

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 (3VP-P)
OSD.....50MHz
- Input :RGB.....0.7VP-P (typ.)
OSD.....3.0VP-P min. (positive)
BLK (for OSD).....3.0VP-P min. (positive)
Retrace BLK.....3.0VP-P min. (positive)
- Output :RGB.....4.5VP-P (max.)
OSD.....4.5VP-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

PIN CONFIGURATION (TOP VIEW)

BLK IN (FOR OSD)	1	36	OSD ADJUST
Vcc1 (B)	2	35	OUTPUT (B)
INPUT (B)	3	34	Vcc2 (B)
SUB CONTRAST (B)	4	33	HOLD (B)
OSD IN (B)	5	32	NC
GND1 (B)	6	31	GND2 (B)
Vcc1 (G)	7	30	OUTPUT (G)
INPUT (G)	8	29	Vcc2 (G)
SUB CONTRAST (G)	9	28	HOLD (G)
OSD IN (G)	10	27	NC
GND1 (G)	11	26	GND2 (G)
Vcc1 (R)	12	25	OUTPUT (R)
INPUT (R)	13	24	Vcc2 (R)
SUB CONTRAST (R)	14	23	HOLD (R)
OSD IN (R)	15	22	NC
GND1 (R)	16	21	GND2 (R)
MAIN CONTRAST	17	20	BLK IN (FOR RETRACE)
CP IN	18	19	BRIGHTNESS

M52737SP

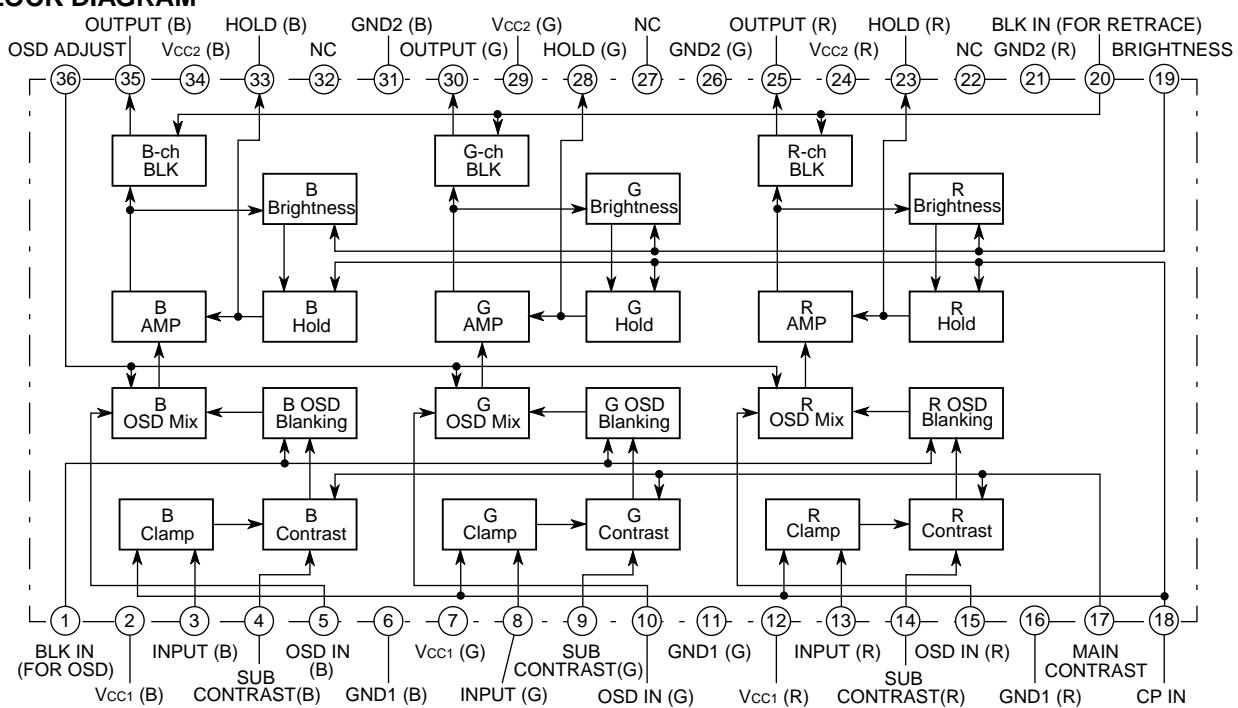
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NC : NO CONNECTION

