M52758SP/FP

WIDE BAND ANALOG SWITCH

DESCRIPTION

The M52758 is a semiconductor integrated circuit for the RGBHV interface. The device features switching signals input from two types of image and outputting them to CRT display etc.
Synchronous signal meeting the frequency band of 10 kHz to 200 kHz are output at TTL. The frequency band of video signals is 250MHz, acquiring high-resolution images,and are optimum as an interface IC with high-resolution CRT display and various new media.

FEATURES

Frequency band : RGB 250MHz
HV 10Hz to 200kHz
Input level : RGB 0.7Vp-p (typ.)
HV TTL input 2.0Vo-p(both channel)
Only the G channel is provided with sync-on video output.
The TTL format is adopted for HV output.

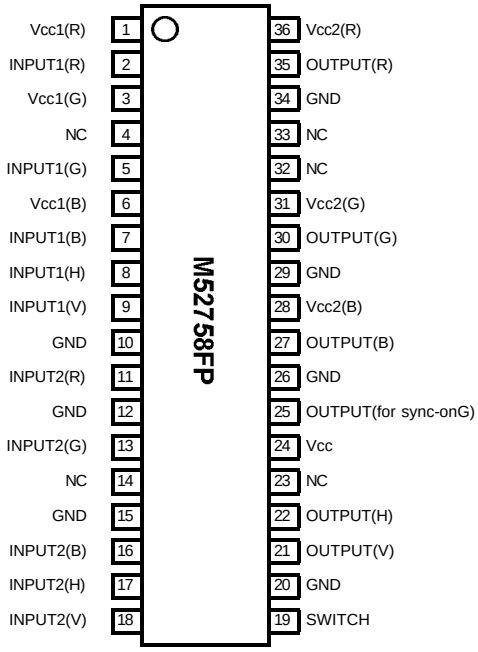
APPLICATION

Display monitor

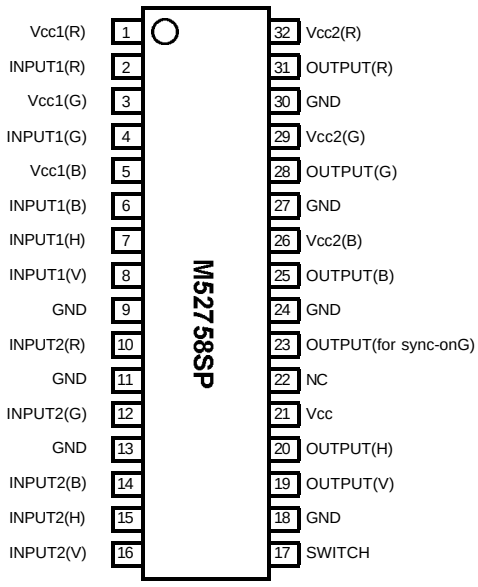
RECOMMENDED OPERATING CONDITION

Supply voltage range 4.75 to 5.5V
Rated supply voltage 5.0V

PIN CONFIGURATION(TOP VIEW)



