

# M52721SP

## WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

### DESCRIPTION

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

### FEATURES

- Input:0.7V<sub>P-P</sub> (Typical), Output:7V<sub>P-P</sub> (Maximum)
- Maximum gain:20dB
- Frequency band:200MHz (-3dB)
- Contrast control (0 to 5Vdc)
- Brightness control (0 to 5Vdc)
- Built-in OSD MIX circuit

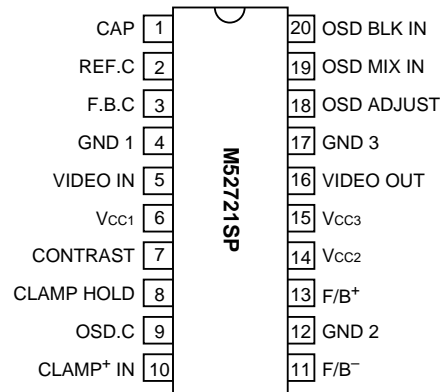
### APPLICATION

Display monitor

### RECOMMENDED OPERATING CONDITION

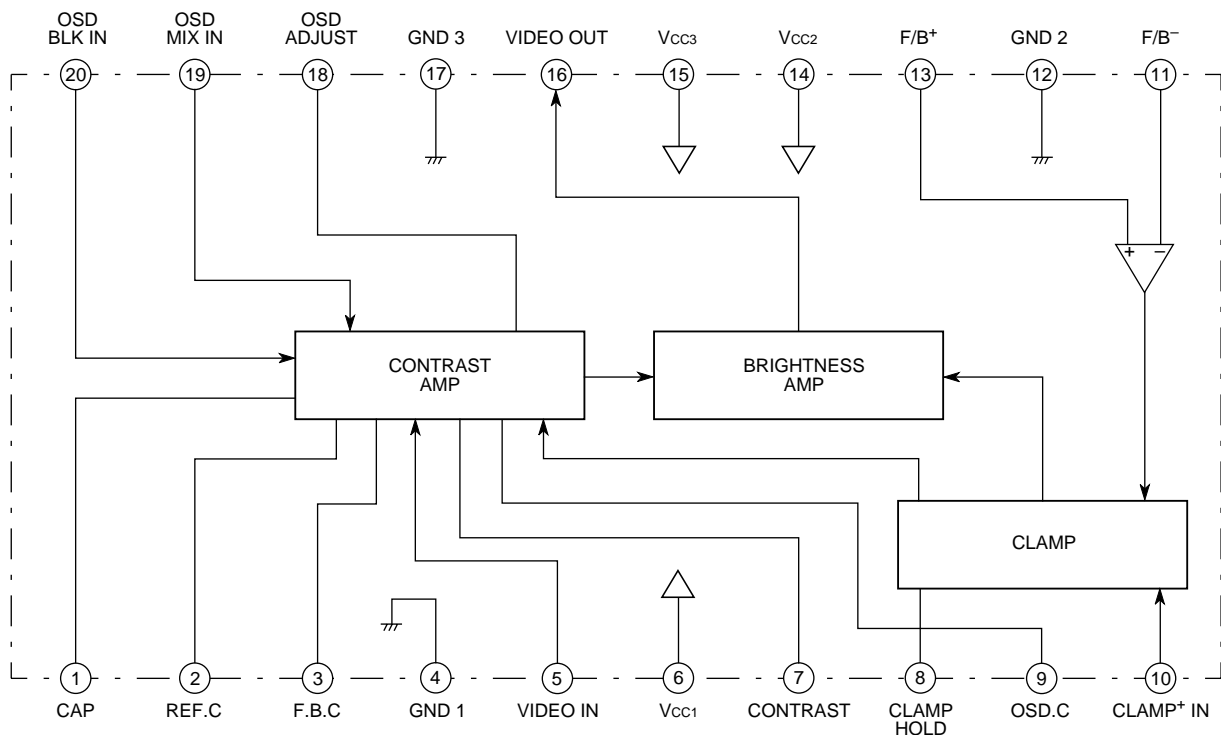
Supply voltage range.....11.5 to 12.5V  
 Rated supply voltage.....12.0V  
 Operating temperature.....-20°C to +85°C  
 Circuit current.....60mA