RECOMMENDED OPERATING CONDITION

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

BLOCK DIAGRAM



3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings				Unit
Vcc	Supply voltage	13.0				V
Pd	Power dissipation	2403				mW
Topr	Ambient temperature	-20 to +85				°C
Tstg	Storage temperature	-40 to +150				°C
Vopr	Recommended supply voltage	12.0				V
Vopr'	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 conditions											Limits			Unit		
		Test point (s)	Input			External power supply (V)				Pulse input								
			SW13 R-ch	SW8 G-ch	SW3 B-ch	V4	V17	V19	V36	SW18	SW1, 5, 10, 15	SW20	Min.	Typ.	Max.			
Icc	Circuit current	A	a —	a —	a —	5	5	5	2	b SG4	a —	a —	72	93	115	mA		
Vomax	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		
Vimax	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		
Gv	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		
ΔGv	Relative maximum gain		Relative to measured values above										0.8	1	1.2	—		
VCR1	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		
ΔVCR1	Contrast control relative characteristics (typical)		Relative to measured values above										0.8	1	1.2	—		
VCR2	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		
ΔVCR2	Contrast control relative characteristics (minimum)		Relative to measured values above										0.8	1	1.2	—		
VSCR1	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		
ΔVSCR1	Sub contrast control relative characteristics (typical)		Relative to measured values above										0.8	1	1.2	—		
VSCR2	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		
ΔVSCR2	Sub contrast control relative characteristics (minimum)		Relative to measured values above										0.8	1	1.2	—		
VSCR3	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		
ΔVSCR3	Contrast/sub contrast control relative characteristics (typical)		Relative to measured values above										0.8	1	1.2	—		
VB1	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		
ΔVB1	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 conditions											Limits			Unit		
		Test point (s)	Input			External power supply (V)				Pulse input								
			sw13 R-ch	SW8 G-ch	SW3 B-ch	V4	V17	V19	V36	sw18 5, 10, 15	SW1, 5, 10, 15	SW20	Min.	Typ.	Max.			
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	Vari- able	—	—	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	Vari- able	—	—	c —	a —	a —	—3	—2.0	3	dB		
ΔF _{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	Vari- able	—	—	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	Vari- able	Vari- able	—	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	Vari- able	Vari- able	—	b SG4	a —	a —	—	2.5	—	nsec		
V _{14th}	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}		
W ₁₄	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 conditions												Limits			Unit
		Test point (s)	Input			External power supply (V)				Pulse input							
			sw13 R-ch	SW8 G-ch	SW3 B-ch	V4	V17	V19	V36	sw18	SW1, 5, 10, 15	SW20	Min.	Typ.	Max.		
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	Variable	Variable	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	Variable	Variable	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	
ΔOaj1	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	
ΔOaj2	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

- 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

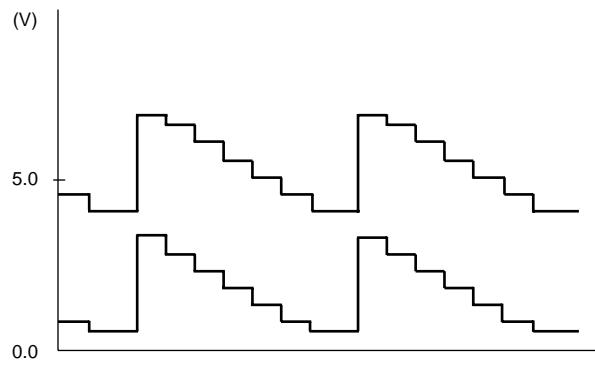
Voltage V19 is varied as described below:

- 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).

- 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).

- Voltage VOMAX is calculated by the equation below:

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



Waveform Output at T.P25
(Identical to output at T.P30 and T.P35.)

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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:

$$Gv=20\log \frac{VOR1 \text{ (VOG1, VOB1)}}{0.7} \text{ [Vp-P]}$$

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

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

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:

$$Vcr1=20\log \frac{VOR2 \text{ (VOG2, VOB2)}}{0.7} \text{ [Vp-P]}$$

$$\Delta Vcr1=VOR2/VOG2, VOG2/VOB2, VOB2/VOR2$$

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 (30 or 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:

$$\Delta Vcr2=VOR3/VOG3, VOG3/VOB3, VOB3/VOR3$$

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:

$$Vscr1=20\log \frac{VOR4 \text{ (VOG4, VOB4)}}{0.7} \text{ [Vp-P]}$$

$$\Delta Vscr1=VOR4/VOG4, VOG4/VOB4, VOB4/VOR4$$

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:

$$\Delta Vscr2=VOR5/VOG5, VOG5/VOB5, VOB5/VOR5$$

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

$$\Delta Vscr3=VOR6/VOG6, VOG6/VOB6, VOB6/VOR6$$

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.

