M52721SP

WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

DESCRIPTION

The M52721SP is a wideband video preamplifier with 200MHz band.

FEATURES

- Input:0.7V_{P-P} (Typical), Output:7V_{P-P} (Maximum)
- Maximum gain:20dB
- Frequency band:200MHz (-3dB)
- Contrast control (0 to 5V_{DC})
- Brightness control (0 to 5V_{DC})
- Built-in OSD MIX circuit

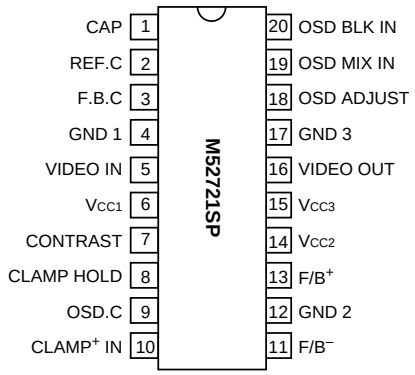
APPLICATION

Display monitor

RECOMMENDED OPERATING CONDITION

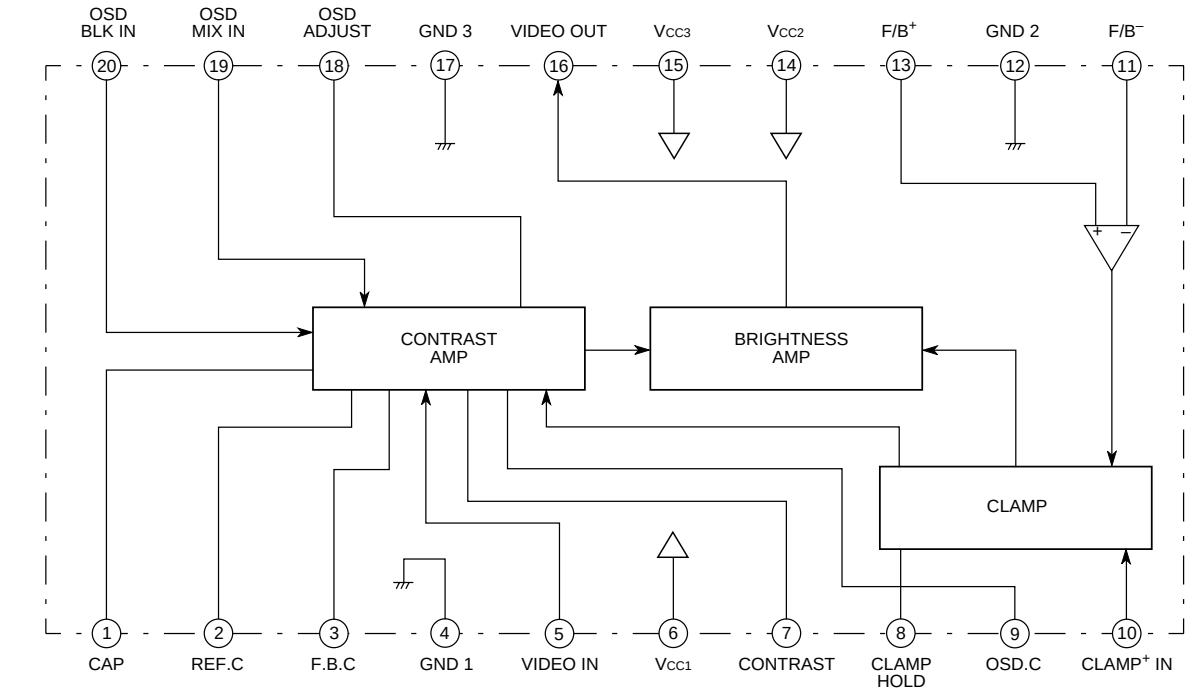
Supply voltage range.....11.5 to 12.5V
Rated supply voltage.....12.0V
Operating temperature.....-20°C to +85°C
Circuit current.....60mA

PIN CONFIGURATION (TOP VIEW)



Outline 20P4B

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	13.0	V
P_d	Power dissipation	1524	mW
T_{opr}	Operating temperature	-20 to +85	°C
T_{stg}	Storage temperature	-40 to +150	°C
V_{opr}	Recommended operating supply voltage	12.0	V
$V_{opr'}$	Recommended operating supply voltage range	11.5 to 12.5	V
Surge	Electrostatic discharge	±200	V