### PIN CONFIGURATION (TOP VIEW)



Outline 20P4B

### BLOCK DIAGRAM



**WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX**

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

Symbol	Parameter	Ratings	Unit
Vcc	Supply voltage	13.0	V
Pd	Power dissipation	1524	mW
Topr	Operating temperature	-20 to +85	°C
Tstg	Storage temperature	-40 to +150	°C
Vopr	Recommended operating supply voltage	12.0	V
Vopr'	Recommended operating supply voltage range	11.5 to 12.5	V
Surge	Electrostatic discharge	±200	V

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

Symbol	Parameter	Test point	SWA	Test conditions							Limits			Unit
				Input	External supply voltage (V)			Pulse			Min.	Typ.	Max.	
					SW5	V7 Contrast	V11 Brightness	V18 OSD Adj	SW10 Clamp	SW19 OSD MIX				
Icc	Circuit current	A	a	b	5.0	3.0	5.0	c	b	b	40	52	64	mA
Vomax	Output dynamic range	T.P16	b	a SG8	5.0	0.5	0	a SG6	b	b	8.0	8.9	11.5	VP-P
Vimax	Maximum allowable input	T.P16	b	a SG8	2.5	0.5	0	a SG6	b	b	–	0.7	1.0	VP-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
VCR1	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
VCR2	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
VB1	Brightness control characteristics 1	T.P16	b	b	5.0	1.0	0	a SG6	b	b	0.6	1.0	1.4	Vdc
VB2	Brightness control characteristics 2	T.P16	b	b	5.0	2.0	0	a SG6	b	b	1.6	2.0	2.4	Vdc
VB3	Brightness control characteristics 3	T.P16	b	b	5.0	3.0	0	a SG6	b	b	2.6	3.0	3.4	Vdc
F1-a	Frequency characteristics 1-a f=100MHz	T.P16	b	a SG2	2.5	open	0	c	b	b	-1	0	3	dB
F2-a	Frequency characteristics 2-a f=200MHz	T.P16	b	a SG3	2.5	open	0	c	b	b	-3	-2	3	dB
Tr	Pulse characteristics (rise time)	T.P16	b	a SG5	4	2.4	0	a SG6	b	b	–	2.0	5.0	nsec
Tf	Pulse characteristics (fall time)	T.P16	b	a SG5	4	2.4	0	a SG6	b	b	–	1.5	5.0	nsec
V10th	Clamp pulse threshold voltage	T.P16	b	b	4	2.4	0	a SG6	b	b	1.9	2.0	5.0	Vbc
W10	Clamp pulse minimum width	T.P16	b	b	4	2.4	0	a SG6	b	b	0.7	0.8	–	µsec
OTr	OSD pulse characteristics (rise time)	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	–	5.0	10.0	nsec
OTf	OSD pulse characteristics (fall time)	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	–	5.0	10.0	nsec
V19th	OSD input threshold voltage	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	2.2	2.3	5.0	Vbc
V20th	BLK input threshold voltage	T.P16	b	a SG8	4	2.4	4	a SG6	b	a SG7	2.8	2.9	5.0	Vdc
Oaj1	OSD adjust control characteristics 1	T.P16	b	b	4	2.4	4	a SG6	a SG7	b	5.9	6.3	6.8	VP-P
Oaj2	OSD adjust control characteristics 2	T.P16	b	b	4	2.4	2	a SG6	a SG7	b	2.9	3.3	3.7	VP-P

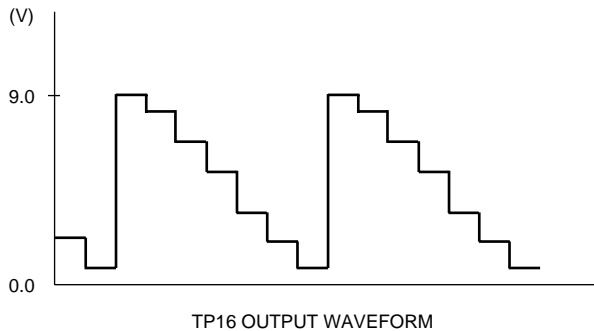
## WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

**ELECTRICAL CHARACTERISTICS TEST METHOD****I<sub>cc</sub> Circuit current**

When there is no signal, fix SWA on side "a", and measure I<sub>cc</sub>, using ampere meter A.

