M52326SP

3-CHANNEL VIDEO AMPLIFIER FOR HIGH-RESOLUTION COLOR DISPLAY

DESCRIPTION

The M52326SP is a semiconductor integrated circuit that has three channels of built-in amplifiers in the broad-band video amplifier series (M51399P, M51387P, M52307P) having a band of 130MHz.

Every channel is provided with a broad-band amplifier, main/sub contrast control, and brightness control functions.

Accordingly, this IC has an optional configuration for use in high-resolution color display monitors.

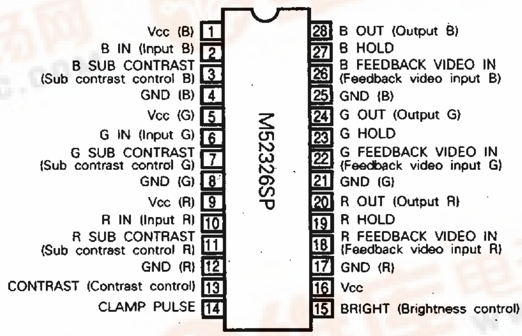
FEATURES

- The M52326SP uses a new bi-polar wafer processing to realize low power dissipation so that three channels can be built in the amplifier. (V_{CC} = 12V, I_{CC} = 63mA)
- Input : 0.7V_{P-P} (Typ.)
  Output : 4.5V_{P-P} (Max.)
  Frequency band : 130MHz (at 3V_{P-P})
- Contrast and brightness control functions. The main contrast control adjusts 3 channels together, and three sub contrast controls adjust the respective channels independently.

APPLICATION

CRT display

PIN CONFIGURATION (TOP VIEW)

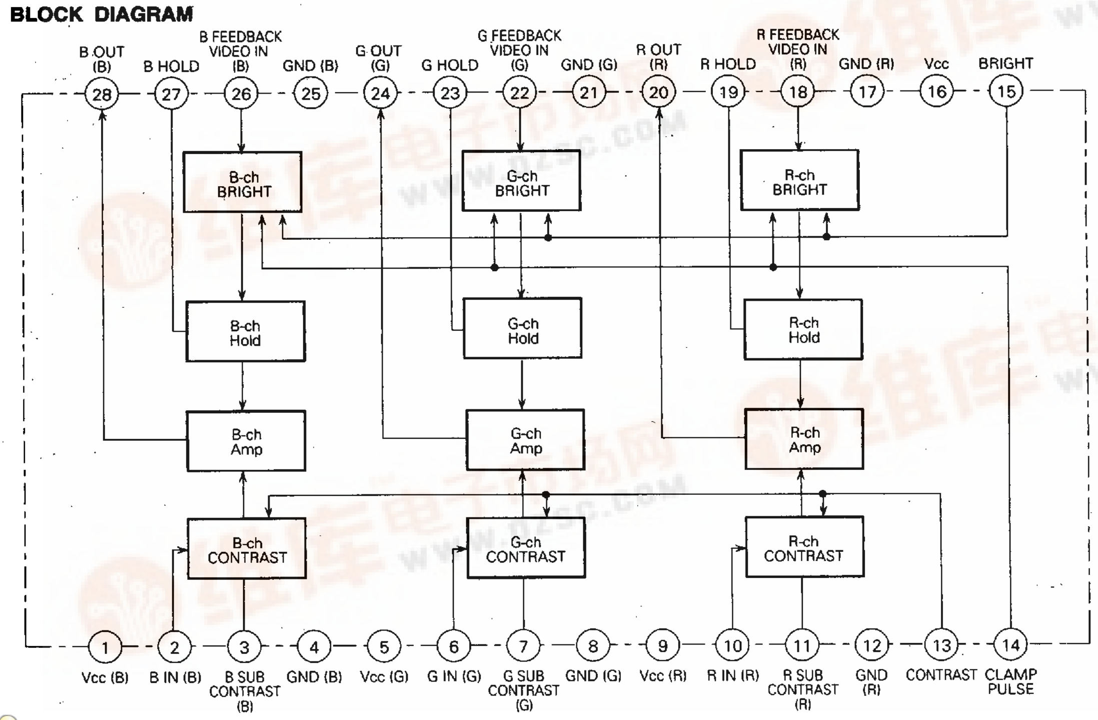


Outline 28P4B

RECOMMENDED OPERATING CONDITION

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

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	13.0	V
P_d	Power dissipation	1580	mW
T_{opr}	Operating temperature	−20~85	°C
T_{stg}	Storage temperature	−40~150	°C
V_{opr}	Recommended operating supply voltage	12.0	V
V_{opr}'	Recommended operating supply voltage range	11.5~12.5	V
Surge	Electrostatic discharge	±200	V

ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{CC} = 12V; unless otherwise noted)

Symbol	Parameter	Test point	Input			Test conditions				Limits			Unit
			SW10 R-ch	SWG G-ch	SW2 B-ch	V3	V13	V15	SW14	Min.	Typ.	Max.	
I_{CC}	Circuit current	A	a –	a –	a –	12.0	12.0	5.0	b SG6	45	72	110	mA
Vomax	Output dynamic range	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	12.0	Variable	a –	5.8	6.8	9.0	V_{P-P}
Vimax	Maximum input voltage	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	6.0	Variable	a –	1.9	2.4	2.9	V_{P-P}
Gv	Maximum gain	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	12.0	V_T	a –	13.0	17.0	20.0	dB
ΔGv	Relative maximum gain	–	–	–	–	–	–	–	–	0.8	1.0	1.2	–
V_{CR1}	Contrast control characteristics (standard)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	6.0	V_T	a –	4.1	7.4	10	dB
ΔV_{CR1}	Relative contrast control characteristics (standard)	–	–	–	–	–	–	–	–	0.8	1.0	1.2	–
V_{CR2}	Contrast control characteristics (minimum)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	12.0	3.5	V_T	a –	5	30.0	70.0	mV_{P-P}
ΔV_{CR2}	Relative contrast control characteristics (minimum)	–	–	–	–	–	–	–	–	0.8	1.0	1.3	–
V_{SCR1}	Sub contrast control characteristics (standard)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	6.0	12.0	V_T	a –	10.0	14.0	18.0	dB
ΔV_{SCR1}	Relative sub contrast control characteristic (standard)	–	–	–	–	–	–	–	–	0.8	1.0	1.2	–
V_{SCR2}	Sub contrast control characteristics (minimum)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	3.0	12.0	V_T	a –	100.0	300.0	860.0	mV_{P-P}
ΔV_{SCR2}	Relative contrast control characteristics (minimum)	–	–	–	–	–	–	–	–	0.8	1.0	1.2	–
V_{CR3}	Contrast/sub contrast control characteristics (Standard for both contrast and sub contrast)	T.P20 T.P24 T.P28	b SG1	b SG1	b SG1	6.0	6.0	V_T	a –	900	1300	1700	mV_{P-P}
ΔV_{CR3}	Relative contrast/sub contrast control characteristics (Standard for both contrast and sub contrast)	–	–	–	–	–	–	–	–	0.8	1.0	1.2	–