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

Symbol	Parameter	Test point	SWA	Test conditions							Limits			Unit
				Input	External supply voltage (V)			Pulse						
				SW5	V7 Con-trast	V11 Bright-ness	V18 OSD Adj	SW10 Clamp	SW19 OSD MIX	SW20 OSD BLK	Min.	Typ.	Max.	
I_{CC}	Circuit current	A	a	b	5.0	3.0	5.0	c	b	b	40	52	64	mA
V_{omax}	Output dynamic range	T.P16	b	a SG8	5.0	0.5	0	a SG6	b	b	8.0	8.9	11.5	V_{P-P}
V_{imax}	Maximum allowable input	T.P16	b	a SG8	2.5	0.5	0	a SG6	b	b	–	0.7	1.0	V_{P-P}
Gv	Maximum gain	T.P16	b	a SG8	5.0	2.0	0	a SG6	b	b	17.0	20.0	23.0	dB
V_{CR1}	Contrast control characteristics 1	T.P16	b	a SG8	2.5	2.0	0	a SG6	b	b	13.0	15.0	17.0	dB
V_{CR2}	Contrast control characteristics 2	T.P16	b	a SG8	1.0	2.0	0	a SG6	b	b	5.0	7.2	9.1	dB
V_{B1}	Brightness control characteristics 1	T.P16	b	b	5.0	1.0	0	a SG6	b	b	0.6	1.0	1.4	V_{DC}
V_{B2}	Brightness control characteristics 2	T.P16	b	b	5.0	2.0	0	a SG6	b	b	1.6	2.0	2.4	V_{DC}
V_{B3}	Brightness control characteristics 3	T.P16	b	b	5.0	3.0	0	a SG6	b	b	2.6	3.0	3.4	V_{DC}
F_{1-a}	Frequency characteristics 1-a f=100MHz	T.P16	b	a SG2	2.5	open	0	c	b	b	-1	0	3	dB
F_{2-a}	Frequency characteristics 2-a f=200MHz	T.P16	b	a SG3	2.5	open	0	c	b	b	-3	-2	3	dB
T_r	Pulse characteristics (rise time)	T.P16	b	a SG5	4	2.4	0	a SG6	b	b	–	2.0	5.0	nsec
T_f	Pulse characteristics (fall time)	T.P16	b	a SG5	4	2.4	0	a SG6	b	b	–	1.5	5.0	nsec
V_{10th}	Clamp pulse threshold voltage	T.P16	b	b	4	2.4	0	a SG6	b	b	1.9	2.0	5.0	V_{DC}
W_{10}	Clamp pulse minimum width	T.P16	b	b	4	2.4	0	a SG6	b	b	0.7	0.8	–	µsec
OT_r	OSD pulse characteristics (rise time)	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	–	5.0	10.0	nsec
OT_f	OSD pulse characteristics (fall time)	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	–	5.0	10.0	nsec
V_{19th}	OSD input threshold voltage	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	2.2	2.3	5.0	V_{DC}
V_{20th}	BLK input threshold voltage	T.P16	b	a SG8	4	2.4	4	a SG6	b	a SG7	2.8	2.9	5.0	V_{DC}
O_{aj1}	OSD adjust control characteristics 1	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	5.9	6.3	6.8	V_{P-P}
O_{aj2}	OSD adjust control characteristics 2	T.P16	b	b	4	2.4	2	a SG6	a SG7	b	2.9	3.3	3.7	V_{P-P}

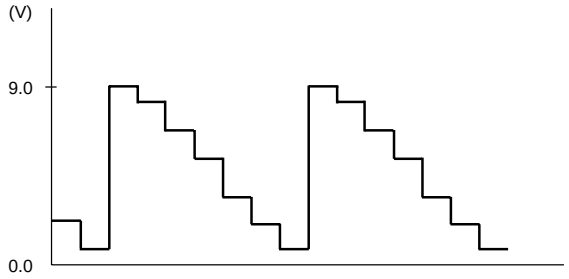
ELECTRICAL CHARACTERISTICS TEST METHOD

I_{CC} Circuit current

When there is no signal, fix SWA on side "a", and measure I_{CC}, using ampere meter A.