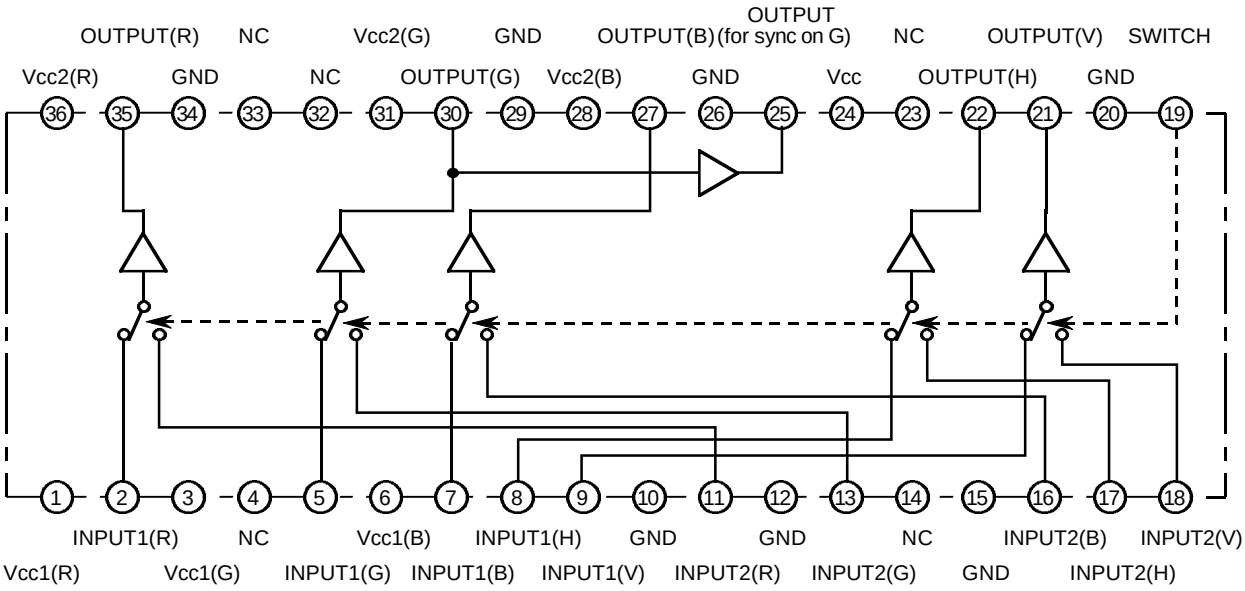
Outline 36P2R-D



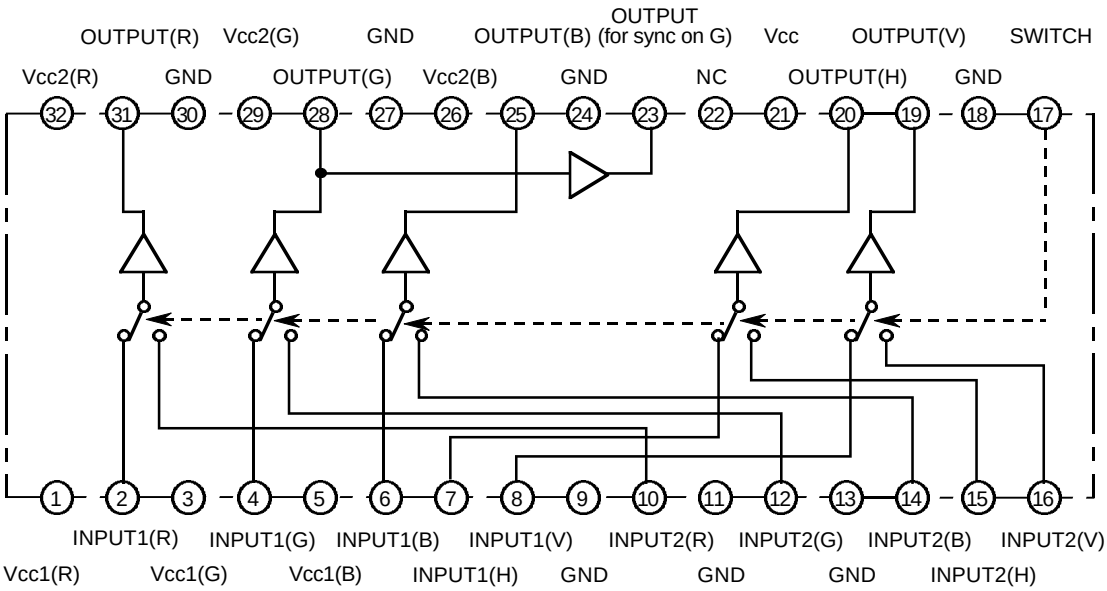
Outline 32P4B

NC : NO CONNECTION

BLOCK DIAGRAM M52758FP



BLOCK DIAGRAM M52758SP



ABSOLUTE MAXIMUM RATIINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
Vcc	Supply voltage	7.0	V
Pd	Power dissipation	1068(FP) 1603(SP)	mW
Topr	Ambient temperature	-20 to +85	°C
Tstg	Storage temperature	-40 to +150	°C
Vopr	Recommended supply voltage	5.0	V
Vopr'	Recommended supply voltage range	4.75 to 5.5	V
Surge	Electrostatic discharge	±200	V

ELECTRICAL CHARACTERISTICS Pin No is FP(Vcc=5V, Ta=25 °C,unless otherwise noted)