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input			Test conditions				Limits			Unit
			SW10 R-ch	SWG G-ch	SW2 B-ch	V3	V13	V15	SW14	Min.	Typ.	Max.	
ΔV_{B1}	Relative brightness control characteristics (maximum)	–	–	–	–	–	–	–	–	-100.0	0.0	100.0	mV
F_{C1}	Frequency characteristics I (f = 50 MHz Max.)	T.P20 T.P24 T.P28	b SG3	b SG3	b SG3	12.0	7.5	V_T	a –	–2	–1	3	dB
ΔF_{C1}	Relative frequency characteristics I (f = 50 MHz Max.)	–	–	–	–	–	–	–	–	–1.0	0.0	1.0	dB
$F_{C1'}$	Frequency characteristics I (f = 130 MHz Max.)	T.P20 T.P24 T.P28	b SG4	b SG4	b SG4	12.0	7.5	V_T	a –	–3	–2	3	dB
$\Delta F_{C1'}$	Relative frequency characteristics I (f = 130 MHz Max.)	–	–	–	–	–	–	–	–	–1.0	0.0	1.0	dB
F_{C2}	Frequency characteristics II (f = 50 MHz standard)	T.P20 T.P24 T.P28	b SG3	b SG3	b SG3	12.0	6.5	V_T	a –	–1	0	3	dB
$F_{C2'}$	Frequency characteristics II (f = 130 MHz standard)	T.P20 T.P24 T.P28	–	–	–	–	–	–	–	–2.5	0	3	dB
F_{C5}	Frequency characteristics III (f = 50 MHz minimum)	T.P20 T.P24 T.P28	b SG3	b SG3	b SG3	12.0	5.0	V_T	a –	–0.5	0	2	dB
$F_{C5'}$	Frequency characteristics III (f = 130 MHz minimum)	T.P20 T.P24 T.P28	b SG4	b SG4	b SG4	12.0	5.0	V_T	a –	–0.5	0	2	dB
C.T.1	Crosstalk I (f = 50 MHz)	T.P20 T.P24 T.P28	b SG3	a –	a –	12.0	12.0	V_T	a –	–	–32	–20	dB
C.T.1'	Crosstalk I (f = 130 MHz)	T.P20 T.P24 T.P28	b SG4	a –	a –	12.0	12.0	V_T	a –	–	–22	–15	dB
C.T.2	Crosstalk II (f = 50 MHz)	T.P20 T.P24 T.P28	a –	b SG3	a –	12.0	12.0	V_T	a –	–	–32	–20	dB
C.T.2'	Crosstalk II (f = 130 MHz)	T.P20 T.P24 T.P28	a –	b SG4	a –	12.0	12.0	V_T	a –	–	–22	–15	dB
C.T.3	Crosstalk III (f = 50 MHz)	T.P20 T.P24 T.P28	a –	a –	b SG3	12.0	12.0	V_T	a –	–	–32	–20	dB
C.T.3'	Crosstalk III (f = 130 MHz)	T.P20 T.P24 T.P28	a –	a –	b SG4	12.0	12.0	V_T	a –	–	–22	–15	dB
Tr	Pulse characteristics I	T.P20 T.P24 T.P28	b SG5	b SG5	b SG5	12.0	7.0	3.0	b SG6	–	2	4	nscc
Tf	Pulse characteristics II	T.P20 T.P24 T.P28	b SG5	b SG5	b SG5	12.0	7.0	3.0	b SG6	–	3	6	nscc
V_{14th}	Clamp pulse threshold voltage	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	3.0	b SG6	0.7	1.5	2.5	V_{DC}
W_{14}	Clamp pulse minimum operating width	T.P20 T.P24 T.P28	a –	a –	a –	12.0	12.0	3.0	b SG6	–	0.3	1.0	nscc
V_{27}	Hold voltage	T.P19 T.P23 T.P27	a –	a –	a –	12.0	12.0	3.0	b SG6	4.6	5.2	5.8	V_{DC}

ELECTRICAL CHARACTERISTICS TEST METHOD

Note1. The switch (SW) numbers for the signal input pin and pulse input pin have already been given in Attached Table1; therefore, only the switch numbers for the external power supply will be given in the following notes.

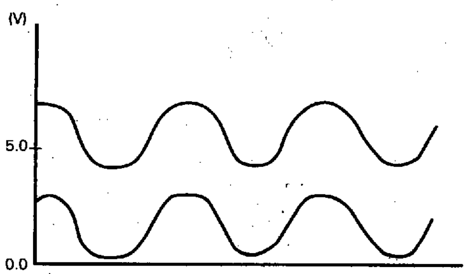
Note2. SUB BRIGHT voltages V18, V22, V26 are normally set at the same value, which are represented by V26 in Attached Table1.
SUB CONTRAST voltages V3, V7, V11 are also set at the same value, which are represented by V3 in Attached Table1.

Icc

1. Fix SW19, SW23 and SW27 on side "b".
2. The other conditions are as shown in Attached Table 1. When SW1 is fixed on side "a," ICC is measured, using ampere meter A.

VOMAX

1. Fix SW19, SW23 and SW27 on side "b."
2. V15 is set up in the following order:
   a) SG1 is input to pin ⑩ (pins ⑥, ②). V15 voltage is gradually increased, and when the upper side of the T.P20 (T.P24 and T.P28) output waveform becomes distorted, V15 is read, which is taken as V_{TR1} (V_{TG1}, V_{TB1}).
   In contrast to the above, when voltage V15 is gradually reduced, and the bottom side of T.P20 (T.P24, T.P28) output waveform becomes distorted, V15 is read, which is taken as V_{TR2} (V_{TG2}, V_{TB2}).