**V<sub>omax</sub> Output dynamic range**

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



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<sub>imax</sub> Maximum allowable input**

From the condition in V<sub>omax</sub> above, change V7 to 2.5V, gradually increase the amplitude of SG8 from 700mV<sub>P-P</sub>, and read the input signal amplitude when the output signal starts to be distorted.

**G<sub>v</sub> Maximum gain**

Read the amplitude of TP16 output: it should be taken as V<sub>0</sub>.

The maximum gain G<sub>v</sub> is determined by:

$$G_v = 20 \text{LOG} \frac{V_0 [\text{V}_{P-P}]}{0.7 [\text{V}_{P-P}]} \text{ [dB]}$$

**V<sub>CR1</sub> Contrast control characteristics 1**

Set V7 at 2.5V, and read the amplitude of TP16 output: it should be taken as V<sub>01</sub>.

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

**V<sub>CR2</sub> Contrast control characteristics 2**

Set V7 at 1.0V, and read the amplitude of TP16 output: it should be taken as V<sub>02</sub>.

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

**V<sub>B1</sub> Brightness control characteristics 1**

Set brightness (V11) at 1.0V, and measure the output of TP16 with a voltmeter. This value is V<sub>B1</sub>.

**V<sub>B2</sub> Brightness control characteristics 2**

Set brightness (V11) at 2.0V, and measure the output of TP16 with a voltmeter. This value is V<sub>B2</sub>.

**V<sub>B3</sub> Brightness control characteristics 3**

Set brightness (V11) at 3.0V, and measure the output of TP16 with a voltmeter. This value is V<sub>B3</sub>.

**F<sub>1-a</sub> Frequency characteristics 1-a f=100MHz****F<sub>2-a</sub> 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<sub>01</sub>).

Input SG2 and measure the amplitude of TP16 output (V<sub>02</sub>).

Input SG3 and measure the amplitude of TP16 output (V<sub>03</sub>).

F<sub>1-a</sub> and F<sub>2-a</sub> are determined by:

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

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

**T<sub>r</sub> Pulse characteristics (rise time)****T<sub>f</sub> Pulse characteristics (fall time)**

1. Measure the rise time T<sub>r1</sub> and fall time T<sub>f1</sub> between 10 and 90% of the input pulse with an active probe.
2. Next, measure the rise time T<sub>r2</sub> and fall time T<sub>f2</sub> between 10 and 90% of the output pulse with an active probe.

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

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

**V<sub>10th</sub> Clamp pulse threshold voltage**

While monitoring the output (approx. 2.4V<sub>DC</sub>), decrease the SG6 pulse width gradually and measure the SG6 amplitude when the output reaches 2.4V or more.

**W<sub>10</sub> Clamp pulse minimum width**

While monitoring the output (approx. 2.4V<sub>DC</sub>), decrease the SG6 amplitude gradually and measure the SG6 pulse width when the output becomes 2.4V or more.

**O<sub>T</sub> OSD pulse characteristics (rise time)****O<sub>T</sub> OSD pulse characteristics (fall time)**

Measure the OSD rise time T<sub>r</sub> and OSD fall time T<sub>f</sub> between 10 and 90% of the output pulse with an active probe.