Symbol	Parameter	Test conditions													Limits			Unit
		Test point (s)	Vcc (V)	Input										SW				
			Vcc	SW2 Rin1	SW5 Gin1	SW7 Bin1	SW8 Hin1	SW9 Vin1	SW11 Rin2	SW13 Gin2	SW16 Bin2	SW17 Hin2	SW18 Vin2	SW19 Switch	Min.	Typ.	Max.	
Icc1	Circuit current1 (no signal)	A	5	b	b	b	b	b	b	b	b	b	b	b	46	66	86	mA
Icc2	Circuit current2 (no signal)	A	5	b	b	b	b	b	b	b	b	b	b	a	46	66	86	mA
(RGB SW)																		
V_{DC1}	Output DC voltage1	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	b	b	b	b	b	b	1.85	2.05	2.25	V
V_{DC2}	Output DC voltage2	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	b	b	b	b	b	a	1.85	2.05	2.25	V
V_{DC3}	Output DC voltage3	T.P.25	5	b	b	b	b	b	b	b	b	b	b	b	0.75	1.15	1.55	V
V_{DC4}	Output DC voltage4	T.P.25	5	b	b	b	b	b	b	b	b	b	b	a	0.75	1.15	1.55	V
V_{imax1}	Maximum allowable input1	T.P.2 T.P.5 T.P.7	5	abb SG1	bab SG1	bba SG1	b	b	b	b	b	b	b	b	2.0	2.4	-	Vp-p
V_{imax2}	Maximum allowable input2	T.P.11 T.P.13 T.P.16	5	b	b	b	b	b	abb SG1	bab SG1	bba SG1	b	b	a	2.0	2.4	-	Vp-p
G_{v1}	Voltage gain1	T.P.35 T.P.30 T.P.27	5	abb SG2	bab SG2	bba SG2	b	b	b	b	b	b	b	b	0.3	0.9	1.5	dB
$\triangle G_{v1}$	Relative Voltage gain1	Relative to measured values above													-0.4	0	0.4	dB
G_{v2}	Voltage gain2	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG2	bab SG2	bba SG2	b	b	a	0.3	0.9	1.5	dB
$\triangle G_{v2}$	Relative Voltage gain2	Relative to measured values above													-0.4	0	0.4	dB
G_{v3}	Voltage gain3	T.P.25	5	b	a SG2	b	b	b	b	b	b	b	b	b	-0.4	0.2	0.8	dB
G_{v4}	Voltage gain4	T.P.25	5	b	b	b	b	b	b	a SG2	b	b	b	a	-0.4	0.2	0.8	dB
F_{c1}	Frequency characteristic1 (100MHz)	T.P.31 T.P.28 T.P.25	5	abb SG4	bab SG4	bba SG4	b	b	b	b	b	b	b	b	-1.0	0	1.0	dB
$\triangle F_{c1}$	Relative Frequency characteristic1(100MHz)	Relative to measured values above													-1.0	0	1.0	dB
F_{c2}	Frequency characteristic2 (100MHz)	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG4	bab SG4	bba SG4	b	b	a	-1.0	0	1.0	dB
$\triangle F_{c2}$	Relative Frequency characteristic2(100MHz)	Relative to measured values above													-1.0	0	1.0	dB
F_{c3}	Frequency characteristic3 (250MHz)	T.P.35 T.P.30 T.P.27	5	abb SG5	bab SG5	bba SG5	b	b	b	b	b	b	b	b	-3.0	-1.5	1.0	dB
F_{c4}	Frequency characteristic4 (250MHz)	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG5	bab SG5	bba SG5	b	b	a	-3.0	-1.5	1.0	dB