T.P20 Output Waveform
(This is also the same with T.P24 and T.P28.)

   b) Accordingly, V_T (V_{TR}, V_{TG}, V_{TB}) is found by:

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

   This equation should be used properly, depending on the output pin.
   When TP20 is measured, V_{TR1} should be used, and when TP24 and TP28 are measured, V_{TG1} and V_{TB} should be used respectively.
3. After V_{TR} (V_{TG}, V_{TB}) is set, gradually increase the amplitude of SG1 from 700mV, and measure the amplitude of the output waveform when the upper/lower output waveforms of T.P20 (T.P24, T.P28) start distortion at the same time.

VIMAX

From the condition in NOTE 2 above, change V13 to 6.0V as given in Attached Table1, gradually increase the amplitude of the input signal from 700mVP-P, and read the input signal amplitude when the output signal starts to be distorted.

GV

1. Fix SW19, SW23 and SW27 on side "b," and also set the conditions as shown in Attached Table1.
2. Input SG1 to pin ⑩ (pins ⑥, ②) and read the amplitude of T.P20 (T.P24/T.P28) output at this time: it should be taken as V_{OR1} (V_{OG1}, V_{OB1}).
3. The maximum gain Gv is determined by:

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

4. The relative maximum gain ΔGv is calculated as follows:
   $\Delta Gv = V_{OR1}/V_{OG1},\ V_{OG1}/V_{OB1},\ V_{OB1}/V_{OR1}$

V_{CR1} ΔV_{CR1}

1. The conditions are the same as in Attached Table1 except that V13 is set at 6.0V.
2. Read the amplitude of T.P20 (T.P24/T.P28) output at this time: it should be taken as V_{OR2} (V_{OG2}/V_{OB2}).
3. The contrast control characteristics V_{CR1} and relative contrast control characteristics ΔV_{CR1} are calculated as follows:

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

$$\Delta V_{CR1} = V_{OR2}/V_{OG2},\ V_{OG2}/V_{OB2},\ V_{OB2}/V_{OR1}$$

V_{CR2} ΔV_{CR2}

1. The conditions are the same as in Attached Tablel except that V13 is set at 3.0V.
2. Read the amplitude of T.P20 (T.P24/T.P28) output at this time: it should be taken as V_{OR3} (V_{OG3}/V_{OB3}), which shall be V_{CR2}.
3. The relative contrast control characteristics ΔV_{CR2} is:
   $\Delta V_{CR2} = V_{OR3}/V_{OG3},\ V_{OG3}/V_{OB3},\ V_{OB3}/V_{OR3}$

V_{SCR1} ΔV_{SCR1}

1. The conditions are the same as in Attached Table1 except that V3, V7 and V11 are set at 6.0V.
2. Read the amplitude of T.P20 (T.P24/T.P28) output at this time: it should be taken as V_{OR4} (V_{OG4}/V_{OB4}).
3. The sub contrast control characteristics V_{SCR1} and relative sub contrast control characteristics ΔV_{SCR1} are found by:

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

ΔV_{SCR1} = V_{OR4}/V_{OG4}, V_{OG4}/V_{OB4}, V_{OB4}/V_{OR4}

V_{SCR2} ΔV_{SCR2}

1. The conditions are the same as in Attached Table1 except that V3, V7 and V11 are set at 3.0V.
2. Read the amplitude of T.P20 (T.P24/T.P28) output at this time: it should be taken as V_{OR5} (V_{OG5}/V_{OB5}), which shall be V_{SCR2}.
3. The relative sub contrast control characteristics ΔV_{CR2} is:

ΔV_{CR2} = V_{OR5}/V_{OG5}, V_{OG5}/V_{OB5}, V_{OB5}/V_{OR5}

V_{CR3} ΔV_{CR3}

1. The conditions are the same as in Attached Table1 except that V13, V3, V7 and V11 are set at 6.0V.
2. Read the amplitude of T.P20 (T.P24/T.P28) output at this time: it should be taken as V_{OR6} (V_{OG6}/V_{OB6}).
3. The gain and relative gain when the contrast and sub contrast are standard are determined by:

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

ΔV_{CR3} = V_{OR6}/V_{OG6}, V_{OG6}/V_{OB6}, V_{OB6}/V_{OR6}

V_{B1} ΔV_{B1}

1. Set the conditions as given in Attached Table1.
2. Measure the output of T.P20 (T.P24/T.P28) at this time with a voltmeter: it should be taken as V_{OR7} (V_{OG7}/V_{OB7}). This value is V_{B1}.
3. Also calculate the difference between each channel from V_{OR7}, V_{OG7} and V_{OB7}.
   The relative brightness control characteristics ΔV_{B1} is found by:

$$\Delta V_{B1} = V_{OR7} - V_{OG7}\quad [mV]$$
$$= V_{OG7} - V_{OB7}$$
$$= V_{OB7} - V_{OR7}$$

F_{C1} $F_{C1'}$

1. Fix SW19, SW23 and SW27 on side "a" and set the conditions as given in Attached Table1.
2. Use SG3 and SG4. According to the procedure shown in NOTE 4 above, however, measure the amplitude of output waveform on T.P20 (T.P24/T.P28).
3. When these measured amplitudes are output amplitudes V_{OR1} (V_{OG1}/V_{OB1}), V_{OR8} (V_{OG8}/V_{OB8}) and V_{OR9} (V_{OG9}/V_{OB9}) at SG1, SG3 and SG4 inputs respectively, the frequency characteristics F_{C1}, $F_{C1'}$ are calculated as follows:

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

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

4. For relative frequency characteristics ΔF_{C1}, $\Delta F_{C1'}$, calculate the difference between F_{C1} and $F_{C1'}$ for each channel.

F_{C2} $F_{C2'}$

The conditions are the same as given in NOTE 14 above except that CONTRAST (V13) is reduced to 6.5V.

F_{C5} $F_{C5'}$

The conditions are the same as given in NOTE 14 above except that CONTRAST (V13) is reduced to 4.5V.