V_{omax} Output dynamic range

Input SG8 to pin 5, and set V11 at 0.5V



TP16 OUTPUT WAVEFORM

Gradually increase the amplitude of SG8 from 700mV, and measure the amplitude of the TP16 output waveform when the upper side of the waveform becomes distorted.

V_{imax} Maximum allowable input

From the condition in Vomax above, change V7 to 2.5V, gradually increase the amplitude of SG8 from 700mV_{P-P}, and read the input signal amplitude when the output signal starts to be distorted.

Gv Maximum gain

Read the amplitude of TP16 output: it should be taken as V_0.

The maximum gain G_V is determined by:

$$G_V=20LOG\ \frac{V_0\ [V_{P-P}]}{0.7\ [V_{P-P}]}\ [dB]$$

V_{CR1} Contrast control characteristics 1

Set V7 at 2.5V, and read the amplitude of TP16 output: it should be taken as V_{01}.

$$V_{CR1}=20LOG\ \frac{V_{01}\ [V_{P-P}]}{0.7\ [V_{P-P}]}\ [dB]$$

V_{CR2} Contrast control characteristics 2

Set V7 at 1.0V, and read the amplitude of TP16 output: it should be taken as V_{02}.

$$V_{CR2}=20LOG\ \frac{V_{02}\ [V_{P-P}]}{0.7\ [V_{P-P}]}\ [dB]$$

V_{B1} Brightness control characteristics 1

Set brightness (V11) at 1.0V, and measure the output of TP16 with a voltmeter. This value is V_{B1}.

V_{B2} Brightness control characteristics 2

Set brightness (V11) at 2.0V, and measure the output of TP16 with a voltmeter. This value is V_{B2}.

V_{B3} Brightness control characteristics 3

Set brightness (V11) at 3.0V, and measure the output of TP16 with a voltmeter. This value is V_{B3}.

$F_{1\text{-}a}$ Frequency characteristics 1-a f=100MHz

$F_{2\text{-}a}$ Frequency characteristics 2-a f=200MHz

With zero resistance between pins 13 and 16, apply a DC voltage to pin 5 so that the bottom of the input waveform reaches 2.6V. Next, apply a DC voltage to pin 8 so that the bottom of the output waveform reaches 2.4V.

Input SG1 and measure the amplitude of TP16 output (V_{01}).

Input SG2 and measure the amplitude of TP16 output (V_{02}).

Input SG3 and measure the amplitude of TP16 output (V_{03}).

$F_{1\text{-}a}$ and $F_{2\text{-}a}$ are determined by:

$$F_{1\text{-}a}=20LOG\ \frac{V_{02}\ [V_{P-P}]}{V_{01}\ [V_{P-P}]}\ [dB]$$

$$F_{2\text{-}a}=20LOG\ \frac{V_{03}\ [V_{P-P}]}{V_{01}\ [V_{P-P}]}\ [dB]$$

T_r Pulse characteristics (rise time)

T_f Pulse characteristics (fall time)

1. Measure the rise time T_{r1} and fall time T_{f1} between 10 and 90% of the input pulse with an active probe.
2. Next, measure the rise time T_{r2} and fall time T_{f2} between 10 and 90% of the output pulse with an active probe.

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

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

V_{10th} Clamp pulse threshold voltage

While monitoring the output (approx. 2.4V_{DC}), decrease the SG6 pulse width gradually and measure the SG6 amplitude when the output reaches 2.4V or more.

W_{10} Clamp pulse minimum width

While monitoring the output (approx. 2.4V_{DC}), decrease the SG6 amplitude gradually and measure the SG6 pulse width when the output becomes 2.4V or more.

OT_r OSD pulse characteristics (rise time)

OT_f OSD pulse characteristics (fall time)

Measure the OSD rise time T_r and OSD fall time T_f between 10 and 90% of the output pulse with an active probe.

V_{19th} OSD input threshold voltage

While monitoring the output, decrease the SG7 amplitude gradually and measure the SG7 amplitude when the output reaches 0V.

V_{20th} BLK input threshold voltage

Make sure that signal is not output in synchronization with SG7 (blanking portion).

Next, while monitoring this output, decrease the SG7 amplitude gradually and measure the SG7 amplitude when the blanking portion disappears.

