SG8 level when output is stopped to let the value be OSDth.

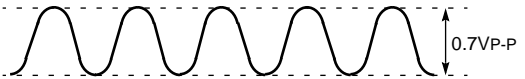
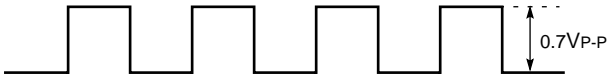
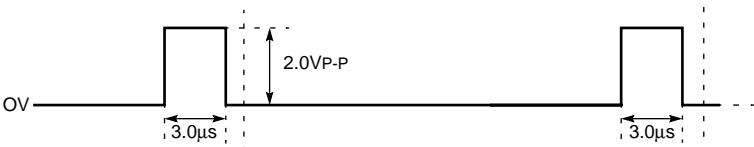
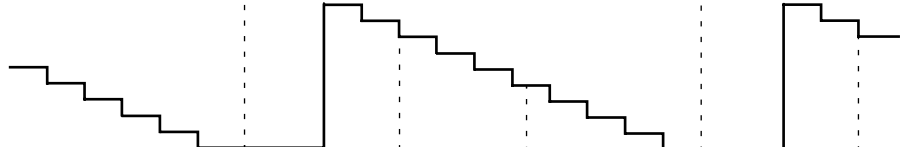
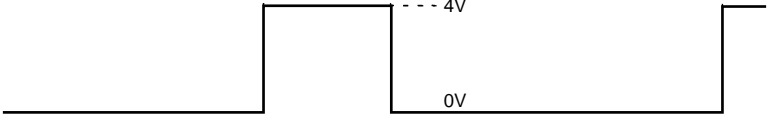
V1th BLK input threshold voltage

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 SG8.
3. Gradually reduce SG8 level at this time, while monitoring output, and measure SG8 level when blanking period expires to let the value be V1th.

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3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

INPUT SIGNAL

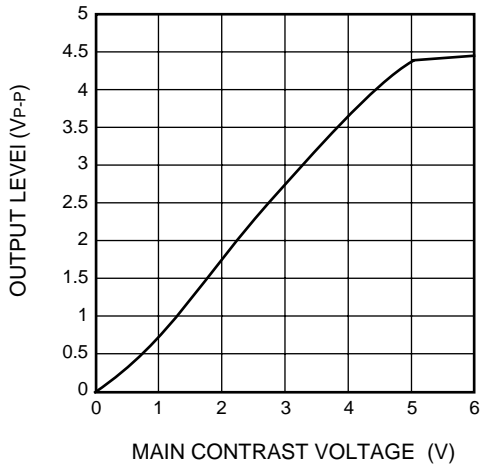
| SG No. | Signals |
|----------------------------------|--|
| SG1 | Sine wave at an amplitude of 0.7V _{P-P} (100 kHz, amplitude partially variable)  |
| SG2 | Sine wave at an amplitude of 0.7V _{P-P} (f=10MHz) |
| SG3 | Sine wave at an amplitude of 0.7V _{P-P} (f=50MHz) |
| SG4 | Sine wave at an amplitude of 0.7V _{P-P} (f=110MHz) |
| SG5 | Pulse at an amplitude of 0.7V _{P-P} (f=30kHz, duty=50%)  |
| SG6 | Pulse at an amplitude of 2.0V _{P-P} and a pulse width of 3.0μs (pulse width and amplitude partially variable) synchronized with the pedestal section of standard video stage wave  |
| SG7 standard video stage wave |  <p>Video signal at an amplitude of 0.7V_{P-P} (f=30kHz, amplitude partially variable)</p> |
| SG8 BLK, OSD signal | Pulse at an amplitude of 4.0V _{P-P} and a pulse width of 15μs synchronized with the image section of standard video stage wave  |

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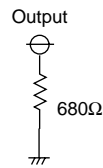
3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