C.T.1 C.T.1'

1. Fix SW19, SW23, and SW27 on side "a" and set the conditions as given in Attached Table1.
2. Input SG2 (or SG4) only to pin ⑩ (R-ch) and measure the amplitude of output waveforms on T.P20 (T.P24 and T.P28) at that time: these measurements should be taken as V_{OR}, V_{OG} and V_{OB}.
3. The crosstalk C.T.1 is determined by:

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

(C.T.1')

C.T.2 C.T.2'

1. Change the input pin from pin ⑩ (R-ch) to pin ⑥ (G-ch), and read the output in the same manner as in NOTE 17 above.
2. The crosstalk C.T.2 is determined by:

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

(C.T.2')

C.T.3 C.T.3'

1. Change the input pin from pin ⑩ (R-ch) to pin ② (B-ch), and read the output in the same manner as in NOTE 17.
   The crosstalk C.T.3 is determined by:

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

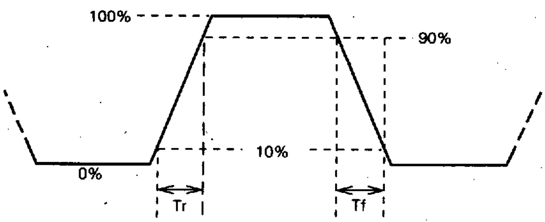
(C.T.3')

Tr Tf

1. Fix SW18, SW22, and SW26 on side "b" and set the conditions as given in Attached Table1.
2. Measure the rise time T_{r1} and fall time T_{f1} between 10 and 90% of the input pulse with an active probe.
3. Next, measure the rise time T_{r2} and fall time T_{f2} between 10 and 90% of the output pulse with an active probe.
4. The pulse characteristics Tr, Tf are found by:

$$Tr\ (nsec) = \sqrt{(T_{r2})^2 - (T_{r1})^2}$$

$$Tf\ (nsec) = \sqrt{(T_{f2})^2 - (T_{f1})^2}$$



W14th

1. Fix SW19, SW23 and SW27 on side "b" and set the conditions as given in Attached Table1.
2. While monitoring the output (approx. $2V_{DC}$) at this time, lower the SG6 level gradually and measure the SG6 level when the output reaches 0V.

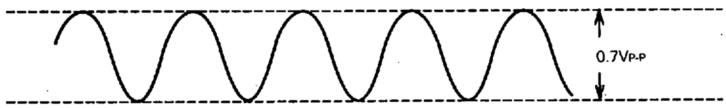
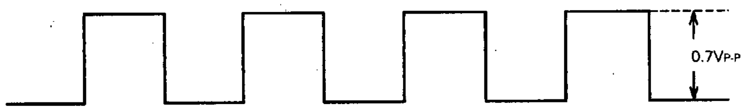
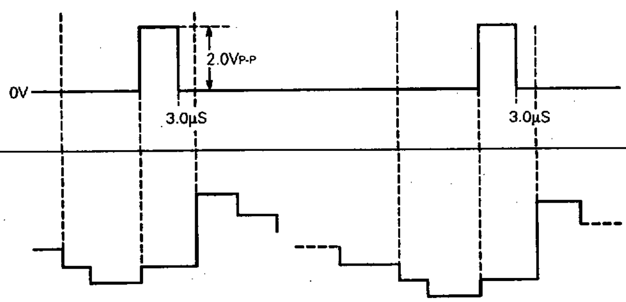
W14

While monitoring the output under the conditions given in NOTE 21 above, decrease the SG6 pulse width gradually.
Also measure the SG6 pulse width when the output becomes 0V.

V27

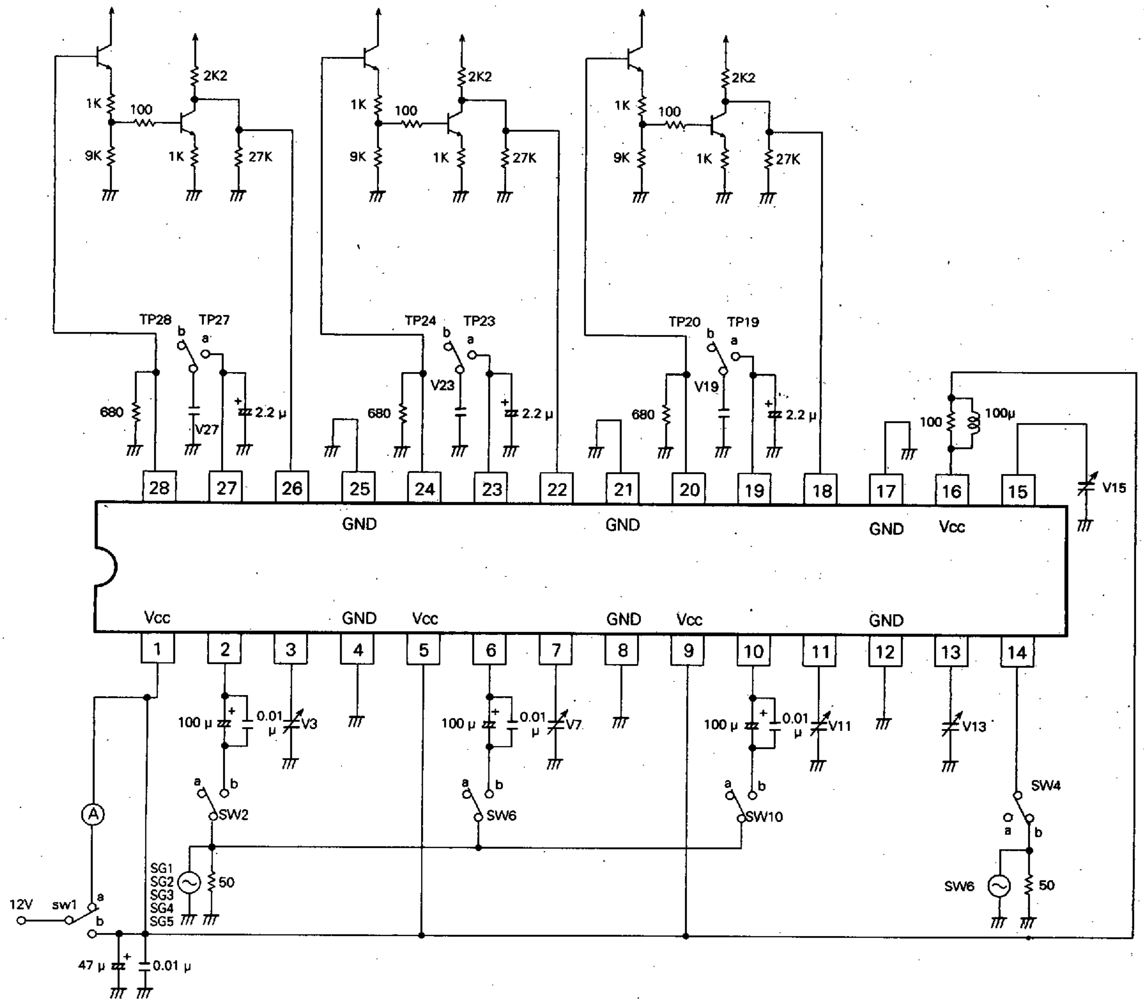
1. Fix SW19, SW23 and SW27 on side "b."
2. Read T.P19, T.P23 and T.P27 with a voltmeter.