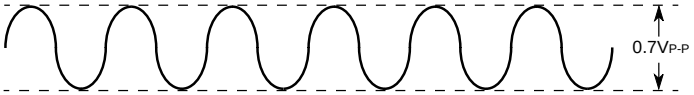
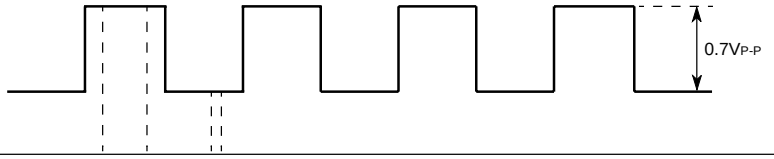
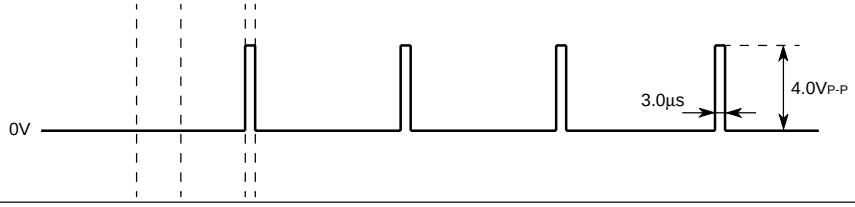
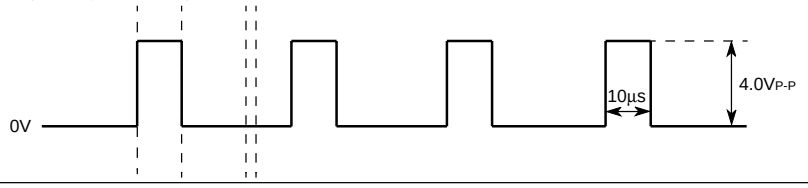
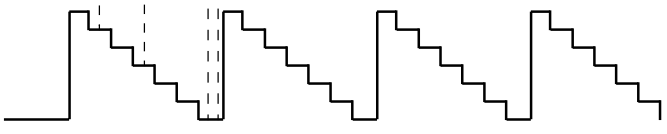
O_{aj1} OSD adjust control characteristics 1

Measure the amplitude of the output.

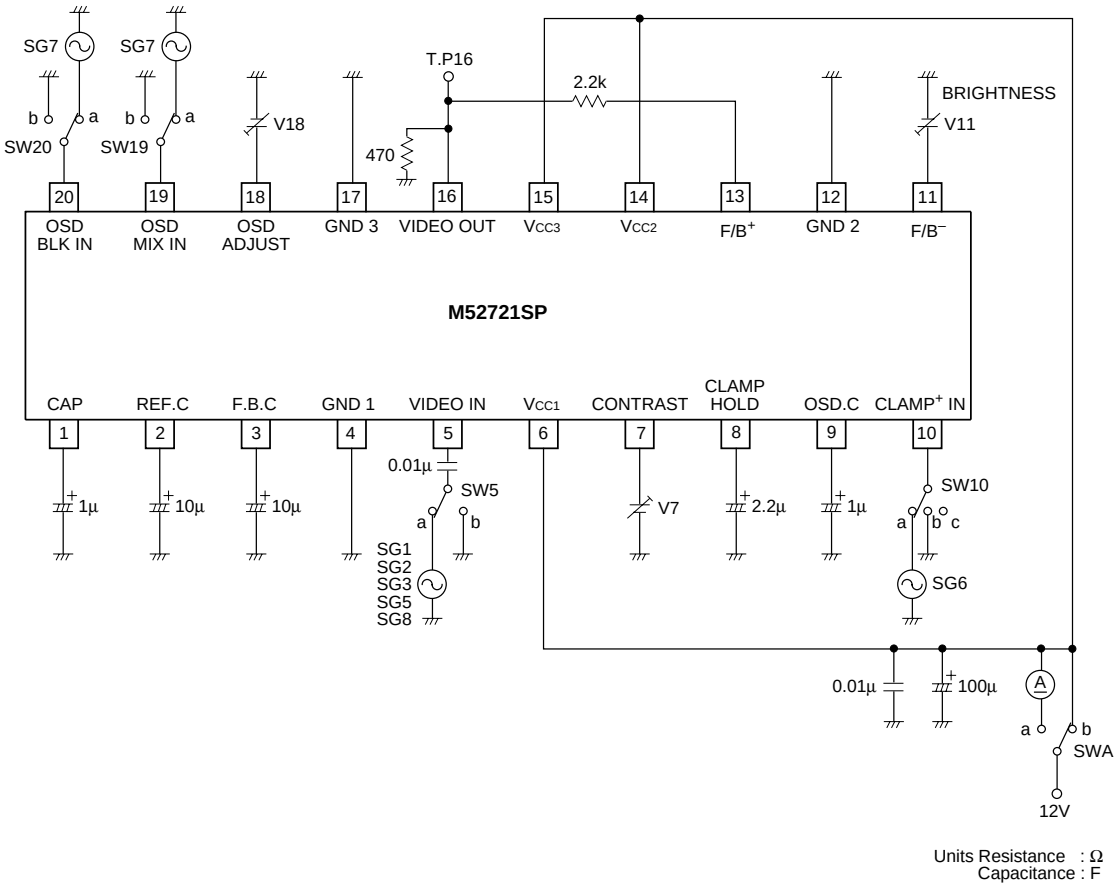
O_{aj2} OSD adjust control characteristics 2