$$\begin{aligned} \Delta Vb1 &= VOR7-VOG7 & [V] \\ &= VOG7-VOB7 \\ &= VOB7-VOR7 \end{aligned}$$

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'.

$$\begin{aligned} \Delta Vb2 &= VOR7'-VOG7' & [V] \\ &= VOG7'-VOB7' \\ &= VOB7'-VOR7' \end{aligned}$$

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V_{B3} Brightness control characteristics (minimum)
ΔV_{B3} 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 V_{OR7"} (V_{OG7"} or V_{OB7"}), and is treated as V_{B2}.
3. To obtain brightness control relative characteristics (ΔV_{B3}), calculate the difference in the output between the channels, using V_{OR7"}, V_{OG7"} and V_{OB7"}.

$$\begin{aligned}\Delta V_{B3} &= V_{OR7"} - V_{OG7"} \\ &= V_{OG7"} - V_{OB7"} \\ &= V_{OB7"} - V_{OR7"}\end{aligned}$$

F_{c1} Frequency characteristics1 (f=50MHz; maximum)**ΔF_{c1} Frequency relative characteristics1****(f=50MHz; maximum)****F_{c1'} Frequency characteristics1 (f=150MHz; maximum)****ΔF_{c1'} Frequency relative characteristics1****(f=150MHz; maximum)**

1. Measuring conditions are as given in Supplementary Table.
2. First, SGA is as input signal. Input a resistor 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 4.0V_{P-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 V_{OR8} (V_{OG8} or V_{OB8}) when SG1 is input, or as V_{OR9} (V_{OG9} or V_{OB9}) when SG2 is input, frequency characteristics F_{c1} and F_{c1'} are calculated as follows:

$$F_{c1} = 20 \log \frac{V_{OR8} (V_{OG8}, V_{OB8})}{4.0} \frac{[V_{P-P}]}{[V_{P-P}]}$$

$$F_{c1'} = 20 \log \frac{V_{OR9} (V_{OG9}, V_{OB9})}{4.0} \frac{[V_{P-P}]}{[V_{P-P}]}$$

4. Frequency relative band widths ΔF_{c1} and ΔF_{c1'} are equal to the difference in F_{c1} and F_{c1'}, respectively, between the channels.

F_{c2} Frequency characteristics2 (f=150MHz; maximum)**ΔF_{c2} Frequency relative characteristics2****(f=150MHz; maximum)**

Measuring conditions and procedure are the same as described in F_{c1}, ΔF_{c1}, F_{c1'}, ΔF_{c1'}, except that Control the MAIN CONTRAST (V17) in order that the amplitude of sine wave output is 1.0V_{P-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 V_{OR}, V_{OG} and or V_{OB} respectively.
3. Crosstalk C.T.1 (C.T.1') is calculated by the equation below:

$$C.T.1 = 20 \log \frac{V_{OR} \text{ or } V_{OB}}{V_{OR}} \frac{[V_{P-P}]}{[V_{P-P}]} \text{ [dB]}$$

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:

$$C.T.2 = 20 \log \frac{V_{OR} \text{ or } V_{OB}}{V_{OG}} \frac{[V_{P-P}]}{[V_{P-P}]} \text{ [dB]}$$

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:

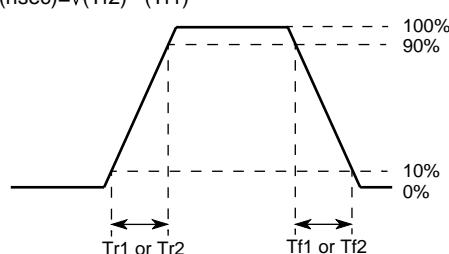
$$C.T.3 = 20 \log \frac{V_{OR} \text{ or } V_{OG}}{V_{OB}} \frac{[V_{P-P}]}{[V_{P-P}]} \text{ [dB]}$$

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 4.0V_{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% (Tr1) and to fall from 90% to 10% (Tf1) with an active probe.
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 probe.
4. Pulse characteristics Tr and Tf are calculated by the equation below:

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

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



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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 Vdc). 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.