INPUT SIGNAL

SG No.	Signals
SG1	Sine wave with amplitude 0.7Vp-p (100kHz, amplitude partially variable*) 
SG2	Sine wave with amplitude 0.7Vp-p (f=10MHz)
SG3	Sine wave with amplitude 0.7Vp-p (f=50MHz)
SG4	Sine wave with amplitude 0.7Vp-p (f=130MHz)
SG5	Square wave with amplitude 0.7Vp-p (f=1MHz, duty=50%) 
SG6	Pulse with amplitude 2.0Vp-p and pulse width 3.0μs synchronous with the pedestal part f standard video stepped wave 
SG7 Standard video stepped wave	

* Refer to the "NOTE" paragraph.

TEST CIRCUIT

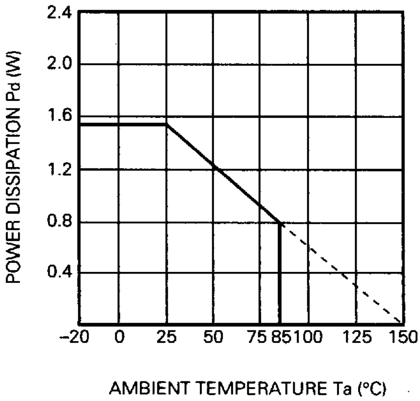


Units Resistance: Ω
Capacitance: F

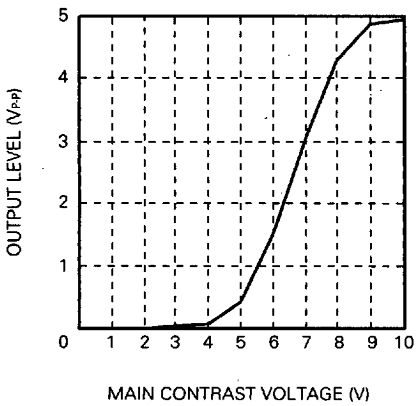
6249826 0020127 652

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)

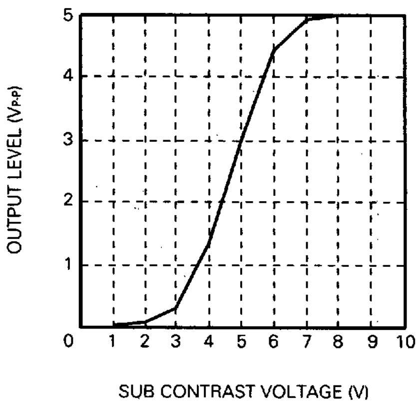


MAIN CONTRAST CHARACTERISTICS



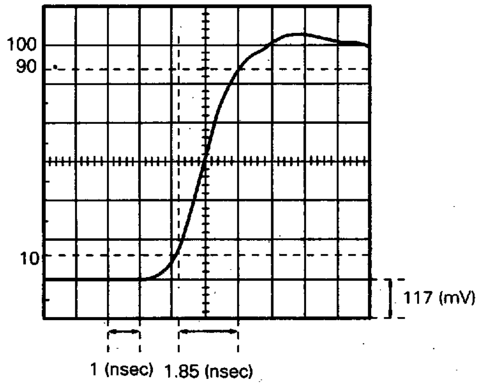
Vcc 12V
Sub contrast 12V
Brightness 3.2V
Input signal level 0.7VP-P

SUB CONTRAST CHARACTERISTICS



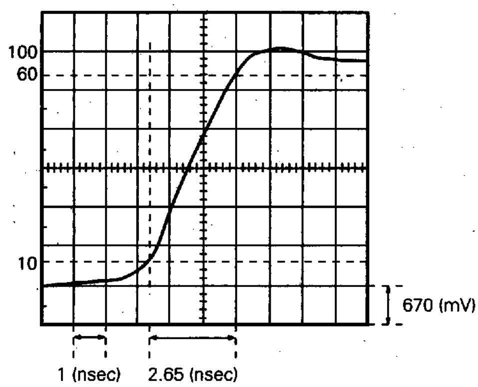
Vcc 12V
Main contrast 12V
Brightness 3.2V
Input signal level 0.7VP-P

RISE TIME



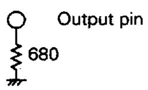
Input signal

Square wave
Input amplitude (level) 0.70 (Vpp)
Trin 1.85 (nsec)



Output signal

Output amplitude (level) 4.0 (Vpp)
Trout 2.65 (nsec)
Vcc = 12V
Main contrast 7.5V
Sub contrast 12V
Brightness 3.2V

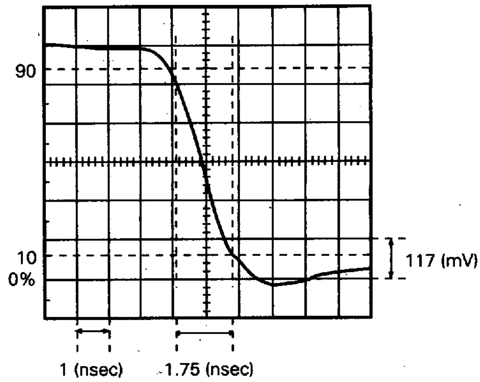


$$Tr = \sqrt{(Trout)^2 - (Trin)^2}$$

$$= \sqrt{2.65^2 - 1.85^2}$$

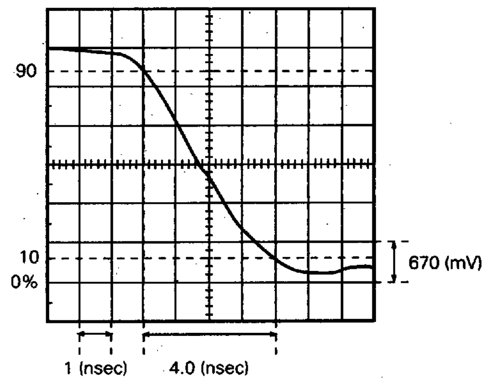
$$\fallingdotseq 1.9 \text{ (nsec)}$$

FALL TIME



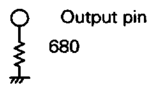
Input signal

Square wave
Input amplitude (level) 0.70 (Vpp)
Tfin 1.75 (nsec)



