M52733SP

3-CHANNEL VIDEO AMPLIFICATION WITH OSD BLANKING

DESCRIPTION

The M52733SP is a semiconductor integrated circuit amplifies video signals, having a 3-channel amplifier with a band width of 130MHz. The circuit also features the OSD blanking function.

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

FEATURES

- Frequency band width: RGB.....130MHz ($3V_{P-P}$)
  Input : RGB.....$0.7V_{P-P}$ (typ.)
  BLK .....$3.0V_{P-P}$ min. (positive)
  Output : RGB.....$4.0V_{P-P}$ (max.)
- To adjust contrast, two types of controls are provided, main and sub. With the main control, the contrast 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

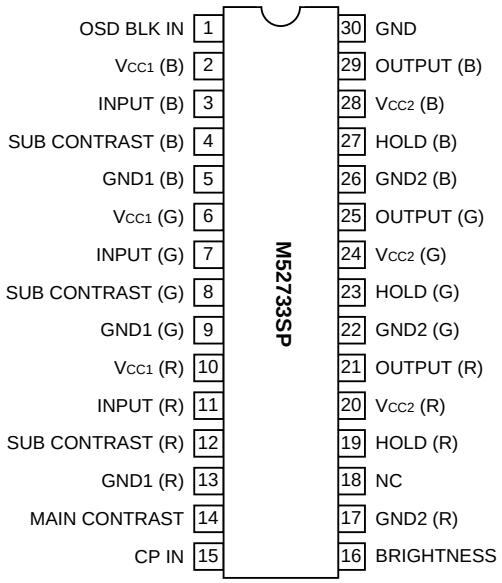
Display monitor

RECOMMENDED OPERATING CONDITION

Supply voltage range.....11.5 to 12.5V

Rated supply voltage.....12.0V

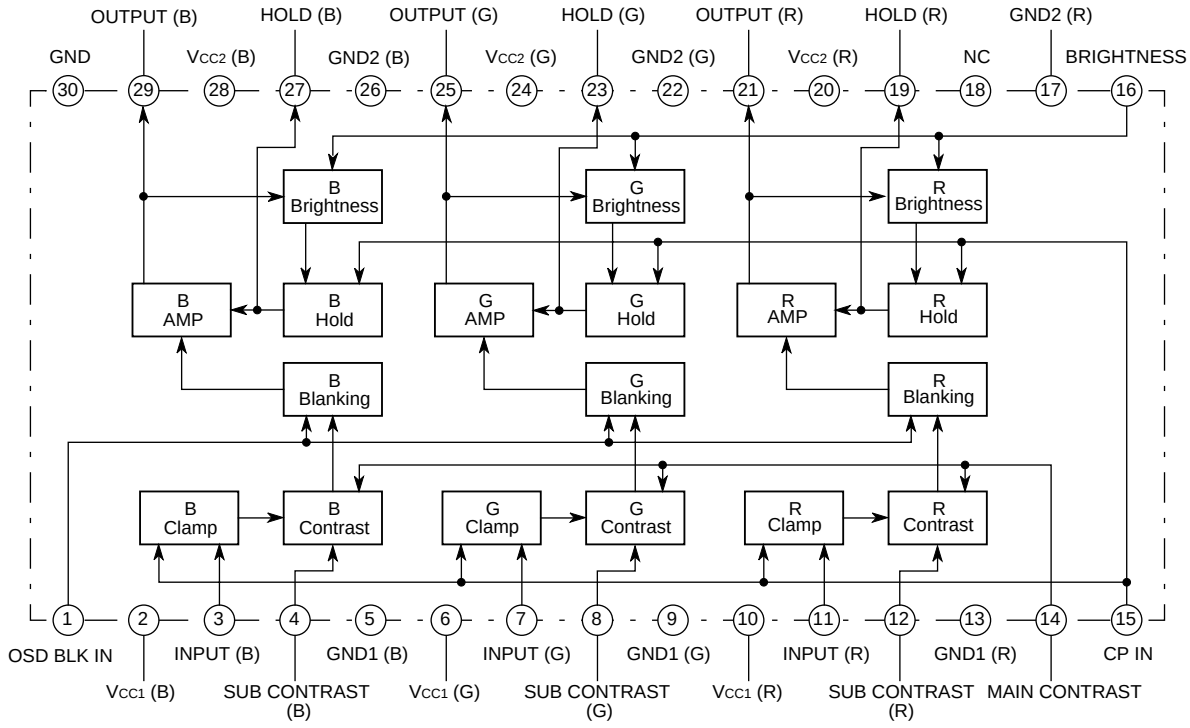
PIN CONFIGURATION (TOP VIEW)



Outline 30P4B

NC : NO CONNECTION

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	13.0	V
P_d	Power dissipation	1736	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 (V_{CC}=12V, Ta=25°C, unless otherwise noted)