Pdch Pedestal voltage temperature characteristics1**Pdcl 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 Pdc1.
3. Measure the pedestal voltage at temperatures of -20°C and 85°C. The measured value is called, respectively, Pdc2 and Pdc3.
4. $Pdch = Pdc1 - Pdc2$
 $Pdcl = Pdc1 - Pdc3$

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 3.0Vp-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% (OTr1) and to fall from 90% to 10% (OTf1) with an active probe.
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 probe.
4. Pulse characteristics Tr and Tf are calculated by the equations below :

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

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

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 VLRA (VLGA or VLBA), and the OSD level is called VHRA (VHGA or VHBA).
3. VLRA (VLGA or VLBA) is treated as Oaj1.
 $Oaj1 = VORA (VOGA, VOB) = VHRA - VLRA, (VHGA - VLGA, VHBA - VLBA)$
4. OSD adjusting control relative characteristics ΔOaj1 are calculated by the equation below:
 $ΔOaj1 = VORA/VOGA, VOGA/VOBA, VOBA/VORA$

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.

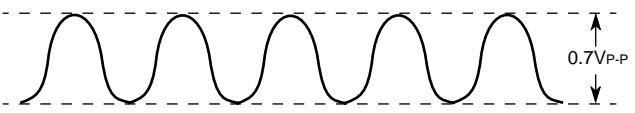
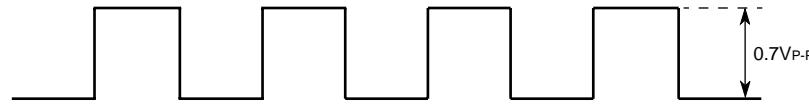
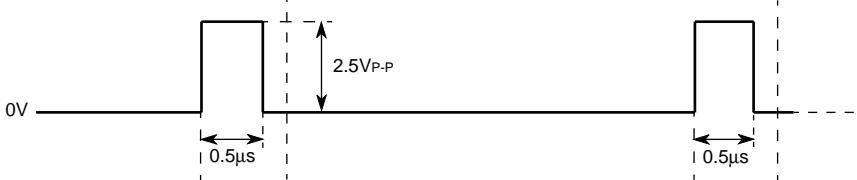
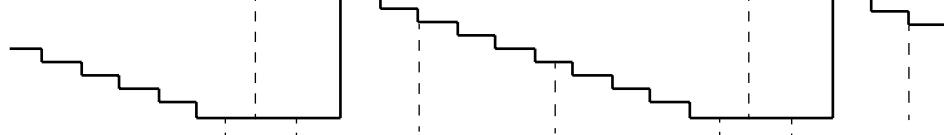
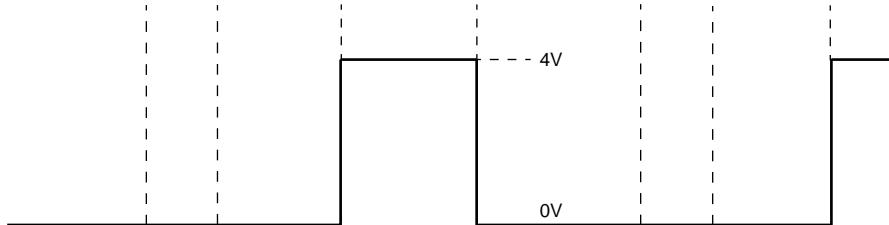
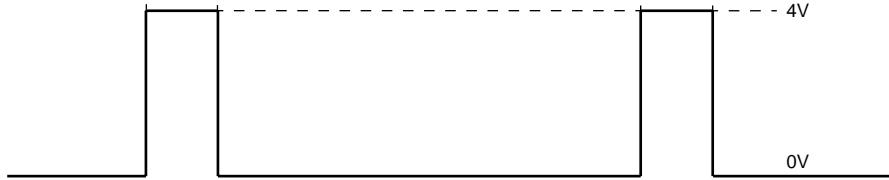
Hblk Retrace BLK voltage

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 0.7V _{P-P} (f=1MHz) 
SG1	Sine wave with amplitude of 0.7V _{P-P} (f=50MHz)
SG2	Sine wave with amplitude of 0.7V _{P-P} (f=150MHz)
SG3	Pulse with amplitude of 0.7V _{P-P} (f=1MHz, duty=50%) Pulses which are synchronous with SG4 pedestal portion 
SG4	Pulses which are synchronous with standard video step waveform pedestal portion: amplitude, 2.5V _{P-P} ; and pulse width, 0.5μs 
SG5 Standard video step waveform	 Video signal with amplitude of 0.7V _{P-P} (f=30kHz, amplitude sometimes variable)
SG6 OSD BLK and OSD signals	 Pulses which are synchronous with standard video step waveform's video portions: amplitude, 4.0V _{P-P} ; and pulse width, 15μs
SG7 Retrace BLK signals	 Pulses which are synchronous with standard video step waveform's video portions: amplitude, 4.0V _{P-P} ; and pulse width, 3μs