Output signal

Output amplitude (level) 4.0 (Vpp)
Tfout 4.0 (nsec)
Vcc = 12V
Main contrast 7.5V
Sub contrast 12V
Brightness 3.2V

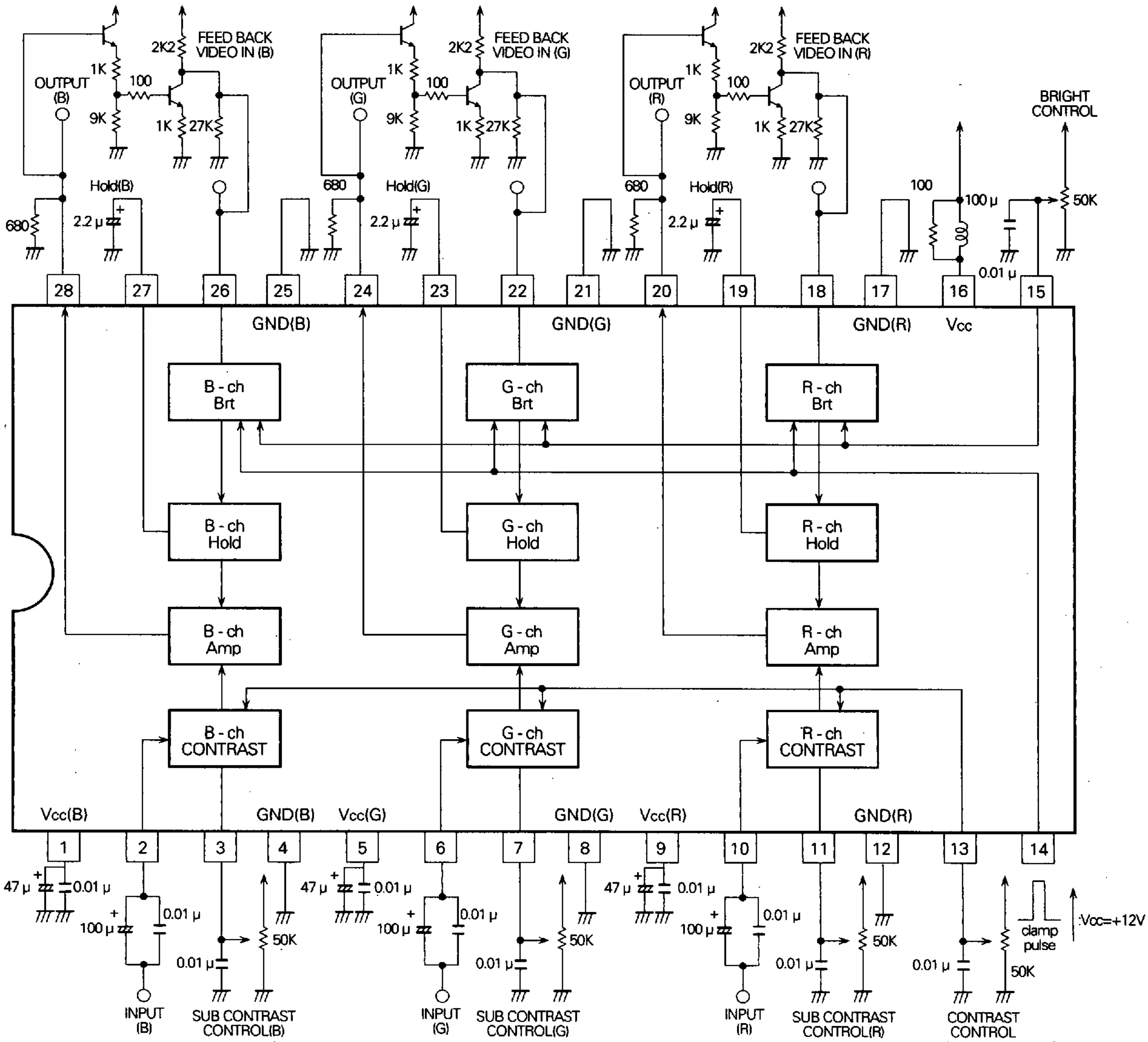


$$Tf = \sqrt{(Tfout)^2 - (Tfin)^2}$$

$$= \sqrt{4^2 - 1.75^2}$$

$$\fallingdotseq 3.6 \text{ (nsec)}$$

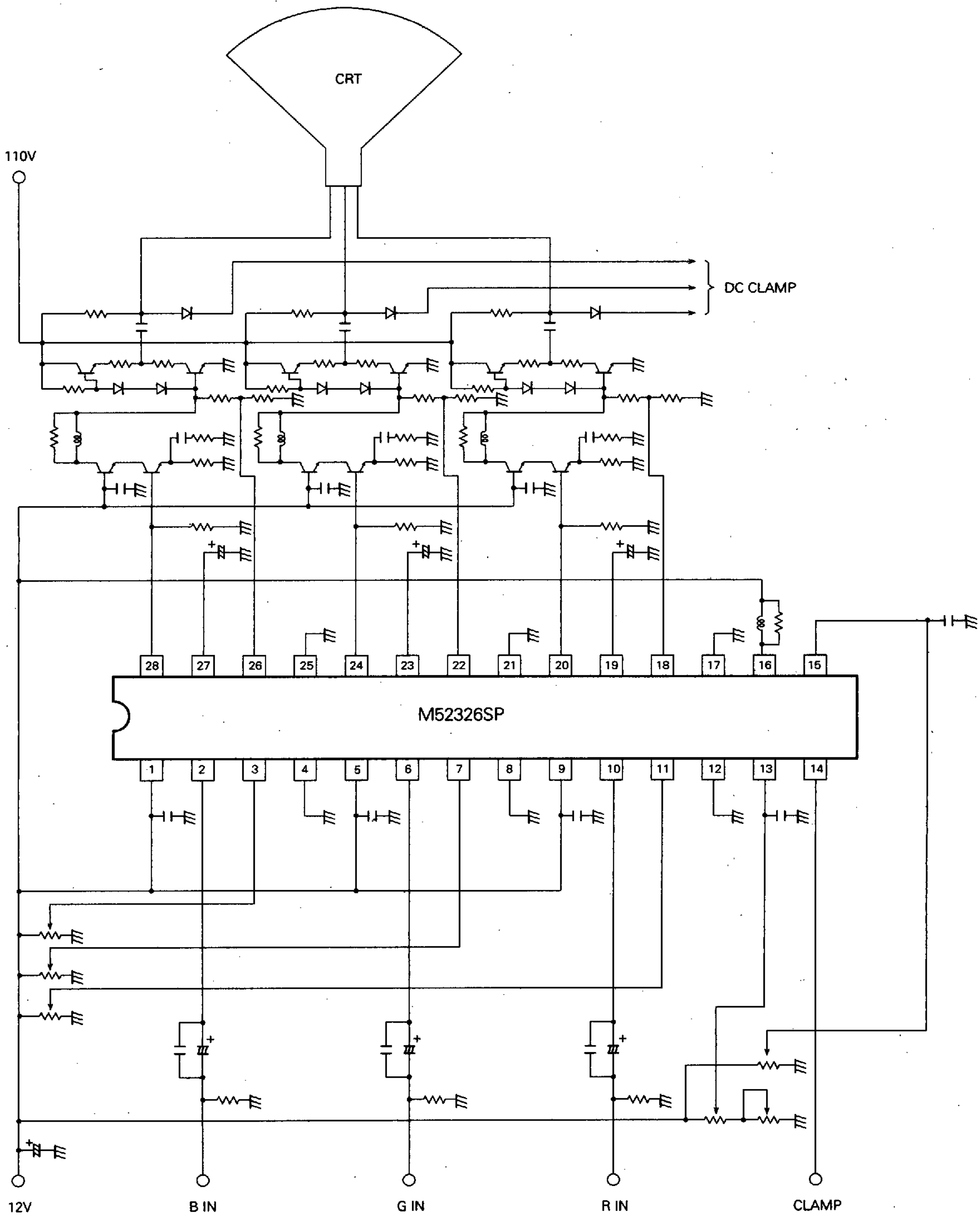
APPLICATION EXAMPLE



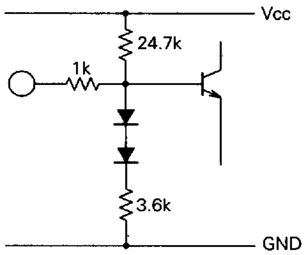
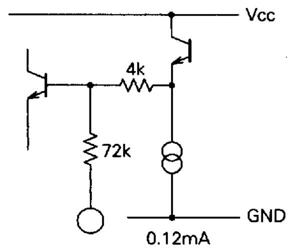
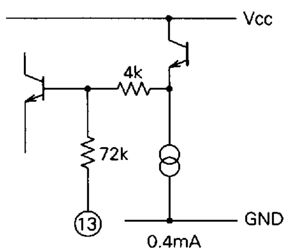
Units Resistance: Ω

Capacitance: F

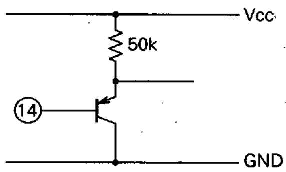
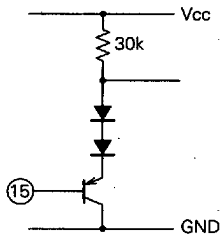
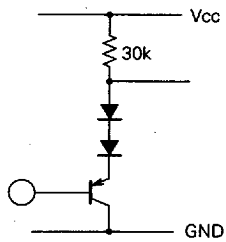
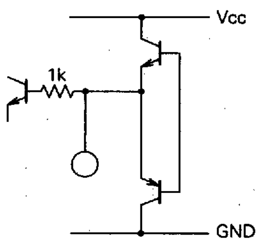
APPLICATION EXAMPLE



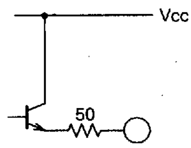
DESCRIPTION OF PIN

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Remarks
① ⑤ ⑨	Vcc (B-ch) Vcc (G-ch) Vcc (R-ch)	12V	———	The voltages applied to three channels should be equal to each other.
② ⑥ ⑩	B-IN G-IN R-IN	2.9V		———
③ ⑦ ⑪	B SUB CONTRAST G SUB CONTRAST R SUB CONTRAST	4.0V		———
④, ㉕ ⑧, ㉑ ⑫, ⑰	GND (B-ch) GND (G-ch) GND (R-ch)	GND	———	———