TYPICAL CHARACTERISTICS

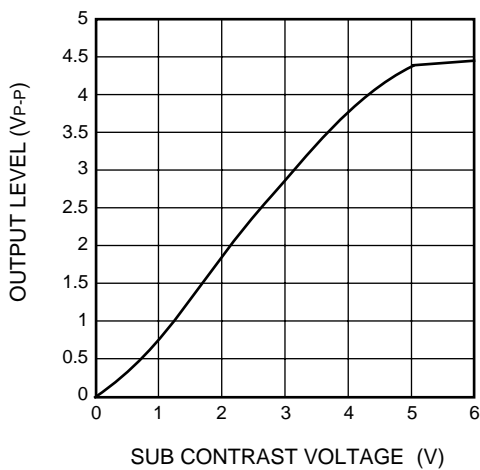
MAIN CONTRAST CONTROL VS. OUTPUT LEVEL



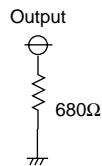
Vcc=12V
 Input Signal : fH=40kHz All white 0.7VP-P
 Sub Cont =5V
 Main Bright=1V
 Sub Bright =5V



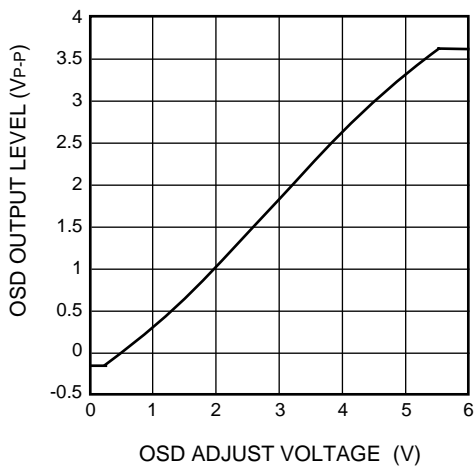
SUB CONTRAST CONTROL VS. OUTPUT LEVEL



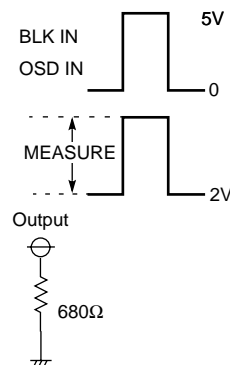
Vcc=12V
 Input Signal : fH=40kHz All white 0.7VP-P
 Main Cont =5V
 Main Bright=1V
 Sub Bright =5V