Symbol	Parameter	Test conditions									Limits			Unit
		Test point (s)	Input			External power supply (V)			Pulse input					
			SW11 R-ch	SW7 G-ch	SW3 B-ch	V4	V14	V16	SW1	SW15	Min.	Typ.	Max.	
I_{CC}	Circuit current	A	a –	a –	a –	5	5	5	a –	b SG5	60	83	123	mA
Vomax	Output dynamic range	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	5	Vari-able	a –	b SG5	5.8	6.8	9.0	V_{P-P}
Vimax	Maximum input	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	2.5	1	a –	b SG5	1	1.8	–	V_{P-P}
Gv	Maximum gain	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	5	2	a –	b SG5	15	17	20	dB
ΔGv	Rrlative maximum gain		Relative to measured values above								0.8	1	1.2	–
V_{CR1}	Contrast control characteristics (typical)	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	4	2	a –	b SG5	14	15.5	17	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.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	1	2	a –	b SG5	0.3	0.6	0.9	V_{P-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.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	4	5	2	a –	b SG5	14	15.5	17	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.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	1	5	2	a –	b SG5	0.5	0.9	1.3	V_{P-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.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	3	3	2	a –	b SG5	0.8	1.5	2.2	V_{P-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.29 T.P.25 T.P.21	a –	a –	a –	5	5	4	a –	b SG5	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

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test conditions									Limits			Unit
		Test point (s)	Input			External power supply (V)			Pulse input					
			SW11 R-ch	SW7 G-ch	SW3 B-ch	V4	V14	V16	SW1	SW15	Min.	Typ.	Max.	
V_{B2}	Brightness control characteristics (typical)	T.P.29 T.P.25 T.P.21	a –	a –	a –	5	5	2.5	a –	b SG5	1.7	2.3	2.9	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.29 T.P.25 T.P.21	a –	a –	a –	5	5	1	a –	b SG5	0.5	0.9	1.3	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)	T.P.29 T.P.25 T.P.21	b SG2	b SG2	b SG2	5	2.5	V_T	a –	a –	-2.5	-1	3	dB
ΔF_{C1}	Frequency relative characteristics 1 (f=50MHz)		Relative to measured values above								-1	0	1	dB
$F_{C1'}$	Frequency characteristics 1 (f=130MHz;maximum)	T.P.29 T.P.25 T.P.21	b SG3	b SG3	b SG3	5	2.5	V_T	a –	a –	-3	-2	3	dB
$\Delta F_{C1'}$	Frequency relative characteristics 1 (f=130MHz;maximum)		Relative to measured values above								-1	0	1	dB
F_{C2}	Frequency characteristics 2 (f=130MHz; maximum)	T.P.29 T.P.25 T.P.21	b SG3	b SG3	b SG3	5	1.5	V_T	a –	a –	-3	0	3	dB
$\Delta F_{C2'}$	Frequency relative characteristics 2 (f=130MHz; maximum)		Relative to measured values above								-1	0	1	dB
C.T.1	Crosstalk 1 (f=50MHz)	T.P.29 T.P.25 T.P.21	b SG2	a –	a –	5	5	V_T	a –	a –	–	-30	-20	dB
C.T.1'	Crosstalk 1 (f=130MHz)	T.P.29 T.P.25 T.P.21	b SG3	a –	a –	5	5	V_T	a –	a –	–	-20	-15	dB
C.T.2	Crosstalk 2 (f=50MHz)	T.P.29 T.P.25 T.P.21	a –	b SG2	a –	5	5	V_T	a –	a –	–	-30	-20	dB
C.T.2'	Crosstalk 2 (f=130MHz)	T.P.29 T.P.25 T.P.21	a –	b SG3	a –	5	5	V_T	a –	a –	–	-20	-15	dB
C.T.3	Crosstalk 3 (f=50MHz)	T.P.29 T.P.25 T.P.21	a –	a –	b SG2	5	5	V_T	a –	a –	–	-30	-20	dB
C.T.3'	Crosstalk 3 (f=130MHz)	T.P.29 T.P.25 T.P.21	a –	a –	b SG3	5	5	V_T	a –	a –	–	-20	-15	dB
Tr	Pulse characteristics 1	T.P.29 T.P.25 T.P.21	b SG4	b SG4	b SG4	5	3.3	2	a –	b SG5	–	3	7	nsec
Tf	Pulse characteristics 2	T.P.29 T.P.25 T.P.21	b SG4	b SG4	b SG4	5	3.3	2	a –	b SG5	–	4	8	nsec
V14th	Clamp pulse threshold voltage	T.P.29 T.P.25 T.P.21	a –	a –	a –	5	5	2	a –	b SG5	1.0	1.5	2.0	V_{DC}
W14	Clamp pulse minimum width	T.P.29 T.P.25 T.P.21	a –	a –	a –	5	5	2	a –	b SG5	–	0.1	0.5	µsec
P_{DCH}	Pedestal voltage temperatere characteristics1	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	5	2	a –	b SG5	-0.3	0	0.3	V_{DC}

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test conditions								Limits			Unit
		Test point (s)	Input			External power supply (V)			Pulse input				
			SW11 R-ch	SW7 G-ch	SW3 B-ch	V4	V14	V16	SW1	SW15	Min.	Typ.	Max.	
P_{DCL}	Pedestal voltage temperatere characteristics2	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	5	2	a –	b SG5	-0.3	0	0.3	V_{DC}
V1th	BLK input threshold voltage	T.P.29 T.P.25 T.P.21	b SG6	b SG6	b SG6	5	5	2	b SG7	b SG5	1.7	2.5	3.5	V_{DC}

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, V8 and V12 are always set to the same voltage, therefore only V4 is referred to in Supplementary Table.