⑬	CONTRAST.	6.9V		———

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Remarks
⑭	CLAMP PULSE	——		——
⑮	BRIGHT	——		——
⑯	Vcc	12V	——	——
⑱ ㉒ ㉖	R FEED BACK VIDEO IN G FEED BACK VIDEO IN B FEED BACK VIDEO IN	5.2V		——
⑲ ㉓ ㉗	R HOLD G HOLD B HOLD	Variable		——

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Remarks
(20) (24) (28)	R OUT G OUT B OUT	Variable		A resistor is required at the GND side. Choose any resistance value under 15mA according to the driving capability required.

PRECAUTIONS FOR APPLICATION

1) Clamp Pulse Input

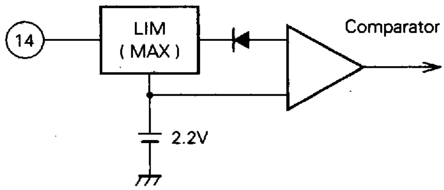
The circuit in the diagram on the right shows the configuration of the clamp pulse input.

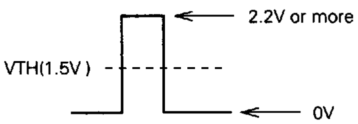
The input is:

V_{TH} = 2.2V - Diode X 1
= 1.5V

2.2V or more voltage is limited by LIM.

Accordingly, the recommended voltage is as shown in the diagram on the right.



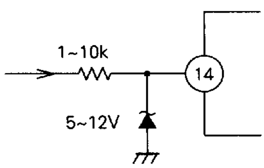


For the pulse width:

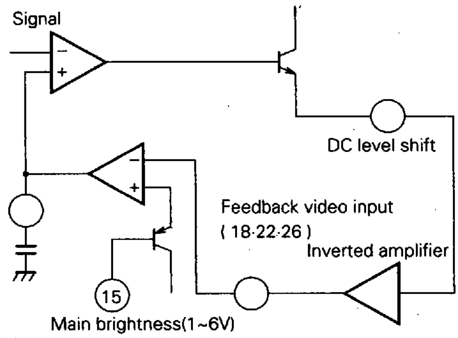
1.0 μ sec Min. at 15kHz
0.5 μ sec Min. at 30kHz
0.3 μ sec Min. at 64kHz

are recommended.