**V<sub>19th</sub> OSD input threshold voltage**

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

**WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX**

**V<sub>20th</sub> 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.

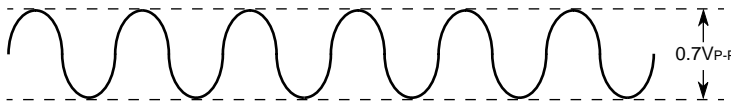
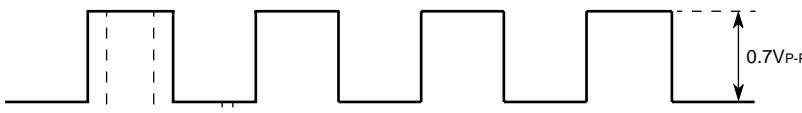
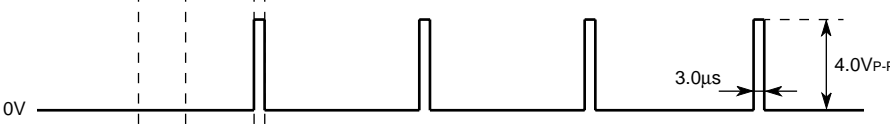
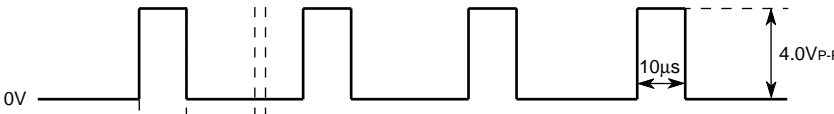
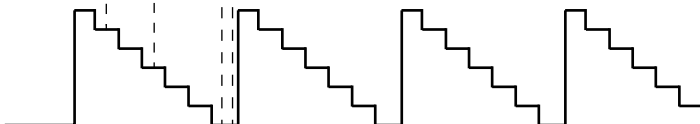
**O<sub>aj1</sub> OSD adjust control characteristics 1**

Measure the amplitude of the output.

**O<sub>aj2</sub> OSD adjust control characteristics 2**

The conditions are the same as in O<sub>aj1</sub> above except that V18 is set at 2V.