The conditions are the same as in O_{aj1} above except that V18 is set at 2V.

INPUT SIGNAL

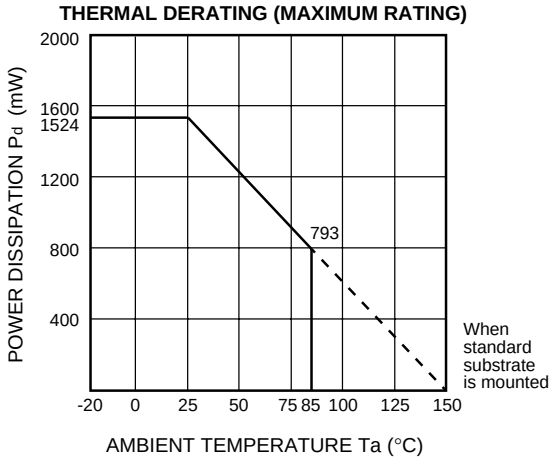
SG No.	Signals
SG1	Sine wave with amplitude 0.7V_{P-P} (100kHz, amplitude partially variable∗) 
SG2	Sine wave with amplitude 0.7V_{P-P} (f=100MHz)
SG3	Sine wave with amplitude 0.7V_{P-P} (f=200MHz)
SG5	Pulse with amplitude 0.7V_{P-P} (f=30kHz, duty=50%) 
SG6 CP^+	Pulse with amplitude 4.0V_{P-P} and pulse width 3.0µs synchronous with the pedestal part of standard video stepped wave (f=30kHz, pulse width and amplitude partially variable) 
SG7 BLK, OSD signals	Pulse with amplitude 4.0V_{P-P} and pulse width 10µs synchronous with the image part of standard video stepped wave (f=30kHz, amplitude partially variable∗) 
SG8 Standard video stepped wave	 Video signal with pulse width 0.7V_{P-P} (f=30kHz, amplitude partially variable∗)