Note that in general, wiring inside the unit for the clamp pulse is long and it is often produced from the high voltage side or connected indirectly to an external pin; therefore, it is liably exposed to a strong surge input. A protective circuit as shown in the diagram on the right is therefore recommended.



2) Brightness Control

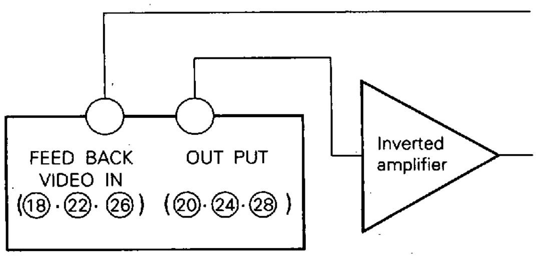


The diagram above shows the principle. Since this IC is of an external feedback system, external DC information is required.

2-1) Feedback pin

A signal is transmitted to output pins (20), (24), (28), which is then fed back to pins (18), (22), (26) through the external circuit as shown on the right.

For the signal thus fed back, only the voltage (electrical potential) at the pedestal part is sampled by the clamping pulse, followed by sampling hold by the holding capacitor at holding pins (19), (23), (27), and the voltage at the pedestal part of VIDEO signal at the output pin is held.



Next, explanation is given below of the FEEDBACK characteristics according to the graph on the following page.

HOLD pin voltage (hereinafter called V_H) changing when the FEEDBACK VIDEO IN pin voltage (hereinafter called V_F) is variable with pin ⑮ (BRIGHT) voltage (hereinafter called V_B) set at 1.5V and 5.1V is shown in (A) and (B) in the graph on the following page.

At (A) in the graph, V_H changes near V_F = 5.1V.

Next, V_F changing when V_H is changed at no input is shown at (C) in the graph.

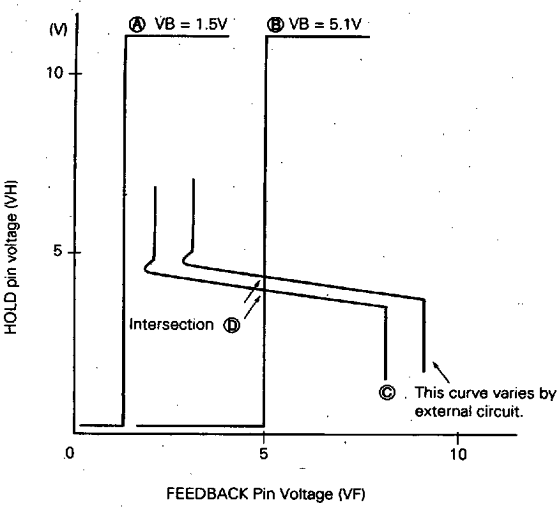
In this graph, the voltage outputted from the OUTPUT pin (hereinafter called Vo) is the output passing through external inverted amplifier, and this characteristic varies with the external inverted amplifier as can be seen from the graph.

Intersection (D) with (A) or (B) and (C) in the graph corresponds to the clamped point. The clamped intersection may not exist, depending on V_B voltage and external circuit.

The V_B available range is approx. 2.5 to 7.5V if the V_F changing characteristics are like (C) in the graph when V_H is variable.

Evaluate the V_F changing characteristics when V_H is variable and set the external circuit so that V_B can be used within the V_B control range.

The recommended voltage level at the OUTPUT pedestal part is 2.0 to 3.0V.



2-2) Holding Capacitor Capacitance

IC requires 1,000 P or more (when f_H = 15kHz). However, this capacitance varies, depending on the holding duration (time other than clamping): as the holding duration is longer, a larger capacitance is required.

In view of IC applications, the response is quicker as the capacitance is smaller, and as it is larger, the response will become more stable.

Consequently, set this capacitance optionally according to the signal or clamp pulse contents (pulse condition at vertical sync timing in particular).

PRECAUTIONS FOR APPLICATION

M52326SP Crosstalk

Testing Conditions : Main contrast pin voltage 12V
Sub contrast pin voltage 12V
Brightness pin voltage 5V
Input signal 0.7V_{P-P} sine wave

		Input Frequency				
		10MHz	50MHz	75MHz	100MHz	Unit
CT1	R→G	−45	−29	−23	−18	dB
	R→B	−60	−38	−30	−20	dB
CT2	G→R	−60	−34	−23	−18	dB
	G→B	−45	−26	−20	−18	dB
CT3	B→R	−65	−35	−23	−19	dB
	B→G	−60	−40	−29	−26	dB

For crosstalk CT1, input a signal only to pin ⑩ (R-ch) and take the output waveform amplitudes at pins 20, 24, 28 at that time as V_{OR}, V_{OG} and V_{OB}.

$$CT1 = 20LOG_{10} \frac{V_{OG} \text{ or } V_{OB}}{V_{OR}} \text{ [dB]}$$

For crosstalk CT2, the conditions are the same as with CT1 above except that the input pin is changed to pin ⑥ (G-ch).

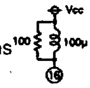
$$CT2 = 20LOG_{10} \frac{V_{OR} \text{ or } V_{OB}}{V_{OG}} \text{ [dB]}$$

For crosstalk CT3, the conditions are the same as with CT1 above except that the input pin is changed to pin ② (B-ch).

$$CT3 = 20LOG_{10} \frac{V_{OR} \text{ or } V_{OG}}{V_{OB}} \text{ [dB]}$$

PC Board Fabricating Precautions

Since a broad-band amplifier is built in this IC and oscillation may occur due to the shape of PC board wiring, note the following points:

- Make the output pin and resistor wiring as short as possible.
- Make the output pin load capacitance as small as possible.
- Install a by-pass capacitor on the Vcc-GND, DC line near or around the pin.
- For Vcc, use a stable power supply. (Independent use of four units is more preferable.)
- Insertion of 10 or more ohm resistor between the output pin and circuit in the next stage makes it hard to oscillate.
- Insertion of a coil or resistor, such as 

to 16-pin Vcc produces an effect, depending on PC board.
- Also pay attention to a leak signal from the power amplifier.
- Make GND as wide as possible; basically, plane grounding is required.
- Also ground the hold capacitance to stable GND, which is as near to the pin as possible.

IC Operating Precautions

- It is recommended that the IC be used between pedestal voltages 2V and 3V. (Optimal distortion)
- Connect each input pin of this IC with a sufficiently low impedance.