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

APPLICATION 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

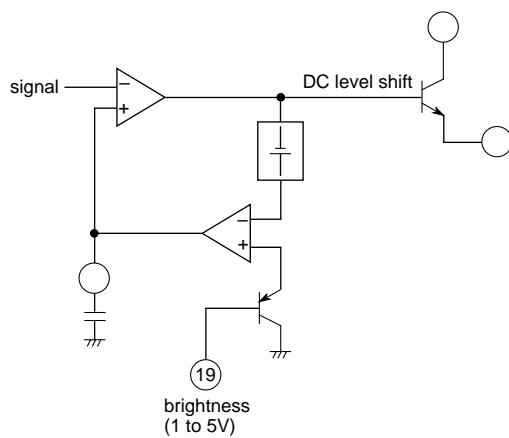
above 15kHz, 1.0μsec
above 30kHz, 0.5μsec
above 64kHz, 0.3μsec .

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.

The figure shows a circuit diagram. A 5V supply is connected to a diode labeled 18. The diode is connected in series with the 5V supply. The output voltage is labeled V_{TH} (1.5V).

2) Brightness action

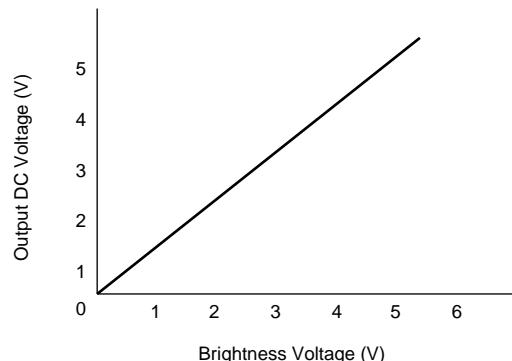


The upper figure is principle

2-1) Brightness terminal

Used range is 1 to 5V

Control characteristic is shown in the right Fig. .



2-2) Sub brightness

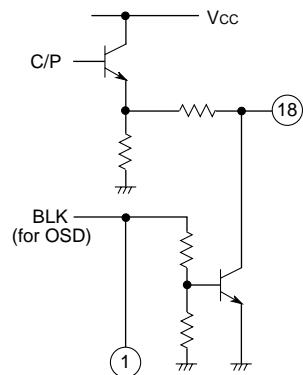
There is no sub brightness control function in this IC.

2-3) Hold capacitor

It is necessary more than $0.01\mu\text{F}$ for this IC (when $fH=15\text{kHz}$). 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.

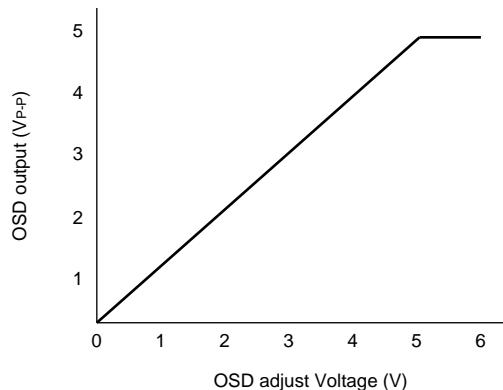


3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING**4) Retrace BLK input terminal**