TEST CIRCUIT



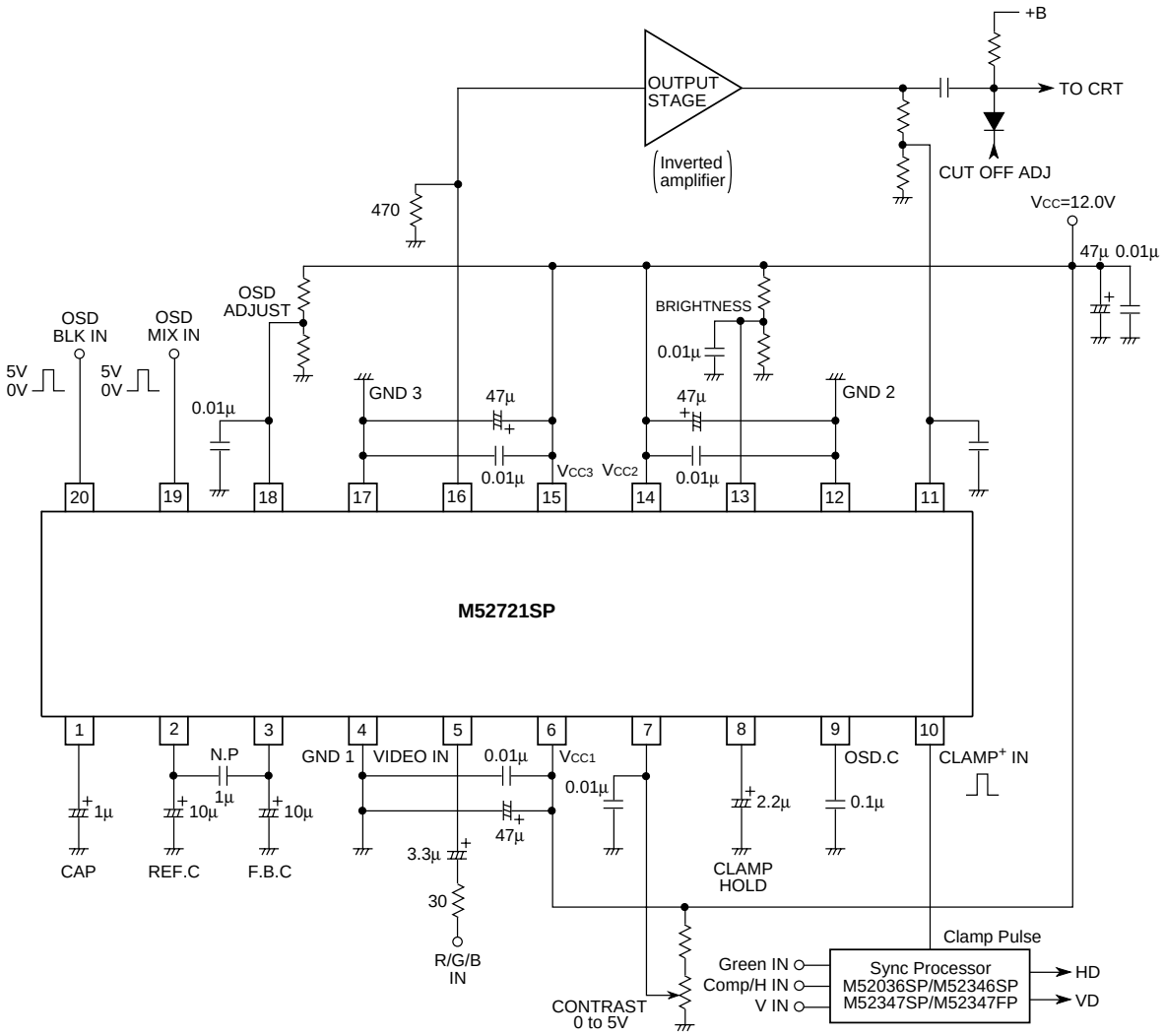
Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS