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test conditions													Limits			Unit
		Test point (s)	Vcc (V)	Input										SW				
			Vcc	SW2 Rin1	SW5 Gin1	SW7 Bin1	SW8 Hin1	SW9 Vin1	SW11 Rin2	SW13 Gin2	SW16 Bin2	SW17 Hin2	SW18 Vin2	SW19 Switch	Min.	Typ.	Max.	
C.T.I.1	Crosstalk between two inputs1(10MHz)	T.P.35 T.P.30 T.P.27	5	abb SG3	bab SG3	bba SG3	b	b	b	b	b	b	b	b ↓ a	-	-60	-50	dB
C.T.I.2	Crosstalk between two inputs2(10MHz)	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG3	bab SG3	bba SG3	b	b	a ↓ b	-	-60	-50	dB
C.T.I.3	Crosstalk between two inputs3(100MHz)	T.P.35 T.P.30 T.P.27	5	abb SG4	bab SG4	bba SG4	b	b	b	b	b	b	b	b ↓ a	-	-40	-35	dB
C.T.I.4	Crosstalk between two inputs4(100MHz)	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG4	bab SG4	bba SG4	b	b	a ↓ b	-	-40	-35	dB
C.T.C.1	Crosstalk between channels1(10MHz)	T.P.35 T.P.30 T.P.27	5	abb SG3	bab SG3	bba SG3	b	b	b	b	b	b	b	b	-	-50	-40	dB
C.T.C.2	Crosstalk between channels2(10MHz)	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG3	bab SG3	bba SG3	b	b	a	-	-50	-40	dB
C.T.C.3	Crosstalk between channels3(100MHz)	T.P.35 T.P.30 T.P.27	5	abb SG4	bab SG4	bba SG4	b	b	b	b	b	b	b	b	-	-30	-25	dB
C.T.C.4	Crosstalk between channels4(100MHz)	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	abb SG4	bab SG4	bba SG4	b	b	a	-	-30	-25	dB
Tr1	Pulse characteristic1	T.P.35 T.P.30 T.P.27	5	a SG6	a SG6	a SG6	b	b	b	b	b	b	b	b	-	1.6	2.5	nsec
Tf1		T.P.35 T.P.30 T.P.27	5	a SG6	a SG6	a SG6	b	b	b	b	b	b	b	b	-	1.6	2.5	nsec
Tr2	Pulse characteristic2	T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	a SG6	a SG6	a SG6	b	b	a	-	1.6	2.5	nsec
Tf2		T.P.35 T.P.30 T.P.27	5	b	b	b	b	b	a SG6	a SG6	a SG6	b	b	a	-	1.6	2.5	nsec
(HV SW)																		
V_{OH1}	High level output voltage1	T.P.21 T.P.22	5	b	b	b	c 5.0V	c 5.0V	b	b	b	b	b	b	4.5	0.5	-	dB
V_{OH2}	High level output voltage2	T.P.21 T.P.22	5	b	b	b	b	b	b	b	b	c 5.0V	c 5.0V	a	4.5	0.5	-	dB
V_{OL1}	Low level output voltage1	T.P.21 T.P.22	5	b	b	b	c 0V	c 0V	b	b	b	b	b	b	-	0.2	0.5	dB
V_{OL2}	Low level output voltage2	T.P.21 T.P.22	5	b	b	b	b	b	b	b	b	c 0V	c 0V	a	-	0.2	0.5	dB
V_{ith1}	Input selectional voltage1	T.P.8 T.P.9	5	b	b	b	c Variable	c Variable	b	b	b	b	b	b	1.4	1.8	2.0	dB
V_{ith2}	Input selectional voltage2	T.P.17 T.P.18	5	b	b	b	b	b	b	b	b	c Variable	c Variable	a	1.4	1.8	2.0	dB
T_{rd1}	Rising delay time1	T.P.21 T.P.22	5	b	b	b	a SG7	a SG7	b	b	b	b	b	b	-	100	150	nsec
T_{rd2}	Rising delay time2	T.P.21 T.P.22	5	b	b	b	b	b	b	b	b	a SG7	a SG7	a	-	100	150	nsec
T_{fd1}	Falling delay time1	T.P.21 T.P.22	5	b	b	b	a SG7	a SG7	b	b	b	b	b	b	-	50	100	nsec
T_{fd2}	Falling delay time2	T.P.21 T.P.22	5	b	b	b	b	b	b	b	b	a SG7	a SG7	a	-	50	100	nsec
V_{sth1}	Switching selectional voltage1	T.P.19	5	a SG1	a SG1	a SG1	a SG7	a SG7	b	b	b	b	b	c	0.5	1.5	2.0	V
V_{sth2}	Switching selectional voltage2	T.P.19	5	b	b	b	b	b	a SG1	a SG1	a SG1	a SG7	a SG7	c	0.5	1.5	2.0	V

ELECTRICAL CHARACTERISTICS TEST METHOD (Pin No is FP**)**
It omits the SW.No accorded with signal input pin because it is already written in Table .
SW A,SW1,SW3,SW5 is in side a if there is not defined specially.

Icc1,Icc2,Circuit current(no signal)
The condition is shown as Table . Set SW19 to GND(or OPEN) and SW A to side b, measure the current by current meter A. The current is as Icc1(Icc2).

VDC1,VDC2 Output DC voltage
Set SW19 to GND (or OPEN), measure the DC voltage of T.P.35(T.P.30,T.P.27) when there is no signal input.The DC voltage is as VDC1(or VDC2).

VDC3,VDC4 Output DC voltage
Measure the DC voltage of T.P.25 same as Table, the DC voltage is as VDC3(or VDC4).

Vimax1,Vimax2 Maximum allowable Input
Set SW19 to GND, SG1 as the input signal of Pin 2.Rising up the amplitude of SG1 slowly, read the amplitude of input signal when the output waveform is distorted. The amplitude is as Vimax1. And measure Vimax1 when SG2 as the input signal of Pin 5,Pin 7 in same way. Next, set SW to OPEN, measure Vimax2 when SG2 as the input signal of Pin11, 13, 16.

Gv1, △Gv1,GV2, △ GV2
1. The condition is shown as Table .
2. Set SW19 to GND, SG2 as the input signal of Pin 2. At this time, read the amplitude output from T.P 35. The amplitude is as VOR1.
3. Voltage gain Gv1 is

$$G_V1 = 20\ LOG \frac{V_{OR}1\ [Vp\text{-}p]}{0.7\ [Vp\text{-}p]}\ [dB]$$

4. The method as same as 2 and 3, measure the voltage gain Gv1 when SG2 as the input signal of Pin 5, 7.
5. The difference of each channel relative voltage gain is as △Gv1.
6. Set SW19 to OPEN, measure Gv2, △Gv12 in the same way.