OSD ADJUST VOLTAGE VS. OSD OUTPUT LEVEL

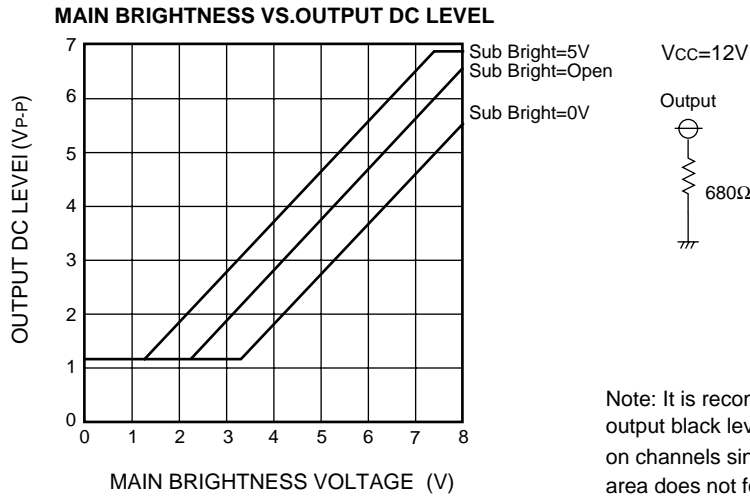


Vcc=12V
 Input Signal : fH=40kHz 5VP-P TTL
 Black level 2VDC



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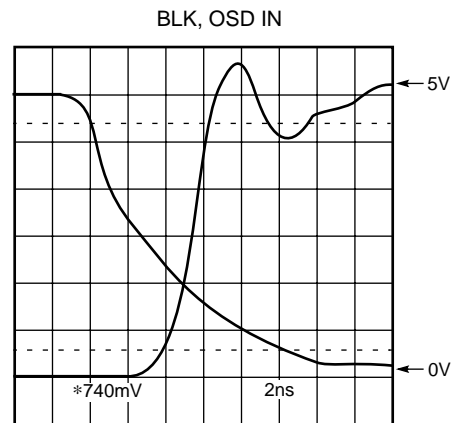
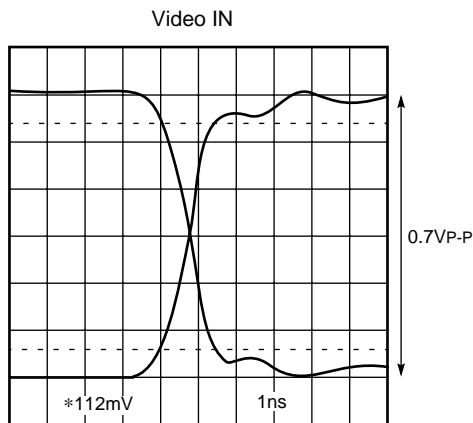
3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS



Note: It is recommended to arrange that output black level is identical on channels on channels since level in the OSD Mix area does not follow variable brightness.

INPUT PULSE RESPONSE

VIDEO IN : 0.7VP-P, fH=64kHz All White
 BLK, OSD IN : 5V TTL
 Video generator Astrodesign VG-819
 Oscilloscope Iwatsu SS6521(to 500MHz)
 Probe Tektronix P6202A

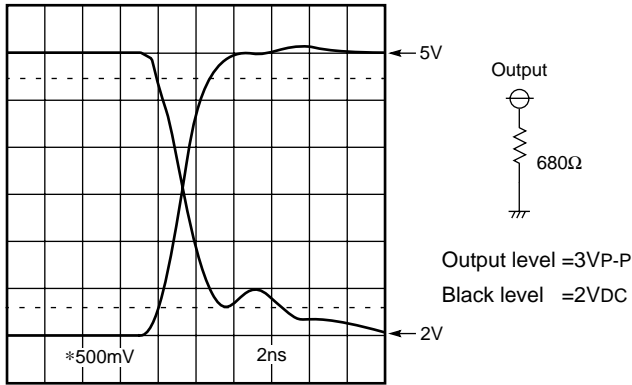


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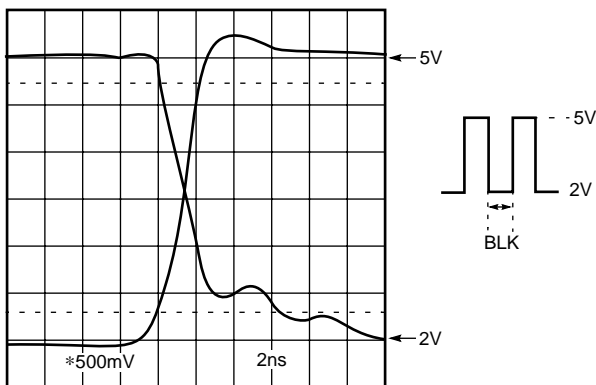
3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

OUTPUT PULSE RESPONSE

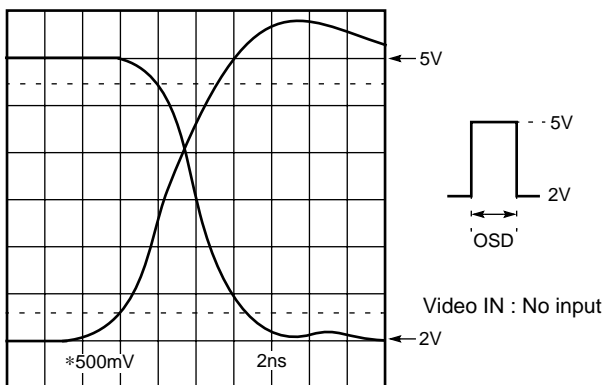
RISE AND FALL OF OUTPUT WAVEFORM (3VP-P)