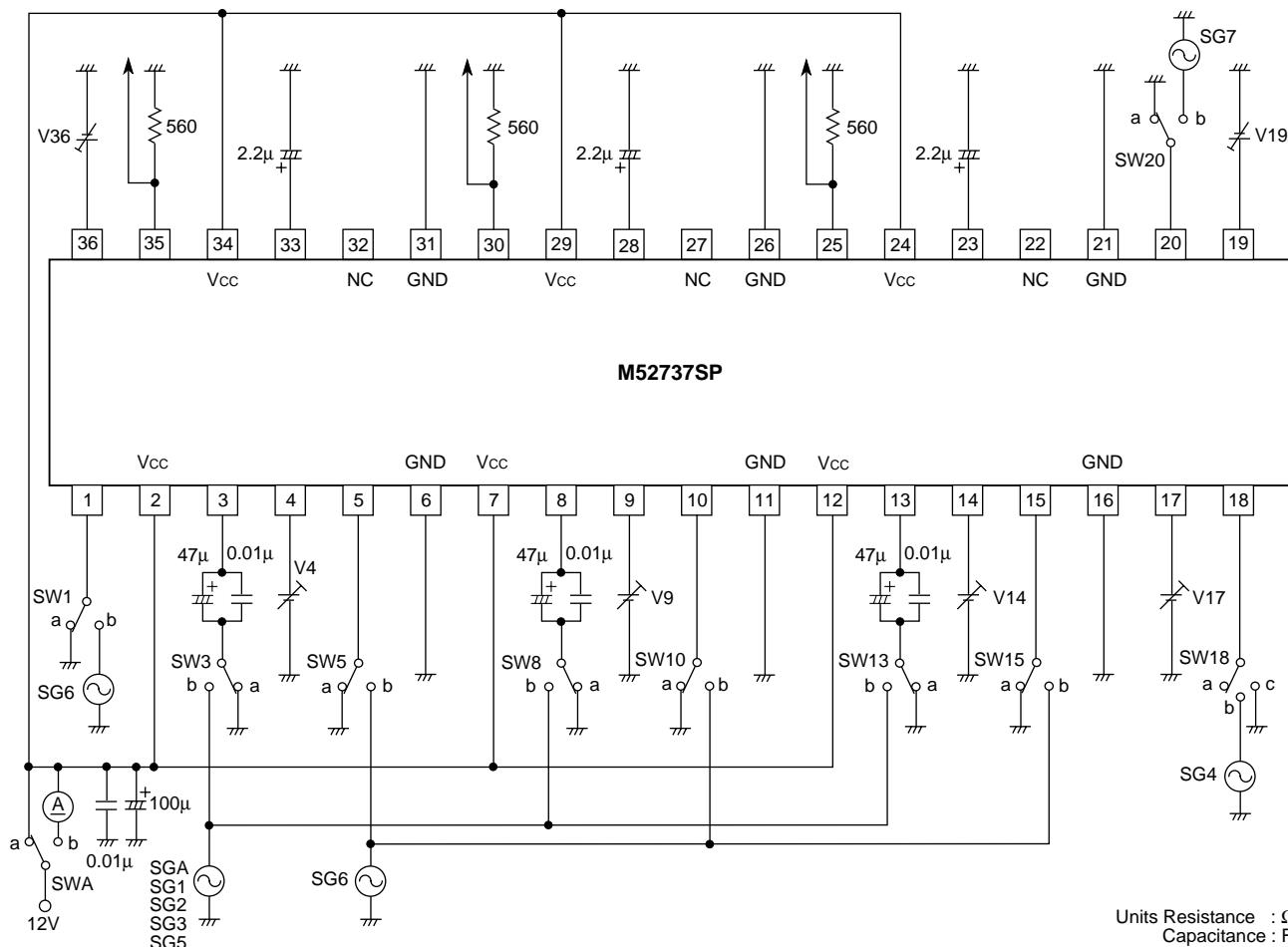
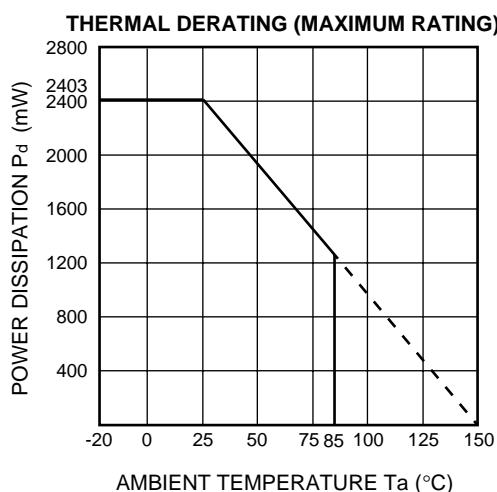
- Input type is open base. (reference to page 5).
- Threshold voltage is 1.5V.
- Grounding this terminal when retrace blanking function is not used.

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.

