M52737SP

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

DESCRIPTION

The M52737SP is a semiconductor integrated circuit amplifies video signals, having a 3-channel amplifier with a band width of 150MHz. The circuit also features the OSD mixing function.

The circuit is most useful with high-resolution displays that have OSD, and its function are available for each channel, including OSD blanking, OSD mixing, retrace blanking, wide-band amplification, contrast control (main and sub), and brightness control.

FEATURES

- Frequency band width: RGB................................150MHz (3V$_{P-P}$)
  OSD...50MHz
  Input　:RGB...0.7V$_{P-P}$ (typ.)
  OSD...3.0V$_{P-P}$ min. (positive)
  BLK (for OSD)...............................3.0V$_{P-P}$ min. (positive)
  Retrace BLK..................................3.0V$_{P-P}$ min. (positive)
  Output　:RGB...4.5V$_{P-P}$ (max.)
  OSD...4.5V$_{P-P}$ (max.)

- To adjust contrast and OSD Adj, for each, two types of controls are provided, main and sub. With the main control, the contrast or OSD Adj of the 3-channels can be changed simultaneously. Sub controls are used to adjust the contrast of a given channel individually. The control terminals can be controlled by applying a voltage of 0 to 5V.

- The DC power remains stable at the IC output terminal because a feedback circuit is built in.
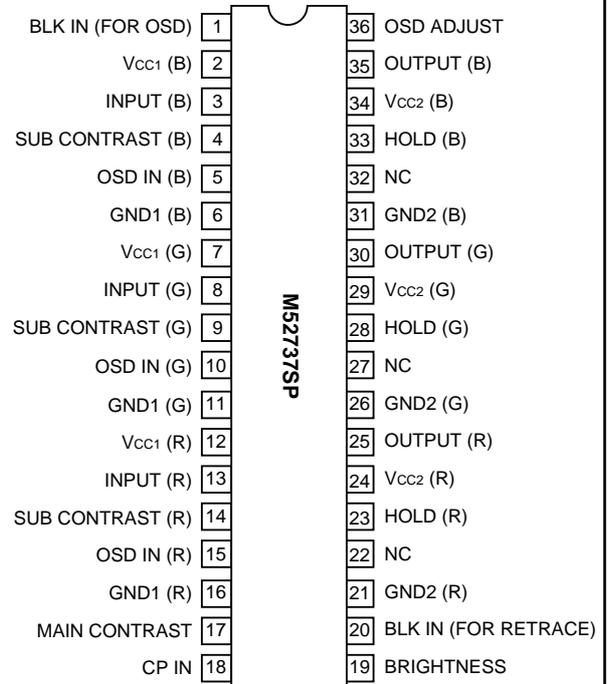
APPLICATION

Display monitor

RECOMMENDED OPERATING CONDITION

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

PIN CONFIGURATION (TOP VIEW)

Pin	Name		Pin	Name
1	BLK IN (FOR OSD)		36	OSD ADJUST
2	V$_{CC1}$ (B)		35	OUTPUT (B)
3	INPUT (B)		34	V$_{CC2}$ (B)
4	SUB CONTRAST (B)		33	HOLD (B)
5	OSD IN (B)		32	NC
6	GND1 (B)		31	GND2 (B)
7	V$_{CC1}$ (G)		30	OUTPUT (G)
8	INPUT (G)		29	V$_{CC2}$ (G)
9	SUB CONTRAST (G)		28	HOLD (G)
10	OSD IN (G)		27	NC
11	GND1 (G)		26	GND2 (G)
12	V$_{CC1}$ (R)		25	OUTPUT (R)
13	INPUT (R)		24	V$_{CC2}$ (R)
14	SUB CONTRAST (R)		23	HOLD (R)
15	OSD IN (R)		22	NC
16	GND1 (R)		21	GND2 (R)
17	MAIN CONTRAST		20	BLK IN (FOR RETRACE)
18	CP IN		19	BRIGHTNESS

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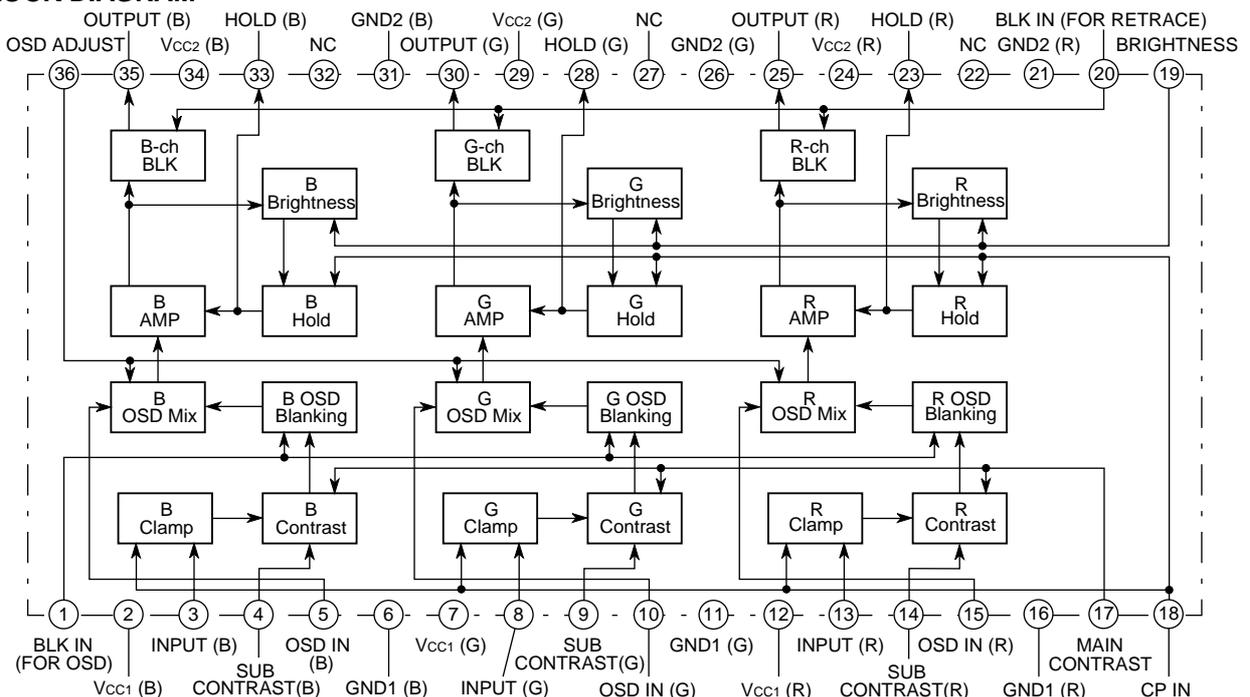
Outline 36P4E