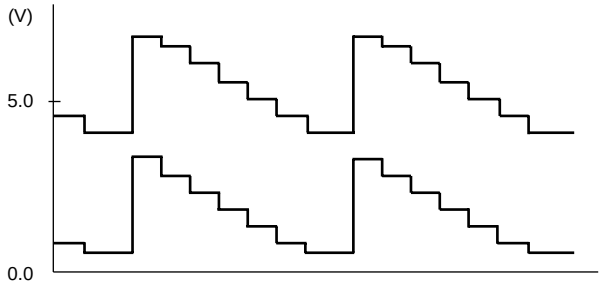
I_{CC} Circuit current

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

Vomax Output dynamic range

Voltage V16 is varied as described below:

1. Increase V16 gradually while inputting SG6 to pin 11 (7 or 3). Measure the voltage when the top of the waveform output at T.P21 (25 or 29) is distorted. The voltage is called V_{TR1} (V_{TG1} or V_{TB1}). Next, decrease V16 gradually, and measure the voltage when the bottom of the waveform output at T.P29 (25 or 21) is distorted. The voltage is called V_{TR2} (V_{TG2} or V_{TB2}).



Waveform Output at T.P21
(Identical to output at T.P25 and T.P29.)

2. Voltage V_T (V_{TR}, V_{TG} and V_{TB}) is calculated by the equation below:

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

   Use relevant voltages, depending on the pin at which the waveform is output; specifically, use V_{TR1} when it is output at T.P21; V_{TG1}, at T.P25, and V_{TB}, at T.P29.

3. After setting V_{TR} (V_{TG} or V_{TB}), increase the SG6 amplitude gradually, starting from 700mV. Measure the amplitude when the top and bottom of the waveform output at T.P21 (25 or 29) starts becoming distorted synchronously.

Vimax Maximum input

Measuring conditions are the same as those used above, except that the setting of V14 is changed to 2.5V as specified in Supplementary Table. Increase the input signal amplitude gradually, starting from 700mV_{P-P}. Measure the amplitude when the output signal starts becoming distorted.

Gv Maximum gain

ΔGv Relative maximum gain

1. Input SG6 to pin 11 (7 or 3), and read the amplitude at output T.P21 (25 or 29). The amplitude is called V_{OR1} (V_{OG1} or V_{OB1}) .
2. Maximum gain G_V is calculated by the equation below:

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

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

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

V_{CR1} Contrast control characteristics (typical)

ΔV_{CR1} Contrast control relative characteristics (typical)

1. Measuring conditions are as given in Supplementary Table. The setting of V14 is changed to 4V.
2. Measure the amplitude output at T.P21 (25 or 29). The measured value is called V_{OR2} (V_{OG2} or V_{OB2}).
3. Contrast control characteristics V_{CR1} and relative characteristics ΔV_{CR1} are calculated, respectively, by the equations below:

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

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

V_{CR2} Contrast control characteristics (minimum)
ΔV_{CR2} Contrast control relative characteristics (minimum)

1. Measuring conditions are as given in Supplementary Table. The setting of V14 is changed to 1.0V.
2. Measure the amplitude output at T.P21 (25 or 29). The measured value is called V_{OR3} (V_{OG3} or V_{OB3}), and is treated as V_{CR2}.
3. Contrast control relative characteristics ΔV_{CR2} are calculated by the equation below:

$$\Delta V_{CR2}=V_{OR3}/V_{OG3},\ V_{OG3}/V_{OB3},\ V_{OB3}/V_{OR3}$$

V_{SCR1} Sub contrast control characteristics (typical)
ΔV_{SCR1} Sub contrast control relative characteristics (typical)

1. Set V4, V8 and V12 to 4.0V. Other conditions are as given in Supplementary Table.
2. Measure the amplitude output at T.P21 (25 or 29). The measured value is called V_{OR4} (V_{OG4} or V_{OB4}).
3. Sub contrast control characteristics V_{SCR1} and relative characteristics ΔV_{SCR1} are calculated, respectively, by the equations below:

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

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

V_{SCR2} Sub contrast control characteristics (minimum)
ΔV_{SCR2} Sub contrast control relative characteristics (minimum)

1. Set V4, V8 and V12 to 1.0V. Other conditions are as given in Supplementary Table.
2. Measure the amplitude output at T.P21 (25 or 29). The measured value is called V_{OR5} (V_{OG5} or V_{OB5}).
3. Relative characteristics ΔV_{SCR2} are calculated by the equation below:

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

V_{SCR3} Contrast/sub contrast control characteristics (typical)
ΔV_{SCR3} Contrast/sub contrast control relative characteristics (typical)

1. Set V4, V8, V12 and V14 to 3.0V. Other conditions are as given in Supplementary Table.
2. Measure the amplitude at T.P21 (25 or 29). The measured value is called V_{OR6} (V_{OG6} or V_{OB6}).