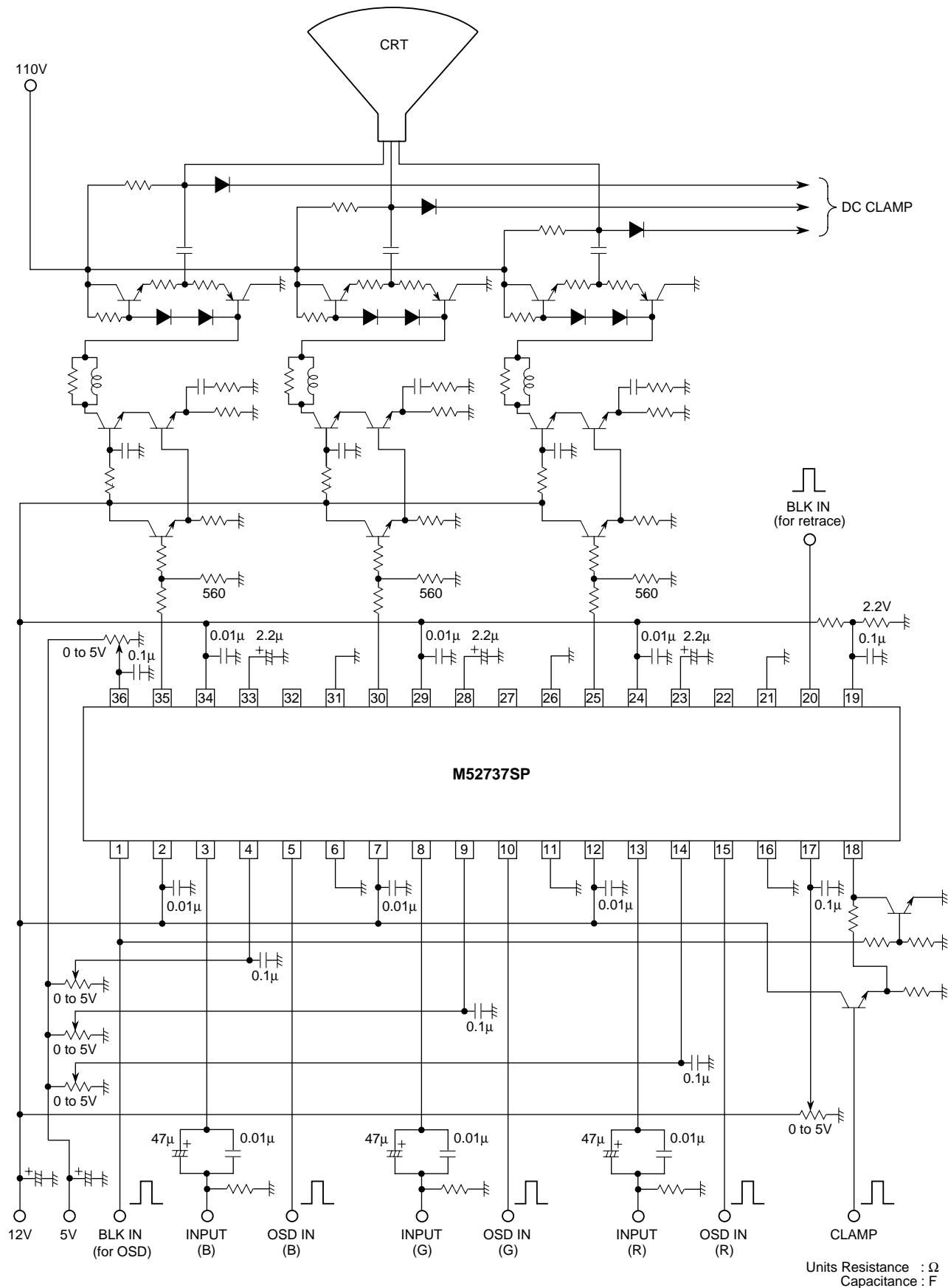
**Notice of application**

- 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****TYPICAL CHARACTERISTICS**

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

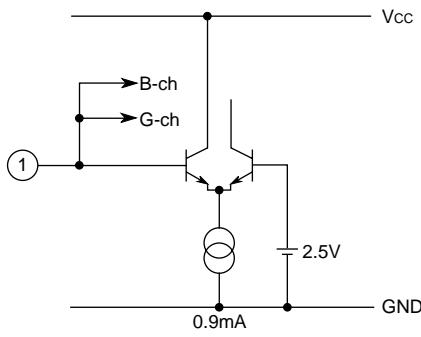
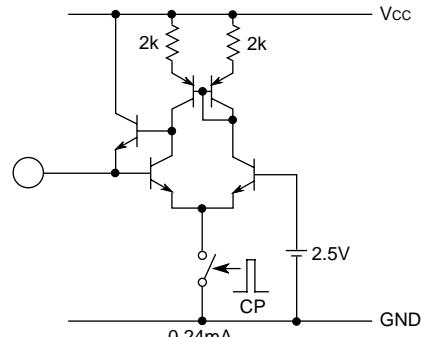
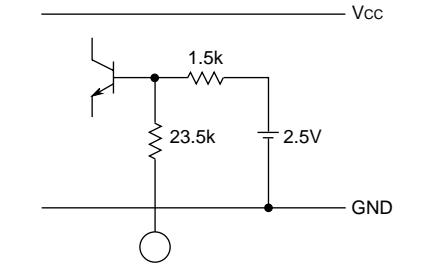
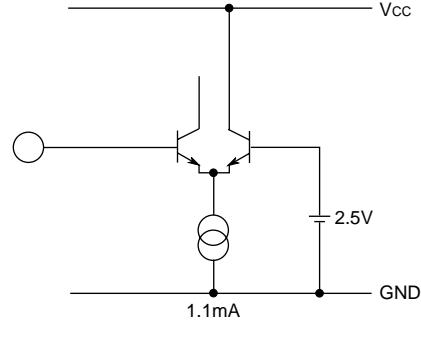
APPLICATION EXAMPLE