NC : NO CONNECTION

BLOCK DIAGRAM

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	13.0	V
P_d	Power dissipation	2403	mW
T_{opr}	Ambient temperature	-20 to +85	°C
T_{stg}	Storage temperature	-40 to +150	°C
V_{opr}	Recommended supply voltage	12.0	V
$V_{opr'}$	Recommended supply voltage range	11.5 to 12.5	V
Surge	Electrostatic discharge	±200	V

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

Symbol	Parameter	Test point (s)	SW13 R-ch	SW8 G-ch	SW3 B-ch	V4	V17	V19	V36	SW18	SW1, 5, 10, 15	SW20	Min.	Typ.	Max.	Unit
			Input			External power supply (V)				Pulse input			Limits			
I_{CC}	Circuit current	A	a —	a —	a —	5	5	5	2	b SG4	a —	a —	72	93	115	mA
V_{omax}	Output dynamic range	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	Vari-able	–	b SG4	a —	a —	6.2	7.7	9.2	VP-P
V_{imax}	Maximum input	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	2.5	2	–	b SG4	a —	a —	1	1.6	–	VP-P
G_v	Maximum gain	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	2	–	b SG4	a —	a —	16.4	17.8	19.4	dB
ΔG_v	Relative maximum gain	Relative to measured values above											0.8	1	1.2	–
V_{CR1}	Contrast control characteristics (typical)	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	4	2	–	b SG4	a —	a —	14.5	16.0	17.5	dB
ΔV_{CR1}	Contrast control relative characteristics (typical)	Relative to measured values above											0.8	1	1.2	–
V_{CR2}	Contrast control characteristics (minimum)	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	1	2	–	b SG4	a —	a —	0.4	0.7	1.0	VP-P
ΔV_{CR2}	Contrast control relative characteristics (minimum)	Relative to measured values above											0.8	1	1.2	–
V_{SCR1}	Sub contrast control characteristics (typical)	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	4	5	2	–	b SG4	a —	a —	14.5	16.0	17.5	dB
ΔV_{SCR1}	Sub contrast control relative characteristics (typical)	Relative to measured values above											0.8	1	1.2	–
V_{SCR2}	Sub contrast control characteristics (minimum)	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	1	5	2	–	b SG4	a —	a —	0.5	0.9	1.3	VP-P
ΔV_{SCR2}	Sub contrast control relative characteristics (minimum)	Relative to measured values above											0.8	1	1.2	–
V_{SCR3}	Contrast/sub contrast control characteristics (typical)	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	3	3	2	–	b SG4	a —	a —	1.1	1.8	2.5	VP-P
ΔV_{SCR3}	Contrast/sub contrast control relative characteristics (typical)	Relative to measured values above											0.8	1	1.2	–
V_{B1}	Brightness control characteristics (maximum)	T.P.35 T.P.30 T.P.25	a —	a —	a —	5	5	4	–	b SG4	a —	a —	3.0	3.6	4.2	V
ΔV_{B1}	Brightness control relative characteristics (maximum)	Relative to measured values above											-0.3	0	0.3	V