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

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

V_{B1} Brightness control characteristics (maximum)
ΔV_{B1} Brightness control relative characteristics (maximum)

1. Measuring conditions are as given in Supplementary Table.
2. Measure the output at T.P21 (25 or 29) with a voltmeter. The measured value is called V_{OR7} (V_{OG7} or V_{OB7}), and is treated as V_{B1}.
3. To obtain brightness control relative characteristics, calculate the difference in the output between the channels, using V_{OR7}, V_{OG7} and V_{OB7}.

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

V_{B2} Brightness control characteristics (typical)
ΔV_{B2} Brightness control relative characteristics (typical)

1. Measuring conditions are as given in Supplementary Table.
2. Measure the output at T.P21 (25 or 29) 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_{B2}), calculate the difference in the output between the channels, using $V_{OR7'}$, $V_{OG7'}$, and $V_{OB7'}$.

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

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.P21 (25 or 29) 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 $V_{OB7''}$.

$$\Delta V_{B3}=V_{OR7''}\text{-}V_{OG7''}\qquad [mV]$$
$$=V_{OG7''}\text{-}V_{OB7''}$$
$$=V_{OB7''}\text{-}V_{OR7''}$$

F_{C1} Frequency characteristics1 (f=50MHz)
ΔF_{C1} Frequency relative characteristics1 (f=50MHz)
F_{C1}' Frequency characteristics1 (f=130MHz; maximum)
$\Delta F_{C1}'$ Frequency relative characteristics1 (f=130MHz; maximum)

1. Measuring conditions are as given in Supplementary Table.
2. SG2 and SG3 are input. The amplitude of the waveform output at T.P21 (25 or 29) is measured by the same procedure as in G_V, ΔG_V.

3. Supposing that the measured value is treated as amplitude V_{OR1} (V_{OG1} or V_{OB1}) when SG1 is input, as V_{OR8} (V_{OG8} or V_{OB8}) when SG2 is input, or as V_{OR9} (V_{OG9} or V_{OB9}) when SG3 is input, frequency characteristics F_{C1} and $F_{C1'}$ are calculated as follows:

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

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

4. Frequency relative band widths ΔF_{C1} and $\Delta F_{C1'}$ are equal to the difference in F_{C1} and $F_{C1'}$, respectively, between the channels.

F_{C2} Frequency characteristics2 (f=130MHz; maximum)
$\Delta F_{C2}'$ Frequency relative characteristics2 (f=130MHz; maximum)

Measuring conditions and procedure are the same as described in F_{C1}, ΔF_{C1}, $F_{C1'}$, $\Delta F_{C1'}$, except that CONTRAST (V14) is turned down to 1.5V.

C.T.1 Crosstalk1 (f=50MHz)
C.T.1' Crosstalk1 (f=130MHz)

1. Measuring conditions are as given in Supplementary Table.
2. Input SG2 (or SG3) to pin 11 (R-ch) only, and then measure the waveform amplitude output at T.P21 (25 or 29). The measured value is called V_{OR}, V_{OG} and or V_{OB} respectively.
3. Crosstalk C.T. 1 is calculated by the equation below:

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

C.T.2 Crosstalk2 (f=50MHz)
C.T.2' Crosstalk2 (f=130MHz)

1. Change the input pin from pin 11 (R-ch) to pin 7 (G-ch), and measure the output in the same way as in C.T.1, C.T.1'.
2. Crosstalk C.T. 2 is calculated by the equation below:

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

C.T.3 Crosstalk3 (f=50MHz)
C.T.3' Crosstalk3 (f=130MHz)

1. Change the input pin from pin 11 (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 is calculated by the equation below:

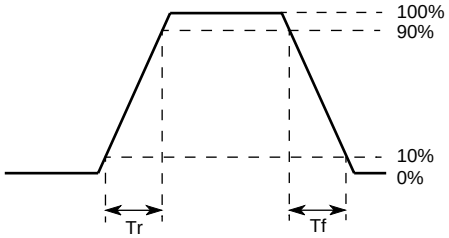
$$\begin{matrix}C.T.3 \\ (C.T.3')\end{matrix} =20LOG \frac{V_{OR}\ or\ V_{OG}\ \ [V_{P-P}]}{V_{OB}\ \ [V_{P-P}]}\ [dB]$$

Tr Pulse characteristics1
Tf Pulse characteristics2

1. Measuring conditions are as given in Supplementary Table.
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 SG5 input level gradually, monitoring the output (about 2.0 VDC). Measure the SG5 input level when the output reaches 0V.

W14 Clamp pulse minimum width

Under the same conditions as given in V14th, reduce the SG5 pulse width gradually, monitoring the output. Measure the SG5 pulse width when the output reaches 0V.