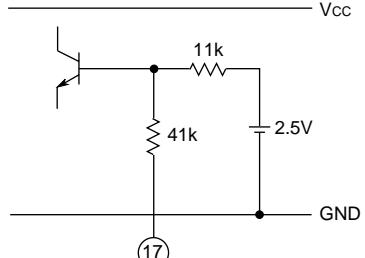
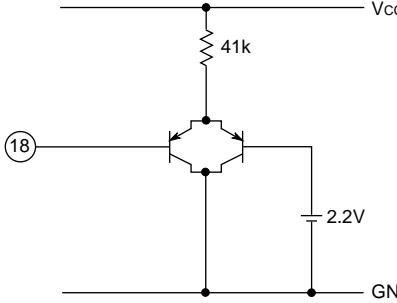
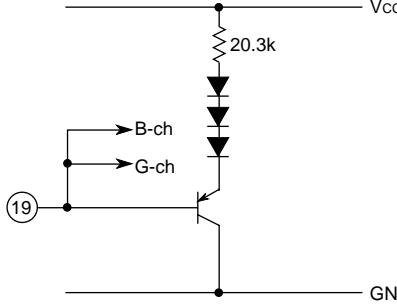
Units Resistance : Ω
Capacitance : F

3-CHANNEL VIDEO PREAMPLIFIER WITH OSD MIXING, RETRACE BLANKING

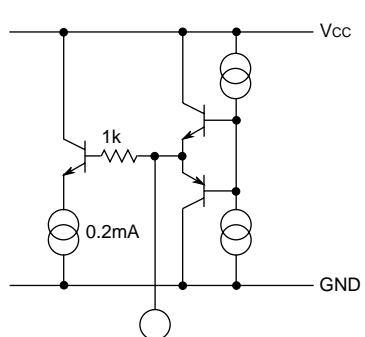
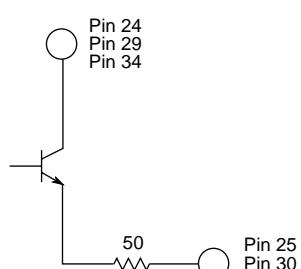
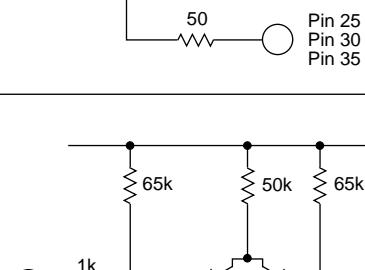
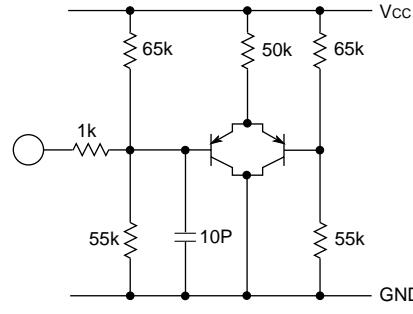
DESCRIPTION OF PIN

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
1	BLK IN (for OSD)	-		<ul style="list-style-type: none"> ·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	-	<ul style="list-style-type: none"> ·Apply equivalent voltage to 3 channels.
3 8 13	INPUT (B) INPUT (G) INPUT (R)	2.5		<ul style="list-style-type: none"> ·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		<ul style="list-style-type: none"> ·Use at maximum 5V for stable operation.
5 10 15	OSD IN (B) OSD IN (G) OSD IN (R)	-		<ul style="list-style-type: none"> ·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		<ul style="list-style-type: none"> Use at maximum 5V for stable operation.
18	CP IN	—		<ul style="list-style-type: none"> Input pulses of minimum 2.5V. Input at low impedance.
19	Brightness	—		
20	BLK IN (for retrace)	—		<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> A capacity is needed on the GND side.
24 29 34	Vcc2 (R) Vcc2 (G) Vcc2 (B)	Apply 12		<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> Pulled up directly to Vcc or open if not used.