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point (s)	SW13 R-ch	SW8 G-ch	SW3 B-ch	V4	V17	V19	V36	SW18	SW1, 5, 10, 15	SW20	Min.	Typ.	Max.	Unit
			Input			External power supply (V)				Pulse input			Limits			
V_{B2}	Brightness control characteristics (typical)	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	2	–	b SG4	a –	a –	1.2	1.8	2.4	V
ΔV_{B2}	Brightness control relative characteristics (typical)		Relative to measured values above										-0.3	0	0.3	V
V_{B3}	Brightness control characteristics (minimum)	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	1	–	b SG4	a –	a –	0.3	0.7	1.1	V
ΔV_{B3}	Brightness control relative characteristics (minimum)		Relative to measured values above										-0.3	0	0.3	V
F_{C1}	Frequency characteristics 1 (f=50MHz;maximum)	T.P.35 T.P.30 T.P.25	b SG1	b SG1	b SG1	5	Variable	–	–	c –	a –	a –	-2	0	2.5	dB
ΔF_{C1}	Frequency relative characteristics 1 (f=50MHz;maximum)		Relative to measured values above										-1	0	1	–
$F_{C1'}$	Frequency characteristics 1 (f=150MHz;maximum)	T.P.35 T.P.30 T.P.25	b SG2	b SG2	b SG2	5	Variable	–	–	c –	a –	a –	-3	-2.0	3	dB
$\Delta F_{C1'}$	Frequency relative characteristics 1 (f=150MHz;maximum)		Relative to measured values above										-1	0	1	–
F_{C2}	Frequency characteristics 2 (f=150MHz; maximum)	T.P.35 T.P.30 T.P.25	b SG2	b SG2	b SG2	5	Variable	–	–	c –	a –	a –	-3	0	3	dB
ΔF_{C2}	Frequency relative characteristics 2 (f=150MHz; maximum)		Relative to measured values above										-1	0	1	–
C.T.1	Crosstalk 1 (f=50MHz)	T.P.35 T.P.30 T.P.25	b SG1	a –	a –	5	5	–	–	c –	a –	a –	–	-30	-20	dB
C.T.1'	Crosstalk 1 (f=150MHz)	T.P.35 T.P.30 T.P.25	b SG2	a –	a –	5	5	–	–	c –	a –	a –	–	-20	-15	dB
C.T.2	Crosstalk 2 (f=50MHz)	T.P.35 T.P.30 T.P.25	a –	b SG1	a –	5	5	–	–	c –	a –	a –	–	-30	-20	dB
C.T.2'	Crosstalk 2 (f=150MHz)	T.P.35 T.P.30 T.P.25	a –	b SG2	a –	5	5	–	–	c –	a –	a –	–	-20	-15	dB
C.T.3	Crosstalk 3 (f=50MHz)	T.P.35 T.P.30 T.P.25	a –	a –	b SG1	5	5	–	–	c –	a –	a –	–	-30	-20	dB
C.T.3'	Crosstalk 3 (f=150MHz)	T.P.35 T.P.30 T.P.25	a –	a –	b SG2	5	5	–	–	c –	a –	a –	–	-20	-15	dB
Tr	Pulse characteristics 1	T.P.35 T.P.30 T.P.25	b SG3	b SG3	b SG3	5	Variable	Variable	–	b SG4	a –	a –	–	2.5	–	nsec
Tf	Pulse characteristics 2	T.P.35 T.P.30 T.P.25	b SG3	b SG3	b SG3	5	Variable	Variable	–	b SG4	a –	a –	–	2.5	–	nsec
V14th	Clamp pulse threshold voltage	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	2	–	b SG4	a –	a –	1.0	1.5	2.5	V_{DC}
W14	Clamp pulse minimum width	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	2	–	b SG4	a –	a –	0.2	0.5	–	μsec
P_{DCH}	Pedestal voltage temperature characteristics1	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	2	–	b SG4	a –	a –	-0.3	0	0.3	V_{DC}

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point (s)	Input SW13 R-ch	Input SW8 G-ch	Input SW3 B-ch	External power supply (V) V4	V17	V19	V36	Pulse input SW18	SW1, 5, 10, 15	SW20	Limits Min.	Typ.	Max.	Unit
PDCL	Pedestal voltage temperature characteristics2	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	2	–	b SG4	a –	a –	-0.3	0	0.3	VDC
OTr	OSD pulse characteristics1	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	Vari-able	Vari-able	b SG4	SW1...a other...b SG6	a –	–	3.5	8	nsec
OTf	OSD pulse characteristics2	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	Vari-able	Vari-able	b SG4	SW1...a other...b SG6	a –	–	3.5	8	nsec
Oaj1	OSD adjusting control characteristics (maximum)	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	2	4	b SG4	b SG6	a –	3.9	4.6	5.3	VP-P
∆Oaj1	OSD adjusting control relative characteristics (maximum)		Relative to measured values above										0.8	1	1.2	–
Oaj2	OSD adjusting control characteristics (minimum)	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	2	0	b SG4	b SG6	a –	–	0	0.5	VP-P
∆Oaj2	OSD adjusting control relative characteristics (minimum)		Relative to measured values above										0.8	1	1.2	–
OSDth	OSD input threshold voltage	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	2	5	b SG4	SW1...a other...b SG6	a –	1.7	2.5	3.5	VDC
V1th	BLK input threshold voltage	T.P.35 T.P.30 T.P.25	b SG5	b SG5	b SG5	5	5	2	5	b SG4	SW1...b SG6 other...a	a –	1.7	2.5	3.5	VDC
HBLK	Retrace BLK voltage	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	2	0	a –	a –	b SG7	–	0.2	0.5	VDC
HVth	Retrace BLK input threshold voltage	T.P.35 T.P.30 T.P.25	a –	a –	a –	5	5	2	0	a –	a –	b SG7	0.5	1.5	2.5	VDC

ELECTRICAL CHARACTERISTICS TEST METHOD

1. Because a description of signal input pin and pulse input pin switch numbers is already given in Supplementary Table, only external power supply switch numbers are included in the notes below.

Sub contrast voltages V4, V9 and V14 are always set to the same voltage, therefore only V4 is referred to in Supplementary Table.

Icc Circuit current
Measuring conditions are as listed in Supplementary Table.
Measured with an ammeter At test point A when SWA is set to b.

Vomax Output dynamic range
Voltage V19 is varied as described below:
1. Decrease V19 gradually while inputting SG5 to pin 13 (8 or 3). Measure the voltage when the bottom of the waveform output at T.P25 (30 or 35) is distorted. The voltage is called VOLR (VOLG or VOLB).

2. Increase V19 gradually, and measure the voltage when the top of the waveform output at T.P25 (30 or 35) is distorted. The voltage is called VOHR (VOHG or VOHB).

3. Voltage VOMAX is calculated by the equation below:

$$V_{OMAX} = V_{OHR} (V_{OHG}, V_{OHB}) - V_{OLR} (V_{OLG}, V_{OLB})$$
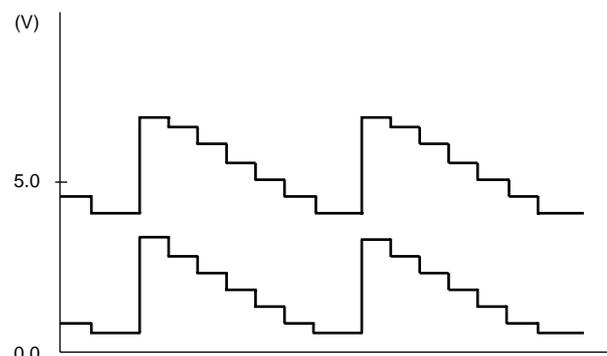
Waveform Output at T.P25
(Identical to output at T.P.30 and T.P.35.)