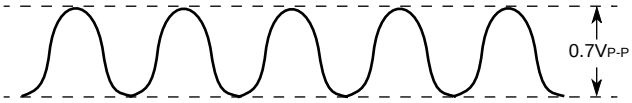
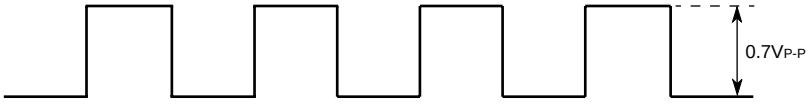
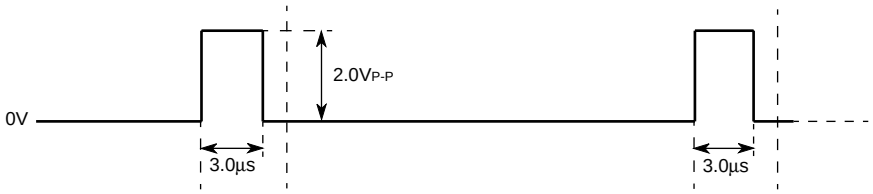
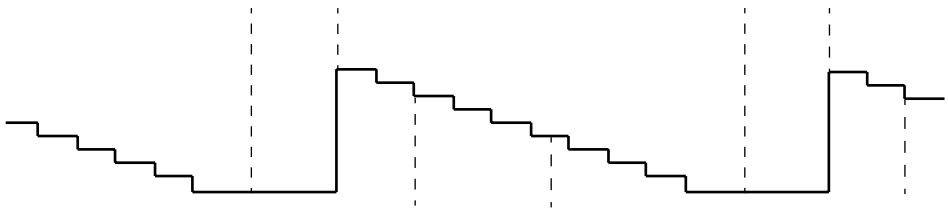
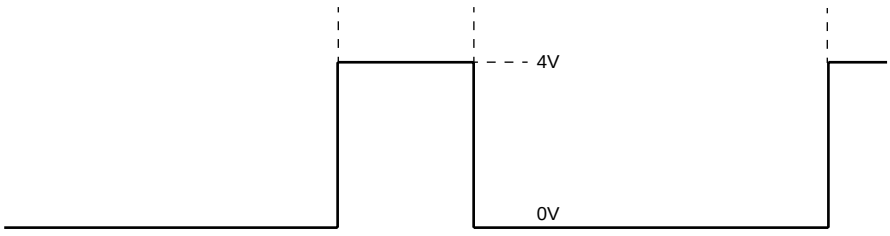
P_{DCH} Pedestal voltage temperatere characteristics1
P_{DCL} Pedestal voltage temperatere characteristics2

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. $P_{DCH}=P_{DC1}-P_{DC2}$
   $P_{DCL}=P_{DC1}-P_{DC3}$