Gv3,Gv4,Voltage gain
1. The condition is shown as Table . This test is by active probe.
2. Measure the amplitude output from T.P.25.
3. Measure the GV3,GV4 by the same way as Gv1, △Gv1,Gv2, △Gv2.

Fc1, △Fc1,Fc2, △Fc2
1. The condition is shown as Table . This test is by active probe.
2. Set SW19 to GND, SG2 as the input signal of Pin 2. Measure the amplitude output from T.P.35.The amplitude is as VOR1.By the same way, measure the output when SG4 is as input signal of Pin 2, the output is as VOR2.
3. The frequency characteristic Fc1 is

$$F_C1 = 20\ LOG \frac{V_{OR}2\ [Vp\text{-}p]}{V_{OR}1\ [Vp\text{-}p]}\ [dB]$$

4. The method as same as 2 and 3, measure the frequency Fc1 when input signal to Pin 5, 7.
5. The difference between of each channel frequency characteristic is as △Fc1.
6. Set SW19 to OPEN, measure Fc2,△Fc2.

Fc3,Fc4 Frequency characteristic
By the same way as Table measure the Fc3, Fc4 when SG5 of input signal.

C.T.I.1,C.T.I.2 Crosstalk between two Input
1. The condition is shown as Table. This test is by active prove.
2. Set SW19 to GND, SG3 as the input signal of Pin 2. Measure the amplitude output from T.P.35.The amplitude is as VOR3.
3. Set SW19 to OPEN, measure the amplitude output from T.P.35. The amplitude is as VOR3'.
4. The crosstalk between two inputs C.T.I.1 is

$$C.T.I.1 = 20\ LOG \frac{V_{OR}3'\ [Vp\text{-}p]}{V_{OR}3\ [Vp\text{-}p]}\ [dB]$$

5. By the same way, measure the crosstalk between two inputs when SG3 as the input signal of Pin5, Pin 7.
6. Next, set SW19 to OPEN, SG3 as the input signal of Pin 11, measure the amplitude output from T.P.35. The amplitude is as VOR4.
7. Set SW19 to GND, measure the amplitude output from T.P.35. The amplitude is as VOR4'.
8. The crosstalk between two inputs C.T.I.2 is

$$C.T.I.2 = 20\ LOG \frac{V_{OR}4'[Vp\text{-}p]}{V_{OR}4[Vp\text{-}p]}\ [dB]$$

9. By the same way, measure the crosstalk between channels when SG3 as the input signal of Pin 13,16.

C.T.I.3,C.T.I.4 Crosstalk between two input
Set SG4 as the input signal, and then the same method as Table, measure C.T.I.3, C.T.I.4.

C.T.C.1,C.T.C.2 Crosstalk between channel
1. The condition is as Table .This test is by active prove.
2. Set SW19 to GND, SG3 as the input signal of Pin 2. Measure the amplitude output from T.P.35. The amplitude is as VOR5.
3. Next, measure T.P.30, T.P.27 in the same state, and the amplitude is as VOG 5, VOB 5.
4. The crosstalk between channels C.T.C.1 is

$$C.T.C1 = 20\ LOG \frac{V_{OG}5\ \text{or}\ V_{OB}5}{V_{OR}5}\ [dB]$$

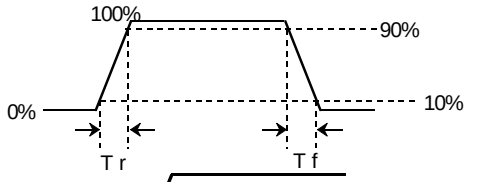
5. Measure the crosstalk between channels when SG3 is as the input signal of Pin 5, Pin 7 .
6. Next, set SW19 to OPEN, SG3 as the input signal of Pin11, measure the amplitude output from T.P.35. The amplitude is as VOR6.
7.Next, measure the amplitude output from T.P.30, T.P.27 in the same state. The amplitude is as VOG6, VOB6.
8. The crosstalk between channels C.T.C.2 is

$$C.T.C2 = 20\ LOG \frac{V_{OG}6 \text{ or } V_{OB}6}{V_{OR}6}\ [dB]$$

9. By the same way, measure the crosstalk between channels when input signal to Pin13, 16.

C.T.C.3,C.T.C.4 Crosstalk between channel
Set SG4 as the input signal, and the same method as Table, measure C.T.C.3, C.T.C.4.