RISE AND FALL OF BLANKING



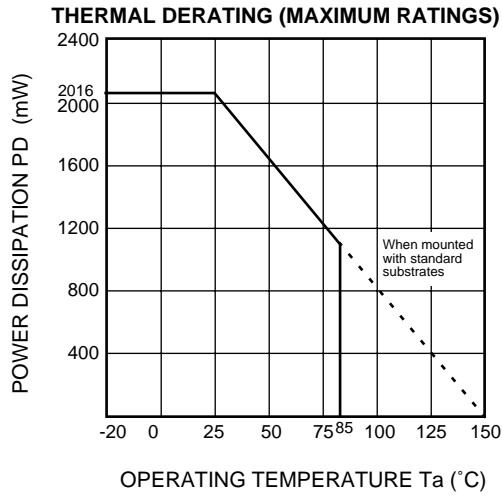
RISE AND FALL OF OSD



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3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

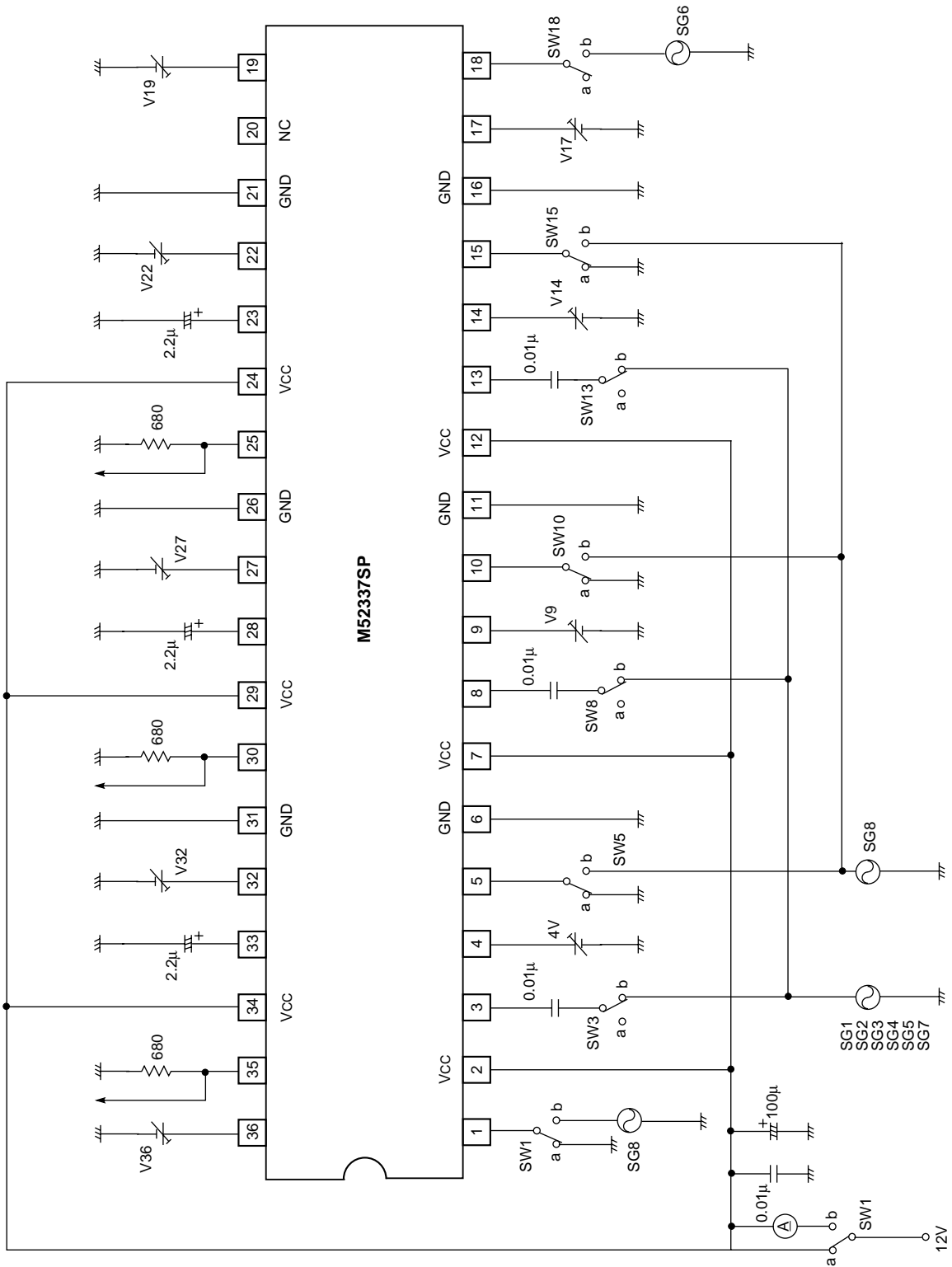
TYPICAL CHARACTERISTICS



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3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