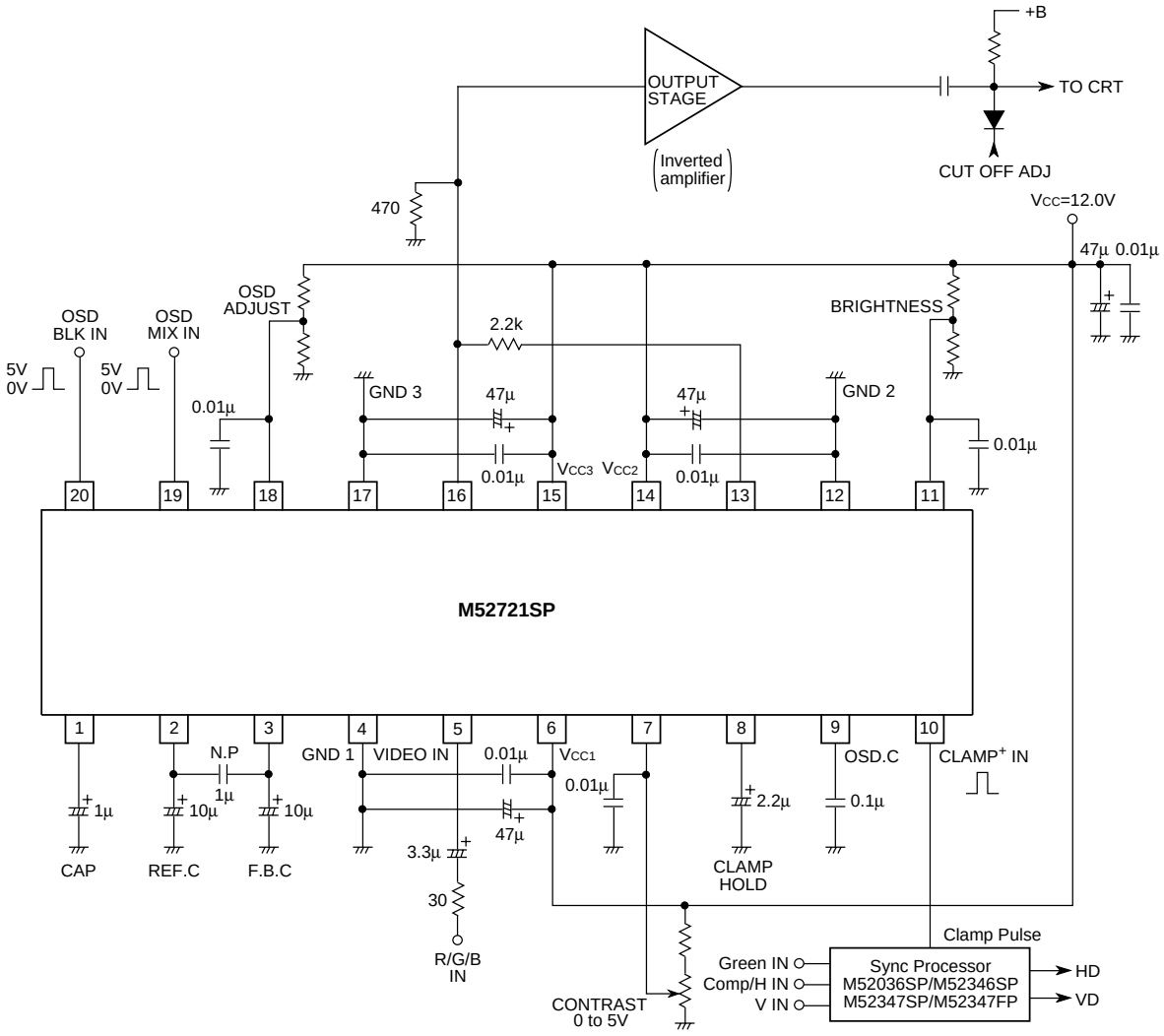
APPLICATION EXAMPLE

1. External Feed Back



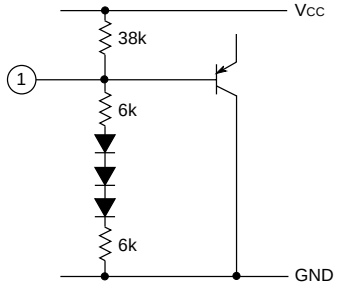
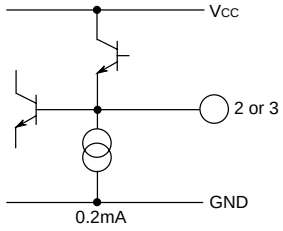
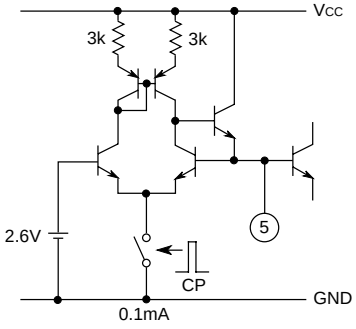
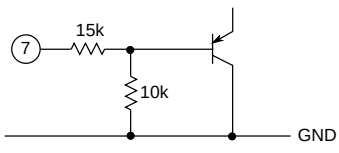
Units Resistance : Ω
Capacitance : F