Tr1,Tf1,Tr2,Tf2 Pulse characteristic
1. The condition is as Table 1. Set SW19 to GND (or OPEN).
2. The rising of 10 % to 90 % for input pulse is Tri, the falling of 10 % to 90 % for input pulse is Tfi.
3. Next, the rising of 10 % to 90 % for output pulse is Tro, the falling of 10 % to 90 % for output pulse is Tfo.
4. The pulse characteristic Tr1, Tf1 (Tr2, Tf2) is



$$Tr1(Tr2) = \sqrt{(Tro)^2 - (Tri)^2} \quad (nsec)$$

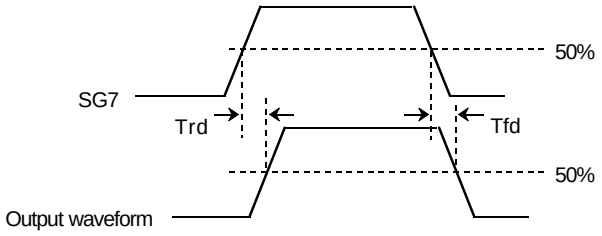
$$Tf1(Tf2) = \sqrt{(Tfo)^2 - (Tfi)^2} \quad (nsec)$$

VOH1,VOH2 High level output voltage
The condition is as Table . Set SW19 to GND (OPEN), input 5V at input terminal. Measure the output voltage, the voltage is as VOH1 (VOH2).

VOL1,VOL2 Low level output voltage
The condition is as Table . Set SW19 to GND (OPEN), input 0V at input terminal. Measure the output voltage, the voltage is as VOL1 (VOL2).

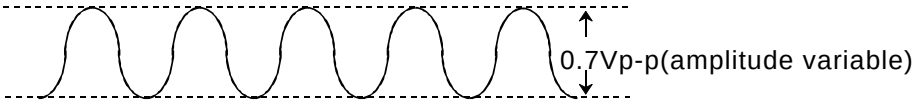
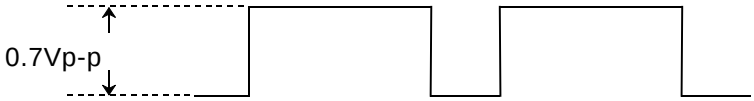
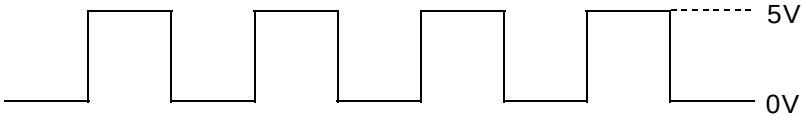
Vith1,Vith2 Input selectional voltage
The condition is as Table . Set SW19 to GND (OPEN), increasing gradually the voltage of input terminal from 0V, measure the voltage of input terminal when output terminal is 4.5V. The input voltage is as Vith1(Vith 2).

Trd1,Trd2 Rising delay time
Tfd1,Tfd2 Falling delay time
The condition is as Table . Set SW19 to GND (OPEN), SG7 is as the input signal of input terminal, measure the waveform of output. Rising delay time is as Trd1 (Trd2). Falling delay time is as Tfd1(Tfd2). Reference to the Fig. as shown below.



Vsth1,Vsth2 Switching selectional voltage
1. The condition is as Table . SG1 is as the input signal of Pin2, Pin5, Pin7, and SG7 is as the input signal of Pin8, Pin9. There is no input at another pins.
2. Input 0V at Pin19, confirm that there are signals output from T.P.21, T.P.22, T.P.25, T.P.27,T.P.30,T.P.35.
3. Increase gradually the voltage of terminal Pin19. Read the voltage when there is no signal output from the terminals listed as above. The voltage is as Vsth1.
4. SG1 as the input signal of Pin11, Pin13, Pin16, and SG7 as the input signal of Pin17, Pin18.There is no input at another pins.
5. Inputs 5V at Pin19, confirm that there is no signal output from T.P.21, T.P.22, T.P.25, T.P.27,T.P.30,T.P.35.
6. Decreasing gradually the voltage of terminal Pin 19. Read the voltage when there are signals output from the terminals listed as above. The voltage is as Vsth2.

INPUT SIGNAL

SG No.	Input Signal
SG1	Sine wave (f = 60 kHz, 0.7Vp-p, amplitude variable) 
SG2	Sine wave (f = 1 MHz, amplitude 0.7Vp-p)
SG3	Sine wave (f = 10 MHz, amplitude 0.7Vp-p)
SG4	Sine wave (f = 100 MHz, amplitude 0.7Vp-p)
SG5	Sine wave (f = 250 MHz, amplitude 0.7Vp-p)
SG6	Pulse with amplitude 0.7Vp-p (f = 60 kHz, duty 80%) 
SG7	Square wave (Amplitude 5.0 Vo-p TTL, f = 60 KHz, duty 50%) 

Note how to use this IC (Pin No is FP**)**

1. R, G, B input signal is 0.7Vp-p of standard video signal.
2. H, V input is 2.0V(minimum) TTL type.
3. Input signal with sufficient low impedance to input terminal.
4. The terminal of H, V output pin are shown as Fig.1. It is possible to reduce rise time by insert the resister between Vcc line and H, V output Pin, but set the value of resister in order that the current is under 7.5 mA. Setting the value of R is more than 2K as shown in Fig.1 .