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Vimax Maximum input

Voltage V17 is changed to 2.5V, and increase the input signal amplitude gradually, starting from 700mVP-P.

Measure the amplitude when the output signal starts becoming distorted.

Gv Maximum gain
ΔGv Relative maximum gain

1. Input SG5 to pin 13 (8 or 3), and read the amplitude at output T.P25 (30 or 35). The amplitude is called VOR1 (VOG1 or VOB1) .

2. Maximum gain Gv is calculated by the equation below:

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

3. Relative maximum gain ΔG is calculated by the equation below:

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

VCR1 Contrast control characteristics (typical)
ΔVCR1 Contrast control relative characteristics (typical)

1. Measuring conditions are as given in Supplementary Table. The setting of V17 is changed to 4V.

2. Measure the amplitude output at T.P25 (30 or 35). The measured value is called VOR2 (VOG2 or VOB2).

3. Contrast control characteristics VCR1 and relative characteristics ΔVCR1 are calculated, respectively, by the equations below:

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

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

VCR2 Contrast control characteristics (minimum)
ΔVCR2 Contrast control relative characteristics (minimum)

1. Set V17 to 1.0V. Other conditions are as given in Supplementary Table.

2. Measure the amplitude output at T.P25 (30or 35). The measured value is called VOR3 (VOG3 or VOB3), and is treated as VCR2.

3. Contrast control relative characteristics ΔVCR2 are calculated by the equation below:

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

VSCR1 Sub contrast control characteristics (typical)
ΔVSCR1 Sub contrast control relative characteristics (typical)

1. Set V4, V9 and V14 to 4.0V. Other conditions are as given in Supplementary Table.

2. Measure the amplitude output at T.P25 (30 or 35). The measured value is called VOR4 (VOG4 or VOB4).

3. Sub contrast control characteristics VSCR1 and relative characteristics ΔVSCR1 are calculated, respectively, by the equations below:

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

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

VSCR2 Sub contrast control characteristics (minimum)
ΔVSCR2 Sub contrast control relative characteristics (minimum)

1. Set V4, V9 and V14 to 1.0V. Other conditions are as given in Supplementary Table.

2. Measure the amplitude output at T.P25 (30 or 35). The measured value is called VOR5 (VOG5 or VOB5), and is treated as VSCR2.

3. Relative characteristics ΔVSCR2 are calculated by the equation below:

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

VSCR3 Contrast/sub contrast control characteristics (typical)
ΔVSCR3 Contrast/sub contrast control relative characteristics (typical)

1. Set V4, V9, V14 and V17 to 3.0V. Other conditions are as given in Supplementary Table.

2. Measure the amplitude at T.P25 (30 or 35). The measured value is called VOR6 (VOG6 or VOB6). and is treated as VSCR3.

3. Relative sub contrast control characteristics ΔVSCR3 is

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

VB1 Brightness control characteristics (maximum)
ΔVB1 Brightness control relative characteristics (maximum)

1. Measuring conditions are as given in Supplementary Table.

2. Measure the output at T.P25 (30 or 35) with a voltmeter. The measured value is called VOR7 (VOG7 or VOB7), and is treated as VB1.

3. To obtain brightness control relative characteristics, calculate the difference in the output between the channels, using VOR7, VOG7 and VOB7.

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

VB2 Brightness control characteristics (typical)
ΔVB2 Brightness control relative characteristics (typical)

1. Measuring conditions are as given in Supplementary Table.

2. Measure the output at T.P25 (30 or 35) with a voltmeter. The measured value is called VOR7' (VOG7' or VOB7'), and is treated as VB2.

3. To obtain brightness control relative characteristics (ΔVB2), calculate the difference in the output between the channels, using VOR7', VOG7', and VOB7'.

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

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VB3 Brightness control characteristics (minimum)

∆VB3 Brightness control relative characteristics (minimum)

1. Measuring conditions are as given in Supplementary Table.

2. Measure the output at T.P25 (30 or 35) with a voltmeter.
   The measured value is called VOR7" (VOG7" or VOB7"), and is treated as VB2.

3. To obtain brightness control relative characteristics (∆VB3), calculate the difference in the output between the channels, using VOR7", VOG7" and VOB7".

$$\Delta V_{B3} = V_{OR7"} - V_{OG7"} \qquad [V]$$
$$= V_{OG7"} - V_{OB7"}$$
$$= V_{OB7"} - V_{OR7"}$$

Fc1 Frequency characteristics1 (f=50MHz; maximum)

∆Fc1 Frequency relative characteristics1 (f=50MHz; maximum)

Fc1' Frequency characteristics1 (f=150MHz; maximum)

∆Fc1' Frequency relative characteristics1 (f=150MHz; maximum)

1. Measuring conditions are as given in Supplementary Table.

2. First, SGA is as input signal. Input a resister that is about 2KΩ to offer the voltage at input pins (Pin 3, Pin 8, Pin 13) in order that the bottom of input signal is 2.5V.
   Inputs the voltage at hold pins (Pin 23, Pin 28, Pin 33) in order that the bottom of sine wave output is 2V.
   Control the MAIN CONTRAST (V17) in order that the amplitude of sine wave output is 4.0VP-P.
   By the same way, measure the output amplitude when SG1, SG2 is as input signal.