TEST CIRCUIT

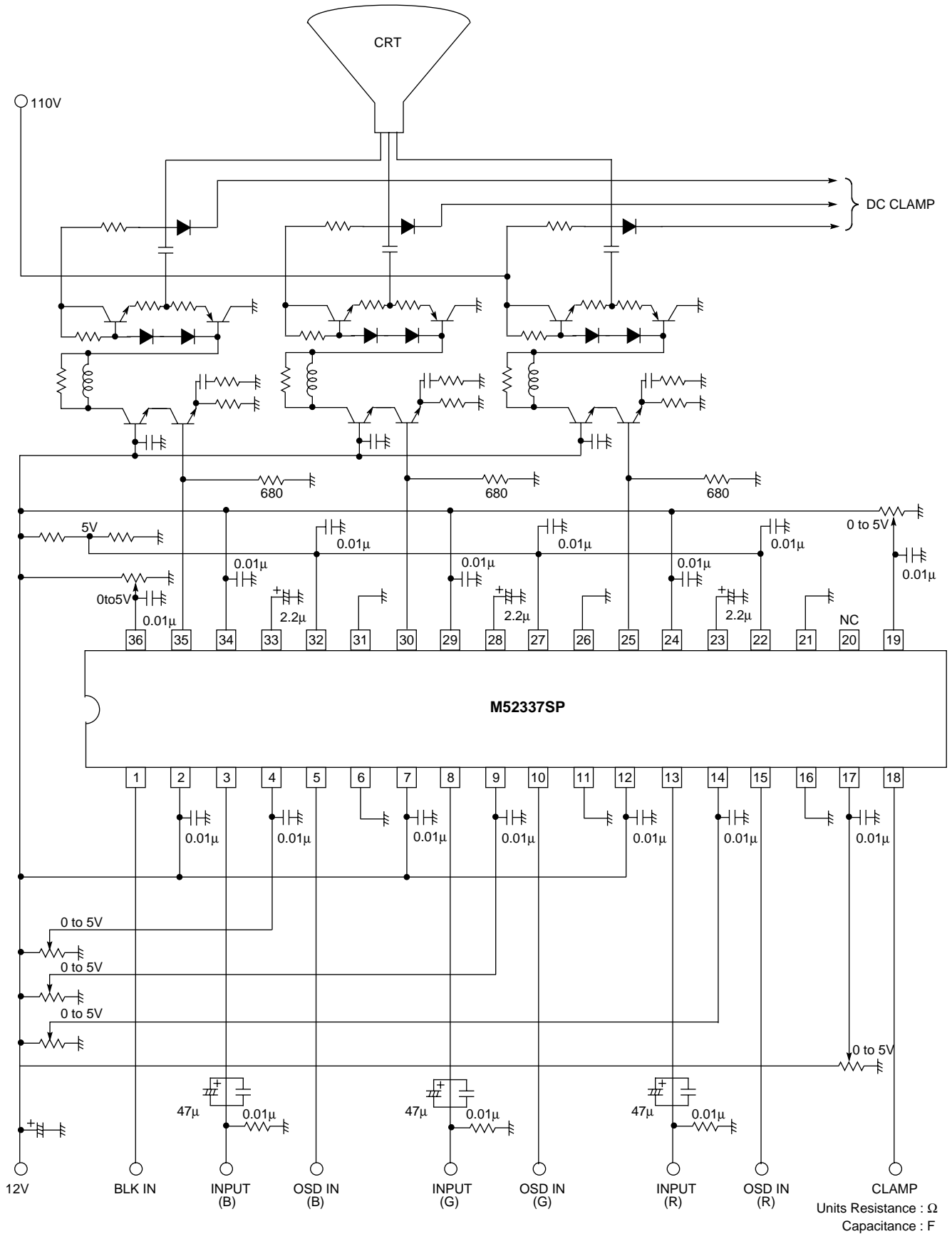


Units Resistance : Ω
Cspacitance : F

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3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

APPLICATION EXAMPLE



M5237SP

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

DESCRIPTION OF PIN

| Pin No. | Name | Peripheral circuit of pins | DC voltage | Description of function |
|-------------|---|----------------------------|------------|---|
| ① | BLK IN | | - | <ul style="list-style-type: none"> Input 3V or more of pulse <ul style="list-style-type: none"> Ground to GND when not in use. |
| ② ⑦ ⑫ | VCC (B-ch) VCC (G-ch) VCC (R-ch) | | 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 5V or less to ensure stable operation. |
| ⑤ ⑩ ⑮ | OSD IN (B) OSD IN (G) OSD IN (R) | | - | <ul style="list-style-type: none"> Input 3V or more and 5V or less of pulse <ul style="list-style-type: none"> Ground to GND when not in use. |

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3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

DESCRIPTION OF PIN (cont.)

| Pin No. | Name | Peripheral circuit of pins | DC voltage | Description of function |
|----------------------|--|----------------------------|------------|--|