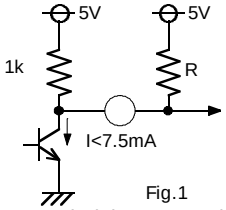


Fig.1

5. The terminal of R,G,B output pin (Pin 27, 30, 35). It is possible to add a pull-up resister according as drive ability. but set the value of resister in order that the current is under 10mA. Setting the value of R is more than 500 as shown in Fig.2 .

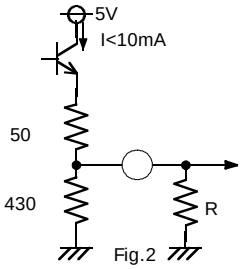


Fig.2

6. Switch (Pin 19) can be changed when this terminal is GND or OPEN
   When GND : Signal output from input 1
   When OPEN : Signal output from input 2
   When the switch is being used as Fig.5
   0 to 0.5V : Signal output from input 1
   2 to 5V : Signal output from input 2
   It is not allowable to set voltage higher than Vcc.

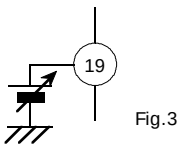


Fig.3

Notice of making printed circuit board.

Please notice following as shown below. It will maybe cause something oscillation because of the P.C.B. layout of the wide band analog switch.

The distance between resister and output pin is as short as possible when insert a output pull-down resister.

The capacitance of output terminal as small as possible.

Set the capacitance between Vcc and GND near the pins if possible.

Using stable power-source(if possible the separated power-source will be better).

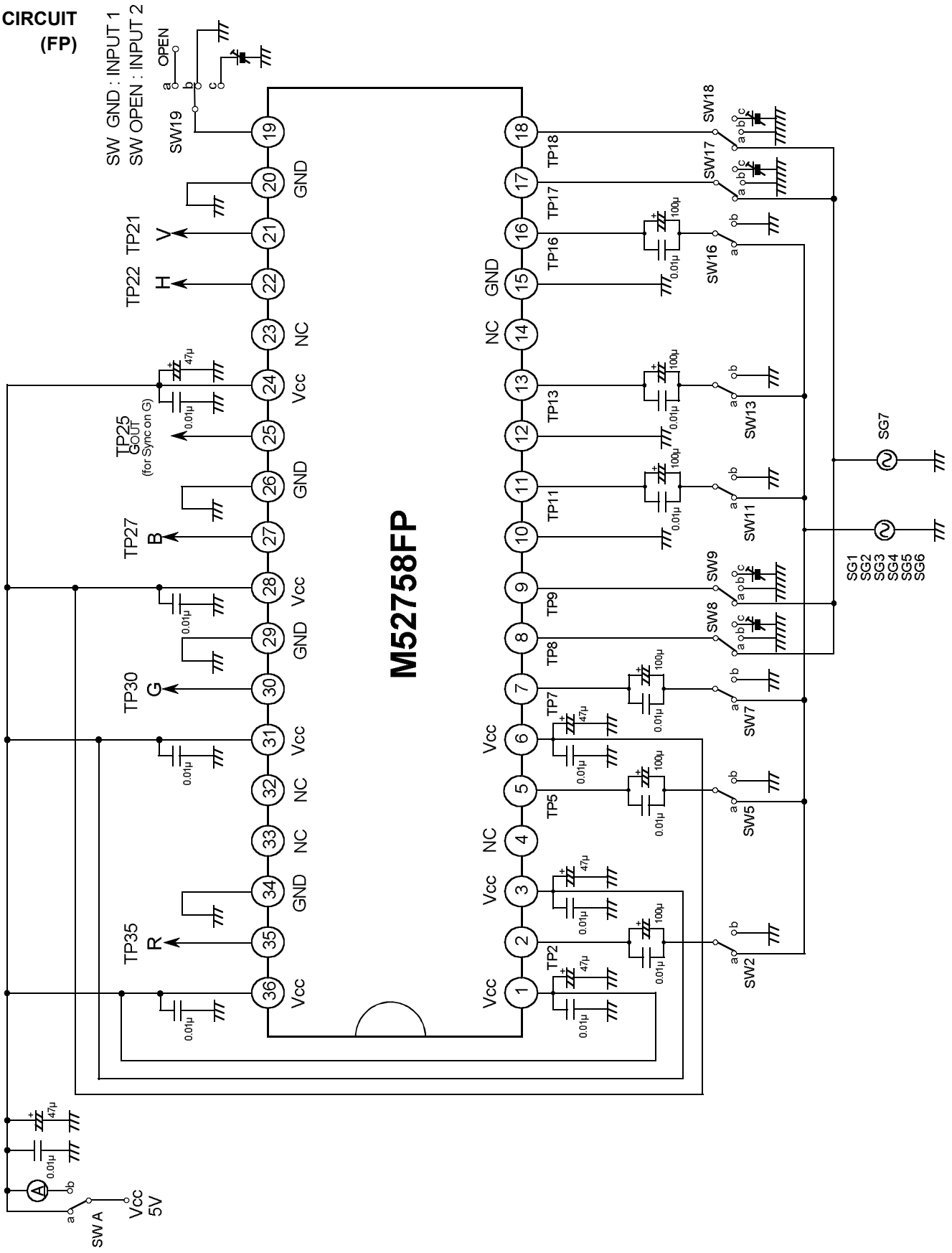
It will reduce the oscillation when add a resister that is tens of ohms between output pin and next stage.