2. Internal Feed Back

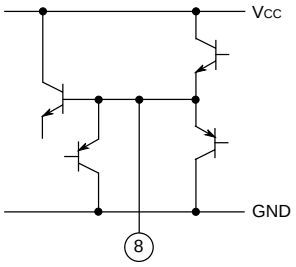
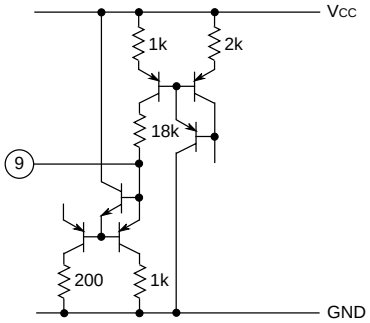
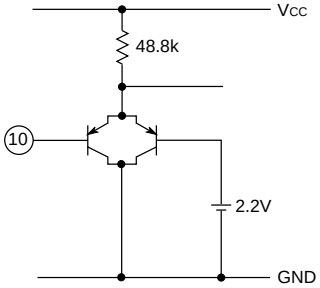
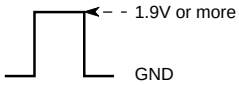
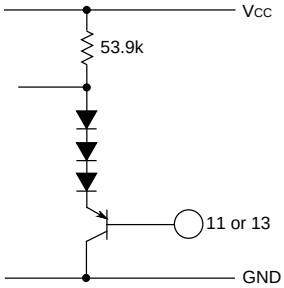


Units Resistance : Ω
Capacitance : F

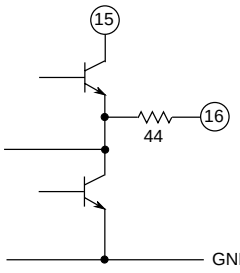
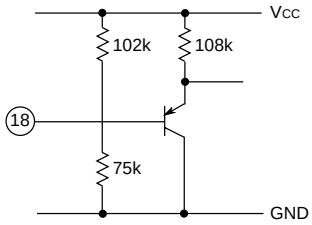
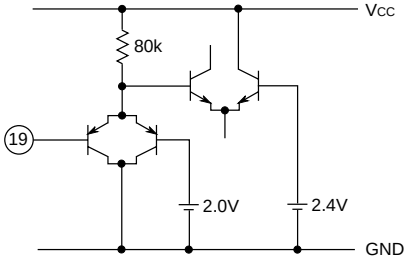
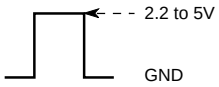
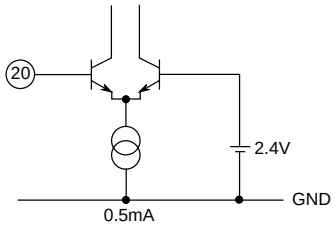
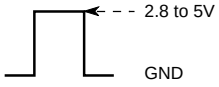
DESCRIPTION OF PIN

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
1	CAP	4.5		·Capacitance is required between the pin and GND.
2 3	REF.C F.B.C	4.5 Variable		·Capacitance is required between the pin and GND. If the output oscillates, consider the use of additional non-polar capacitance (approx. 1µ) between pin 2 and pin 3.
4 12 17	GND1 GND2 GND3	GND	–	·Since pin 17 is a GND pin for the output stage only, make sure that it does not interfere with other GND pins.
5	VIDEO IN	2.6		·Clamped at about 2.6V by the clamp pulse of pin 10.
6 14	Vcc1 Vcc2	12 Impressed	–	
7	CONTRAST	Variable		·Do not apply 5V or more DC voltage.

DESCRIPTION OF PIN (cont.)

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
8	CLAMP HOLD	Variable		·Capacitance is required between the pin and GND. The response is quicker as the capacitance is smaller, and as it is larger, the response will become more stable. Consequently, set this capacitance according to the signal contents.
9	OSD.C	–		·Capacitance is required between the pin and GND.
10	CLAMP+ IN	–		·Input a pulse of 1.9V or more with pulse width 0.7µs or more. 
11 13	F/B- (BRIGHTNESS) F/B+	Variable		·It is recommended that the IC be used between pedestal voltage 2V and 3V.

DESCRIPTION OF PIN (cont.)

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
15	V_{CC3}	12V Impressed		·Power supply for the input stage only.
16	VIDEO OUT	Variable		·A 370Ω or more resistor is required across GND. Make the resistor wiring as short as possible.
18	OSD ADJUST	0 to 5V Impressed		·Do not apply 5V or more DC voltage. When OSD MIX function is not used, ground the pin to GND. If external disturbing voltage intrudes into the pin, which may affect IC output, consider the use of an additional by-pass capacitor as well.
19	OSD MIX IN	–		 ·When not in use, ground the pin to GND. It is not possible to input OSD MIX signal only. Be sure to input the signal with OSD BLK signal.
20	OSD BLK IN	–		 ·When not in use, ground the pin to GND. Cannot be used for blanking of retrace line.