3. Supposing that the measured value is treated as amplitude VOR8 (VOG8 or VOB8) when SG1 is input, or as VOR9 (VOG9 or VOB9) when SG2 is input, frequency characteristics Fc1 and Fc1' are calculated as follows:

$$F_{C1} = 20LOG \frac{V_{OR8} (V_{OG8}, V_{OB8}) \quad [V_{P-P}]}{4.0 \quad [V_{P-P}]}$$

$$F_{C1}' = 20LOG \frac{V_{OR9} (V_{OG9}, V_{OB9}) \quad [V_{P-P}]}{4.0 \quad [V_{P-P}]}$$

4. Frequency relative band widths ∆Fc1 and ∆Fc1' are equal to the difference in Fc1 and Fc1', respectively, between the channels.

Fc2 Frequency characteristics2 (f=150MHz; maximum)

∆Fc2' Frequency relative characteristics2 (f=150MHz; maximum)

Measuring conditions and procedure are the same as described in Fc1, ∆Fc1, Fc1', ∆Fc1', except that Control the MAIN CONTRAST (V17) in order that the amplitude of sine wave output is 1.0VP-P.

C.T.1 Crosstalk1 (f=50MHz)

C.T.1' Crosstalk1 (f=150MHz)

1. Measuring conditions are as given in Supplementary Table.

2. Input SG1 (or SG2) to pin 13 (R-ch) only, and then measure the waveform amplitude output at T.P25 (30 or 35). The measured value is called VOR, VOG and or VOB respectively.

3. Crosstalk C.T.1 (C.T.1') is calculated by the equation below:

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

C.T.2 Crosstalk2 (f=50MHz)

C.T.2' Crosstalk2 (f=150MHz)

1. Change the input pin from pin 8 (G-ch), and measure the output in the same way as in C.T.1, C.T.1'.

2. Crosstalk C.T. 2 (C.T.2') is calculated by the equation below:

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

C.T.3 Crosstalk3 (f=50MHz)

C.T.3' Crosstalk3 (f=150MHz)

1. Change the input pin from pin 13 (R-ch) to pin 3 (B-ch), and measure the output in the same way as in C.T.1, C.T.1'.

2. Crosstalk C.T. 3 (C.T.3') is calculated by the equation below:

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

Tr Pulse characteristics1

Tf Pulse characteristics2

1. Measuring conditions are as given in Supplementary Table.
   Control the MAIN CONTRAST(V17) in order that the amplitude of output signal is 4.0VP-P. Control the BRIGHTNESS(V19) in order that the Black level of output signal is 2.0V.

2. Measure the time needed for the input pulse to rise from 10% to 90% (Tr1) and to fall from 90% to 10% (Tf1)with an active prove.

3. Measure the time needed for the output pulse to rise from 10% to 90% (Tr2) and to fall from 90% to 10% (Tf2) with an active prove.

4. Pulse characteristics Tr and Tf are calculated by the equation below:

$$Tr \ (nsec) = \sqrt{(Tr2)^2 - (Tr1)^2}$$
$$Tf \ (nsec) = \sqrt{(Tf2)^2 - (Tf1)^2}$$
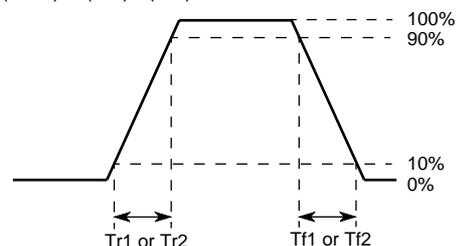
V14th Clamp pulse threshold voltage

1. Measuring conditions are as given in Supplementary Table.
2. Turn down the SG4 input level gradually, monitoring the output (about 1.8 V_{DC}). Measure the top level of input pulse when the output pedestal voltage turn decrease with unstable.

W14 Clamp pulse minimum width

Decrease the SG4 pulse width gradually, monitoring the output. Measure the SG4 pulse width (a point of 1.5V) when the output pedestal voltage turn decrease with unstable.

P_{DCH} Pedestal voltage temperature characteristics1
P_{DCL} Pedestal voltage temperature characteristics2

1. Measuring conditions are as given in Supplementary Table.
2. Measure the pedestal voltage at room temperature. The measured value is called P_{DC1}.
3. Measure the pedestal voltage at temperatures of -20°C and 85°C. The measured value is called, respectively, P_{DC2} and P_{DC3}.
4. $P_{DCH}=P_{DC1} - P_{DC2}$
   $P_{DCL}=P_{DC1} - P_{DC3}$

OTr OSD pulse characteristics1
OTf OSD pulse characteristics2

1. Measuring conditions are as given in Supplementary Table. Control the MAIN OSD ADJUST(V36) in order that the amplitude of output signal is 3.0V_{P-P}. Control the BRIGHTNESS(V19) in order that the Black level of output signal is 2.0V.
2. Measure the time needed for the input pulse to rise from 10% to 90% (OTr1) and to fall from 90% to 10% (OTf1) with an active prove.
3. Measure the time needed for the output pulse to rise from 10% to 90% (OTr2) and to fall from 90% to 10% (OTf2) with an active prove.
4. Pulse characteristics Tr and Tf are calculated by the equations below :

$$OTr\ (nsec)=\sqrt{(OTr2)^2-(OTr1)^2}$$
$$OTf\ (nsec)=\sqrt{(OTf2)^2-(OTf1)^2}$$

Oaj1 OSD adjusting control characteristics (maximum)
ΔOaj1 OSD adjusting control relative characteristics (maximum)

1. Measuring conditions are as given in Supplementary Table.
2. Measure the output at T.P25 (30 or 35). The pedestal level is called V_{LRA} (V_{LGA} or V_{LBA}), and the OSD level is called V_{HRA} (V_{HGA} or V_{HBA}).
3. V_{LRA} (V_{LGA} or V_{LBA}) is treated as Oaj1.
   Oaj1=V_{ORA} (V_{OGA}, V_{OBA}) = V_{HRA}-V_{LRA}, (V_{HGA}-V_{LGA}, V_{HBA}-V_{LBA})
4. OSD adjusting control relative characteristics ΔOaj1 are calculated by the equation below:

   ΔOaj1=V_{ORA}/V_{OGA}, V_{OGA}/V_{OBA}, V_{OBA}/V_{ORA}

Oaj2 OSD adjusting control characteristics (minimum)
ΔOaj2 OSD adjusting control relative characteristics (minimum)

Measuring conditions and procedure are the same as described in Note 23, except that V36 is set to 0V.