| ⑥ ③① ⑪ ②⑥ ⑯ ②① | GND (B-ch) GND (G-ch) GND (R-ch) | | GND | |
| ⑰ | MAIN CONTRAST | | 2.5 | <ul style="list-style-type: none"> Use at 5V or less to ensure stable operation. |
| ⑱ | CP IN | | - | <ul style="list-style-type: none"> Input 2.2V or more of pulse. <ul style="list-style-type: none"> Input at a low impedance. |
| ⑲ | MAIN BRIGHTNESS | | - | |
| ⑳ | NC | | - | <ul style="list-style-type: none"> Normally ground to GND or open. |

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3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING FUNCTION FOR HIGH-RESOLUTION COLOR DISPLAYS

DESCRIPTION OF PIN (cont.)

| Pin No. | Name | Peripheral circuit of pins | DC voltage | Description of function |
|----------------|--|----------------------------|------------|---|
| 22 27 32 | SUB BRIGHTNESS (R) SUB BRIGHTNESS (G) SUB BRIGHTNESS (B) | | 2.8 | <ul style="list-style-type: none"> Pull up directly to Vcc when not in use. |
| 23 28 33 | HOLD (R) HOLD (G) HOLD (B) | | Variable | |
| 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 30 35 | OUTPUT (R) OUTPUT (G) OUTPUT (B) | | Variable | <ul style="list-style-type: none"> Resistor is necessary on the GND side. Use a necessary drive capability to set arbitrarily to provide 15mA or less. |
| 36 | OSD ADJUST | | Apply | |