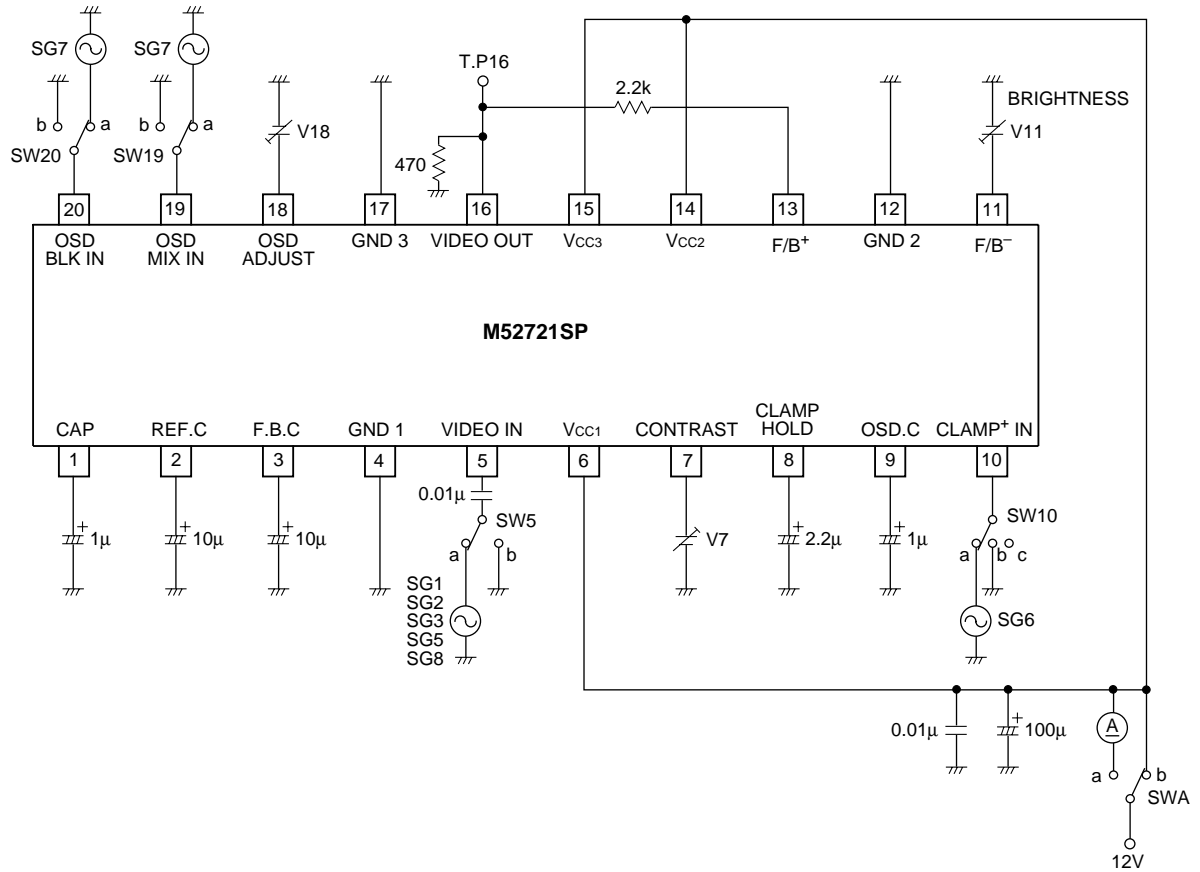
**INPUT SIGNAL**

SG No.	Signals
SG1	Sine wave with amplitude 0.7V <sub>P-P</sub> (100kHz, amplitude partially variable*) 
SG2	Sine wave with amplitude 0.7V <sub>P-P</sub> (f=100MHz)
SG3	Sine wave with amplitude 0.7V <sub>P-P</sub> (f=200MHz)
SG5	Pulse with amplitude 0.7V <sub>P-P</sub> (f=30kHz, duty=50%) 
SG6 CP <sup>+</sup>	Pulse with amplitude 4.0V <sub>P-P</sub> 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 <sub>P-P</sub> 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 <sub>P-P</sub> (f=30kHz, amplitude partially variable*) 

# M52721SP

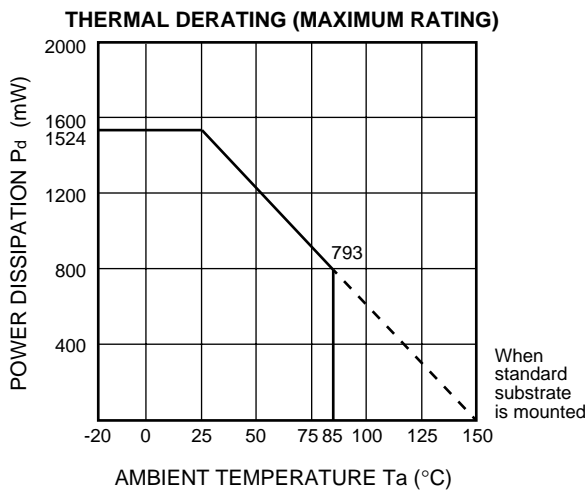
## WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