OSDth OSD input threshold voltage

1. Measuring conditions are as given in Supplementary Table.
2. Reduce the SG6 input level gradually, monitoring output. Measure the SG6 level when the output reaches 0V. The measured value is called OSDth.

V1th BLK input threshold voltage

1. Measuring conditions are as given in Supplementary Table.
2. Make sure that signals are not being output synchronously with SG6 (blanking period).
3. Reduce the SG6 input level gradually, monitoring output. Measure the SG6 level when the blanking period disappears. The measured value is called V1th.

H_{BLK} Retrace BLK voltage

1. Measuring conditions are as given in Supplementary Table.
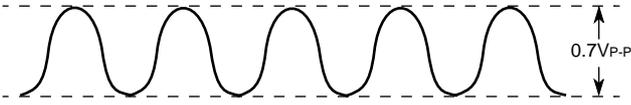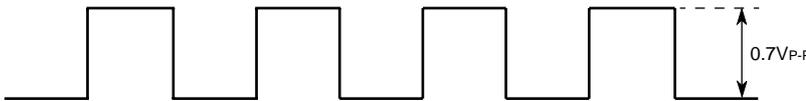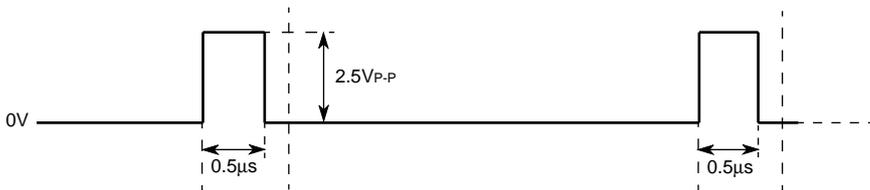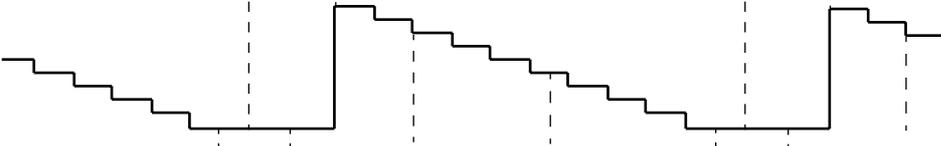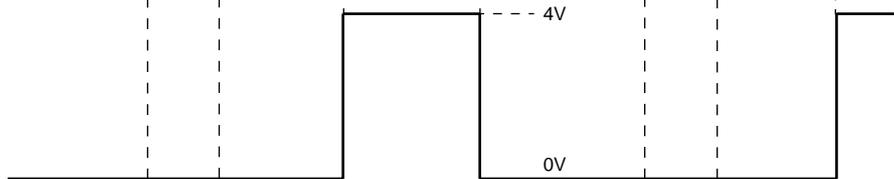2. Monitoring to output at that time, read the level of retrace blanking.

HVth Retrace BLK input threshold voltage

1. Measuring conditions are as given in Supplementary Table.
2. Confirm that output signal is being blanked by the SG7 at the time.
   Monitoring to output signal, decreasing the level of SG7. Measure the top level of SG7 when the blanking period is disappeared.

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

INPUT SIGNAL

SG No.	Signals
SGA	Sine wave with amplitude of 0.7VP-P (f=1MHz) 0.7VP-P
SG1	Sine wave with amplitude of 0.7VP-P (f=50MHz)
SG2	Sine wave with amplitude of 0.7VP-P (f=150MHz)
SG3	Pulse with amplitude of 0.7VP-P (f=1MHz, duty=50%) Pulses which are synchronous with SG4 pedestal portion 0.7VP-P
SG4	Pulses which are synchronous with standard video step waveform pedestal portion: amplitude, 2.5VP-P; and pulse width, 0.5μs 2.5VP-P 0V 0.5μs 0.5μs
SG5 Standard video step waveform	 Video signal with amplitude of 0.7VP-P (f=30kHz, amplitude sometimes variable)
SG6 OSD BLK and OSD signals	4V 0V Pulses which are synchronous with standard video step waveform's video portions: amplitude, 4.0VP-P; and pulse width, 15μs
SG7 Retrace BLK signals	4V 0V Pulses which are synchronous with standard video step waveform's video portions: amplitude, 4.0VP-P; and pulse width, 3μs

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

APLLICATION METHOD FOR M52737SP

1) CLAMP PULSE INPUT
Input positive pulse.

The calculating of clamp pulse threshold voltage is by the method as shown right.
The voltage more than 2.2V is limited.