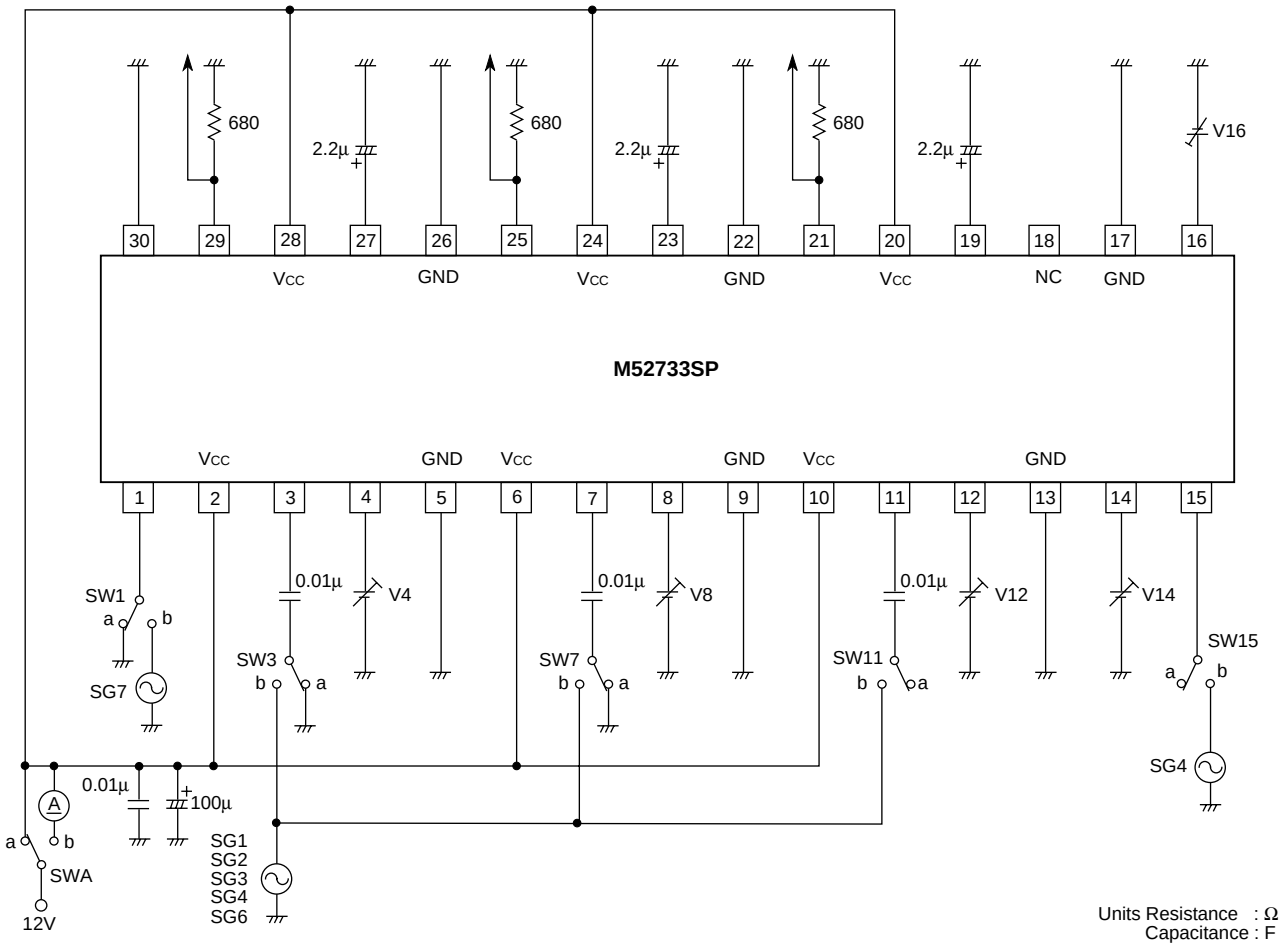
V1th BLK input threshold voltage

1. Measuring conditions are as given in Supplementary Table.
2. Make sure that signals are not being output synchronously with SG7 (blanking period).
3. Reduce the SG7 input level gradually, monitoring output. Measure the SG7 level when the blanking period disappears. The measured value is called V1th.

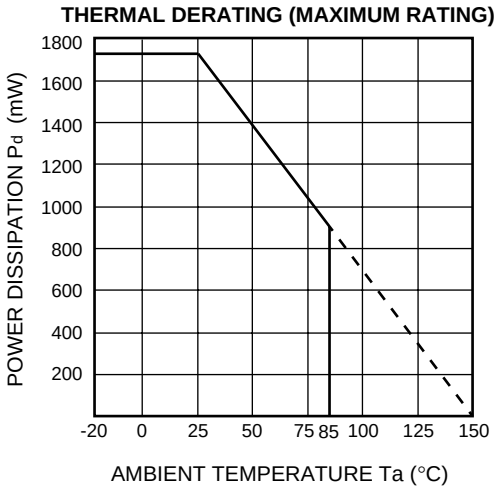
INPUT SIGNAL

SG No.	Signals
SG1	Sine wave of amplitude 0.7V_{P-P} (f=1MHz) 
SG2	Sine wave with amplitude of 0.7V_{P-P} (f=50MHz)
SG3	Sine wave with amplitude of 0.7V_{P-P} (f=130MHz)
SG4	Pulse with amplitude of 0.7V_{P-P} (f=30kHz, duty=50%) Pulses which are synchronous with SG4 pedestal portion 
SG5	Pulses which are synchronous with standard video step waveform pedestal portion: amplitude, 2.0V_{P-P}; and pulse width, 3.0µs (pulse width and amplitude sometimes variable) 
SG6 Standard video step waveform	 Video signal with amplitude of 0.7V_{P-P} (f=30kHz, amplitude sometimes variable)
SG7 OSD BLK signals	 Pulses which are synchronous with standard video step waveform's video portions: amplitude, 4.0V_{P-P}; and pulse width, 25µs