### TEST CIRCUIT



Units Resistance :  $\Omega$   
Capacitance : F

### TYPICAL CHARACTERISTICS

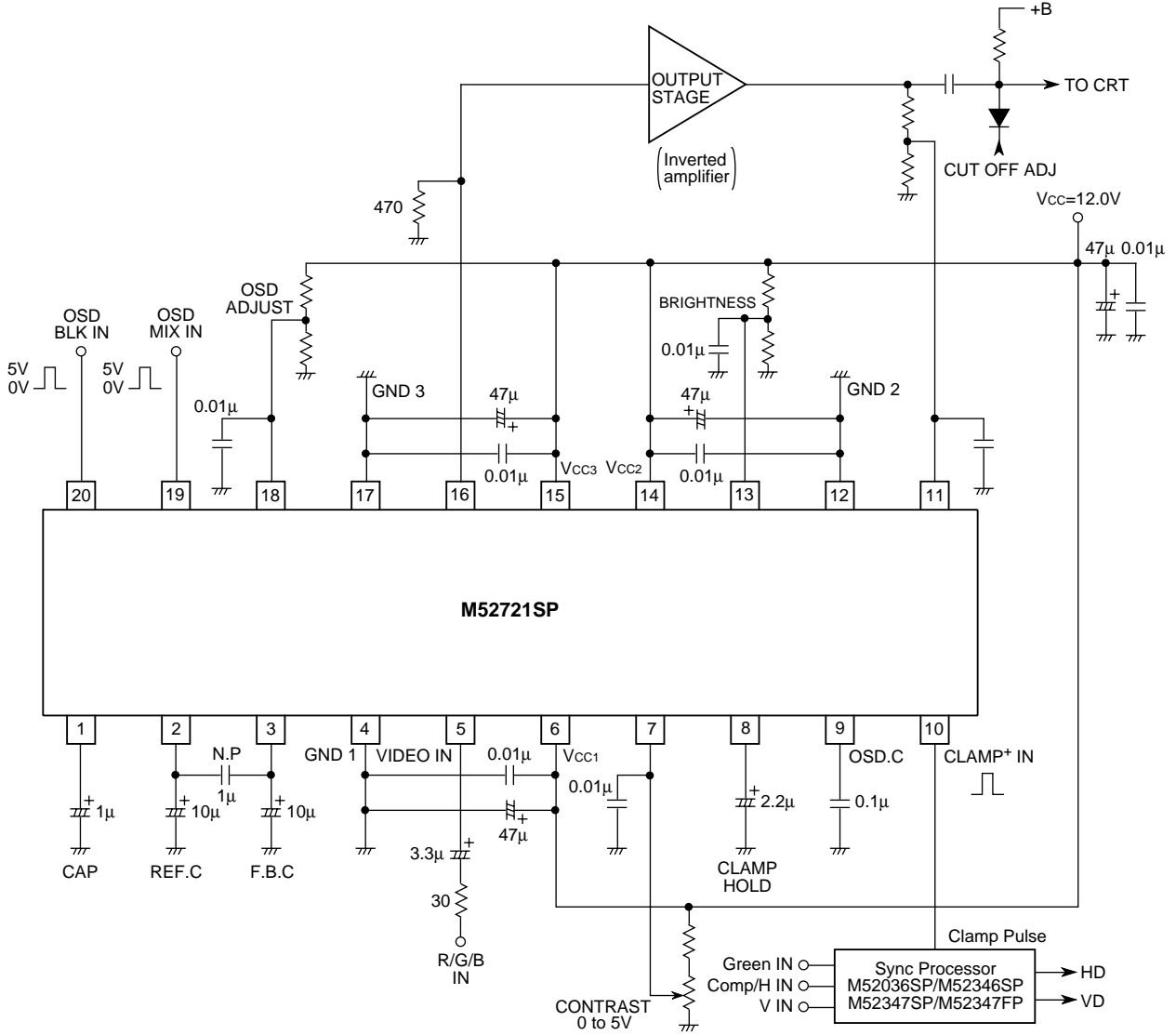


# M52721SP

## WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

### APPLICATION EXAMPLE

#### 1. External Feed Back

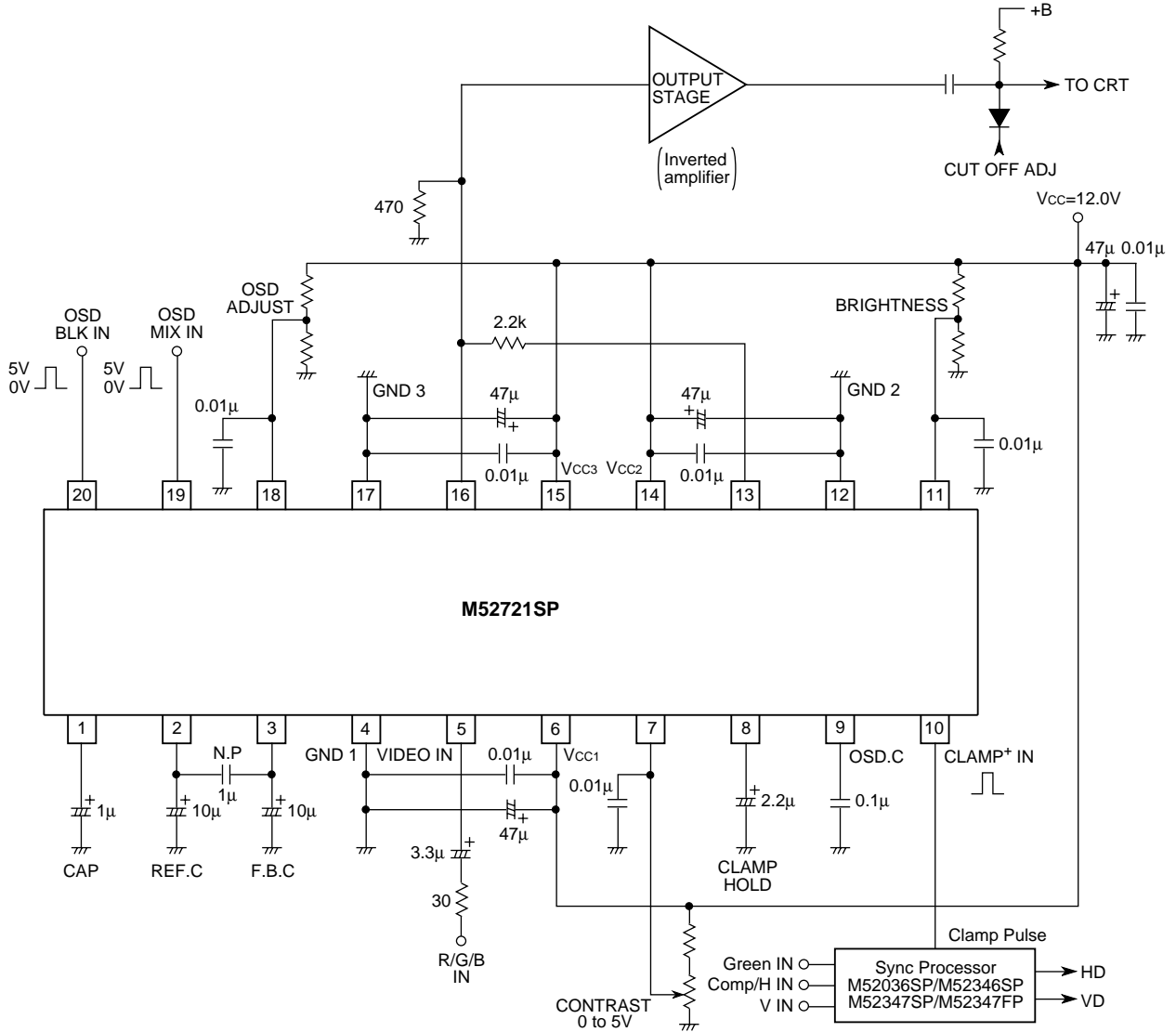


Units Resistance : Ω  
Capacitance : F

# M52721SP

## WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

### 2. Internal Feed Back



Units Resistance : Ω  
Capacitance : F

# M52721SP

## WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX

### 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. 1 $\mu$ ) 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.



**WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX**

**DESCRIPTION OF PIN (cont.)**

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
8	CLAMP HOLD	Variable		<p>·Capacitance is required between the pin and GND.</p> <p>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.</p>
9	OSD.C	-		<p>·Capacitance is required between the pin and GND.</p>
10	CLAMP+ IN	-		<p>·Input a pulse of 1.9V or more with pulse width 0.7μs or more.</p>
11 13	F/B <sup>-</sup> (BRIGHTNESS) F/B <sup>+</sup>	Variable		<p>·It is recommended that the IC be used between pedestal voltage 2V and 3V.</p>

**WIDEBAND VIDEO PREAMPLIFIER WITH OSD MIX**

**DESCRIPTION OF PIN** (cont.)

Pin No.	Name	DC voltage (V)	Peripheral circuit of pins	Description of function
15	Vcc3	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.