Recommended clamp pulse voltage is as the Fig. shown right.
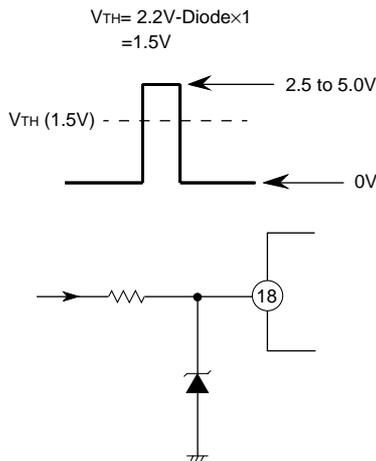
pulse width is recommended
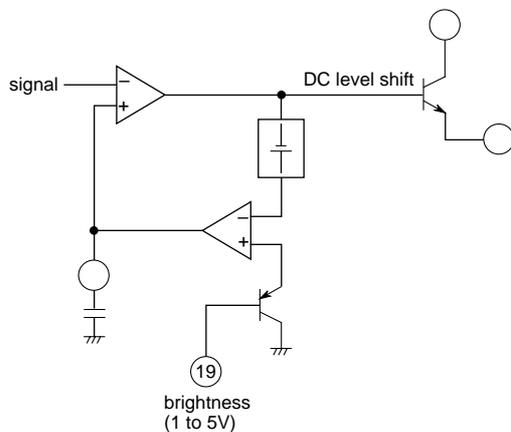
   above 15kHz, 1.0μsec

   above 30kHz, 0.5μsec

   above 64kHz, 0.3μsec .

The clamp pulse circuit in ordinary set is a long roundabout way, and beside high voltage, sometimes connected to external terminal, it is very easy affected by large surge.
Therefore, the Fig. shown right is recommended.

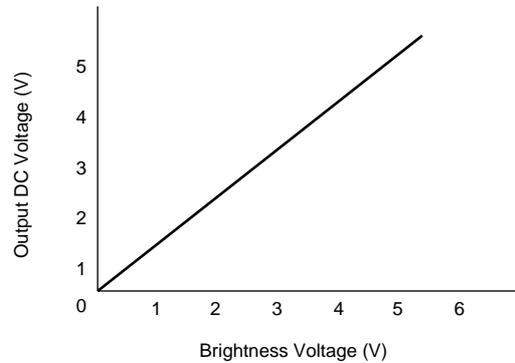V_{TH}= 2.2V-Diode×1
=1.5V

2) Brightness action

The upper figure is principle

2-1) Brightness terminal
Used range is 1 to 5V
Control characteristic is shown in the right Fig. .

2-2) Sub brightness
There is no sub brightness control function in this IC.

2-3) Hold capacitor
It is necessary more than 0.01μF for this IC (when fH=15kHz).
In fact it is changed according with hold time (except clamping time). It is need more capacitance for longer the hold time. In other way, for application. The smaller the capacitance is, the higher the response. The more the capacitance is, the more stable the action. According to signal, it is free to set the value. (especially the status of pulse for vertical sync timing).

3) BLK (for OSD) input terminal
· Input type is open base (reference to page 4).

· Threshold voltage is 2.5V.

· If input of OSD signal without input of BLK pulse, the action will be strange. Therefore, it is necessary to input BLK pulse when input of OSD signal.

· Grounding this terminal when the OSD function is not used.

· If overlay OSD display period with clamp pulse period, the action will be strange. The method for this situation, recommended external circuit is as the right Fig.
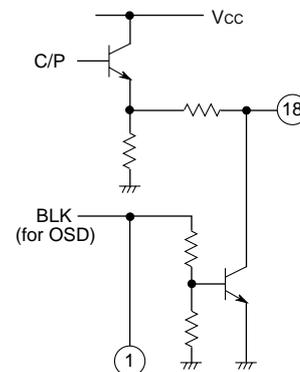
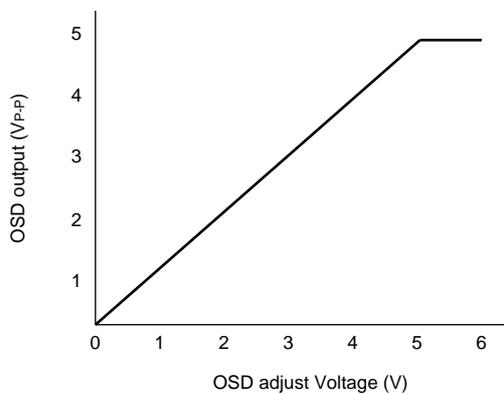### 3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

4) Retrace BLK input terminal

· Input type is open base. (reference to page 5).

· Threshold voltage is 1.5V.

· Grounding this terminal when retrace blanking function is not
  used.

5) OSD adjust terminal

· Used range is 0 to 5V.

· Control characteristic is shown in the right Fig. .

· If there are something noises from the external of the terminals,
  and it also affect the output of the terminals, add capacitances
  will be effective for it.