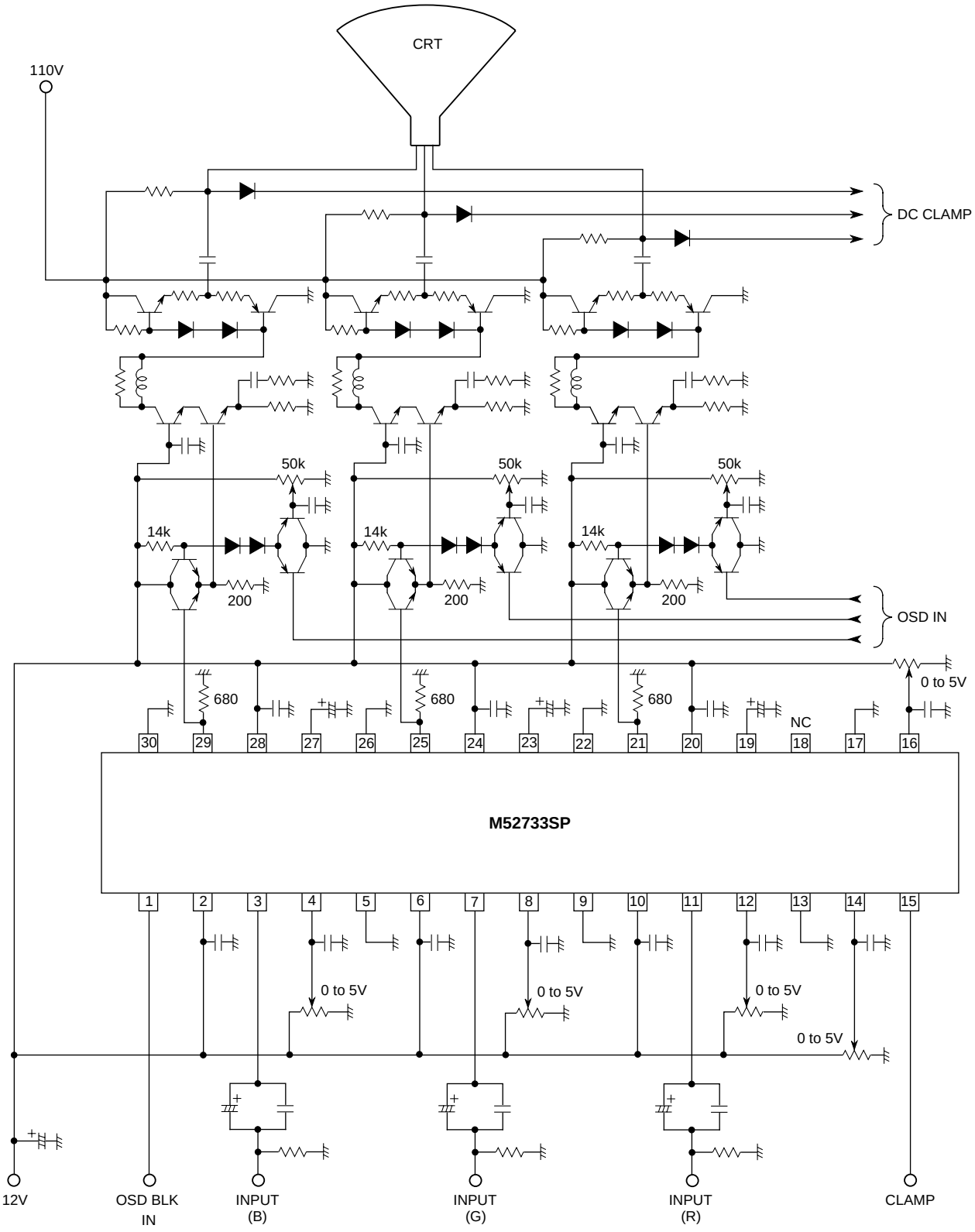
TEST CIRCUIT



TYPICAL CHARACTERISTICS

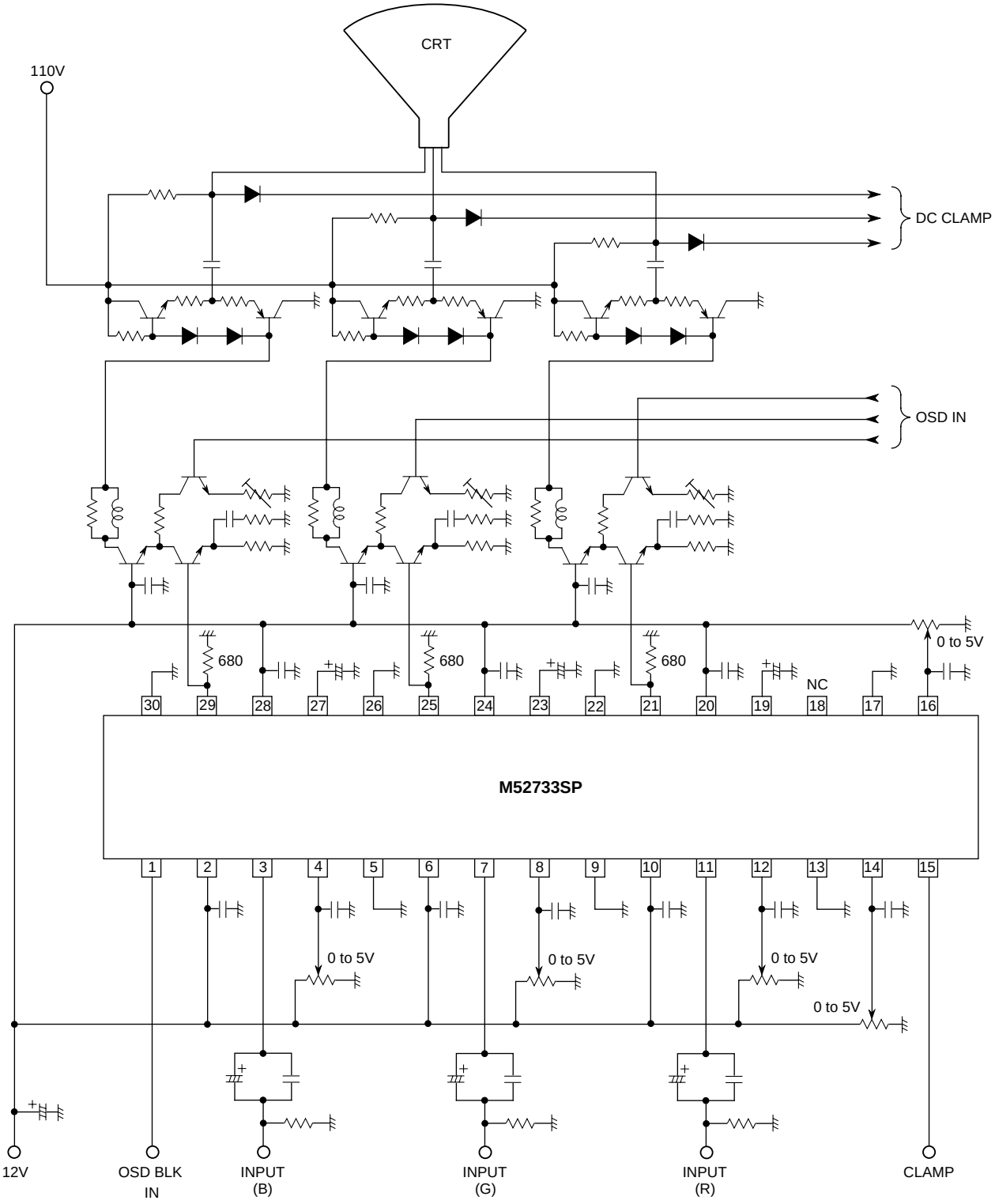


APPLICATION EXAMPLE 1



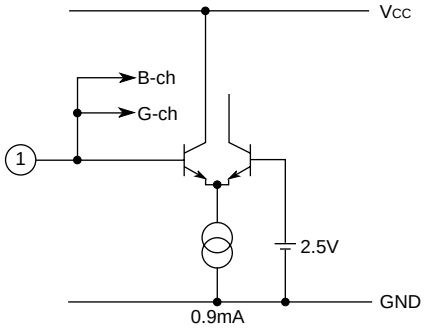
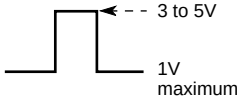
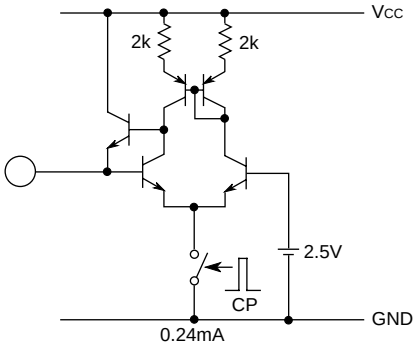
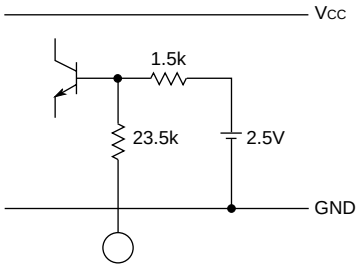
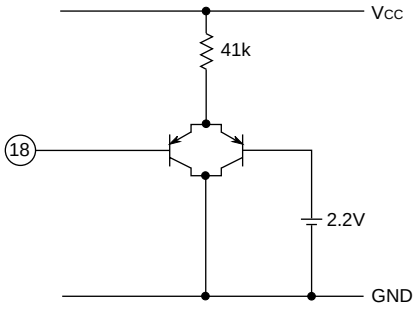
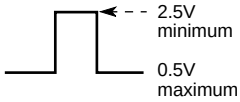
Units Resistance : Ω
Capacitance : F

APPLICATION EXAMPLE 2

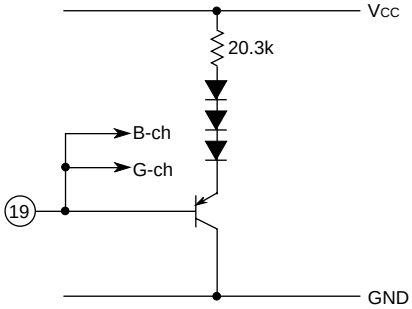
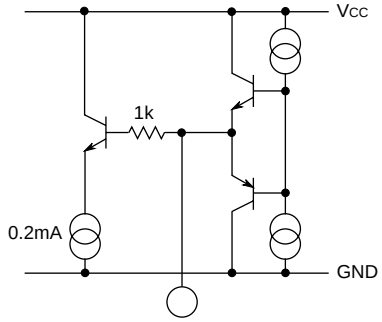
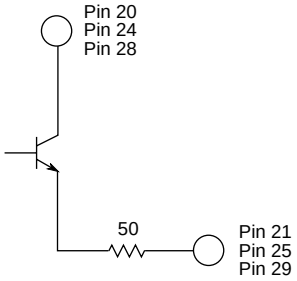


Units Resistance : Ω
Capacitance : F

DESCRIPTION OF PIN

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
1	OSD BLK IN	–		·Input pulses of minimum 3V.  ·Connected to GND if not used.
2 6 10	Vcc (B-ch) Vcc (G-ch) Vcc (R-ch)	12	–	·Apply equivalent voltage to 3 channels.
3 7 11	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 8 12 14	Subcontrast (B) Subcontrast (G) Subcontrast (R) Main contrast	2.5		·Use at maximum 5V for stable operation.
5, 26 9, 22 13, 17 30	GND (B-ch) GND (G-ch) GND (R-ch) GND	GND	–	
15	CP IN	–		·Input pulses of minimum 2.5V.  ·Input at low impedance.

DESCRIPTION OF PIN (CONT.)

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
16	Main brightness	–		
19 23 27	Hold (R) Hold (G) Hold (B)	Variable		·A capacity is needed on the GND side.
20 24 28	Vcc2 (R) Vcc2 (G) Vcc2 (B)	Apply 12		·Used to supply power to output emitter follower only. ·Apply equivalent voltage to 3 channels.
21 25 29	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.