· Make the terminals of OSD adjust open or GND, when OSD
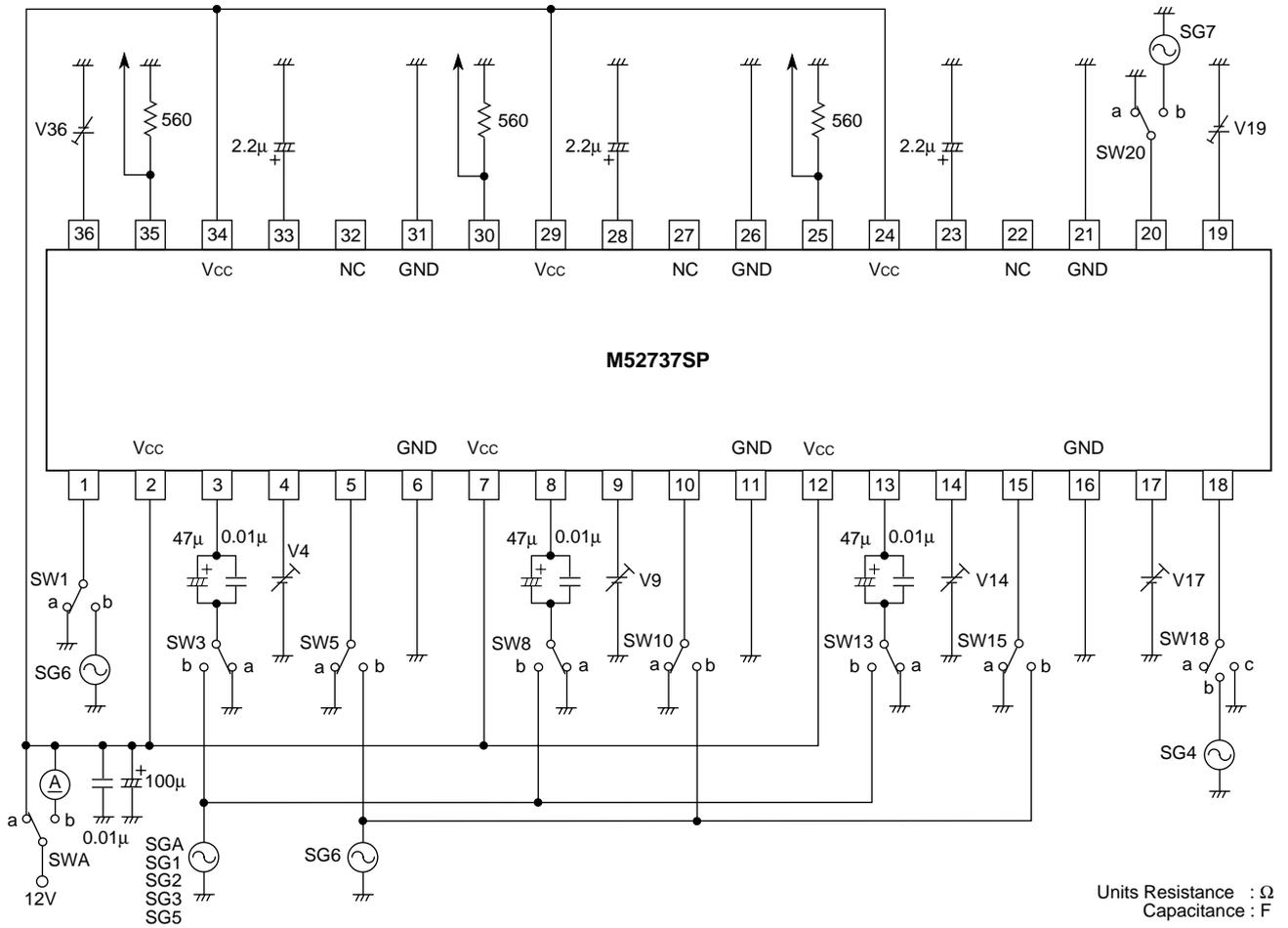 function is not used.

Notice of application

· Make the nearest distance between output pin and pull down
  resister.

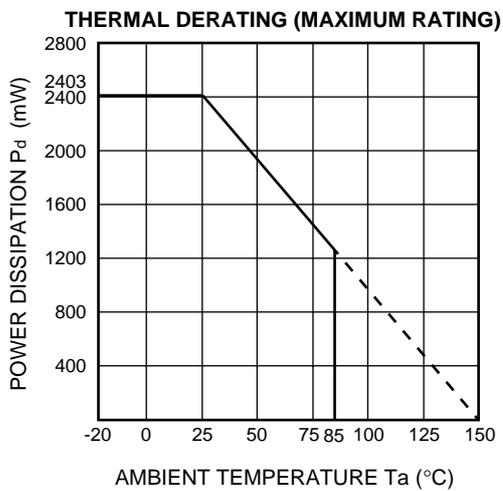· Recommended pedestal voltage of IC output signal is 2V.

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

TEST CIRCUIT

Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)

POWER DISSIPATION P_d (mW)

2800
2403
2400
2000
1600
1200
800
400

-20 0 25 50 75 85 100 125 150

AMBIENT TEMPERATURE Ta (°C)

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

APPLICATION EXAMPLE

Units Resistance : Ω
Capacitance : F

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

DESCRIPTION OF PIN

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
1	BLK IN (for OSD)	–		·Input pulses of minimum 3.5V. 3.5 to 5V 1V maximum ·Connected to GND if not used.
2 7 12	Vcc (B-ch) Vcc (G-ch) Vcc (R-ch)	12	–	·Apply equivalent voltage to 3 channels.
3 8 13	INPUT (B) INPUT (G) INPUT (R)	2.5		·Clamped to about 2.5V due to clamp pulses from pin 18. ·Input at low impedance.
4 9 14	Subcontrast (B) Subcontrast (G) Subcontrast (R)	2.5		·Use at maximum 5V for stable operation.
5 10 15	OSD IN (B) OSD IN (G) OSD IN (R)	–		·Input pulses of minimum 3.5V. 3.5 to 5V 1V maximum ·Connected to GND if not used.

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

DESCRIPTION OF PIN (cont.)

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
6, 31 11, 26 16, 21	GND (B) GND (G) GND (R)	GND	–	
17	Main contrast	2.5		·Use at maximum 5V for stable operation.
18	CP IN	–		·Input pulses of minimum 2.5V. ·Input at low impedance.
19	Brightness	–		
20	BLK IN (for retrace)	–		·Input pulses of minimum 2.5V. ·Connected to GND if not used.

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

DESCRIPTION OF PIN (cont.)

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
22, 27, 32	NC			
23 28 33	Hold (R) Hold (G) Hold (B)	Variable		·A capacity is needed on the GND side.
24 29 34	Vcc2 (R) Vcc2 (G) Vcc2 (B)	Apply 12		·Used to supply power to output emitter follower only. ·Apply equivalent voltage to 3 channels.
25 30 35	OUTPUT (R) OUTPUT (G) OUTPUT (B)	Variable		·A resistor is needed on the GND side. Set discretionally to maximum 15mA, depending on the required driving capacity.
36	OSD adjust	at open 5.5V		·Pulled up directly to Vcc or open if not used.