Assign an area as large as possible for grounding.

M52758SP/FP

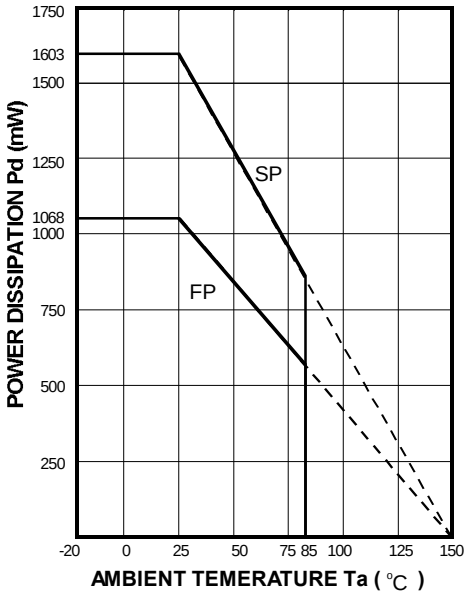
WIDE BAND ANALOG SWITCH

TEST CIRCUIT (FP)

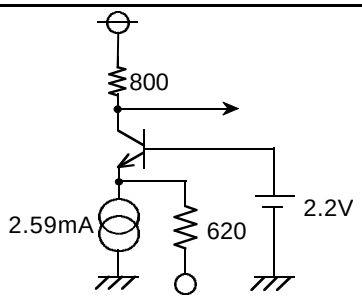
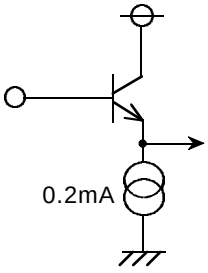
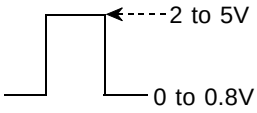


TYPICAL CHARACTERISTICS

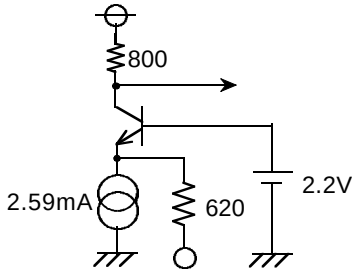
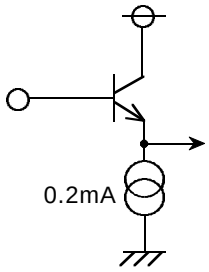
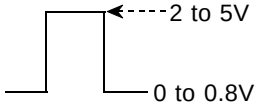
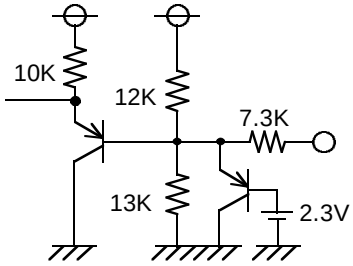
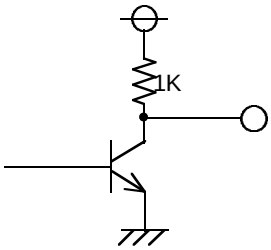
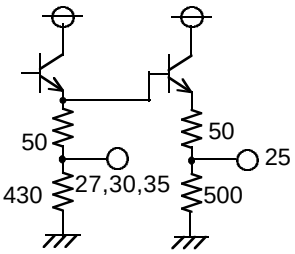
THERMAL DERETING (MAXIMUM RATING)



DESCRIPTION PIN

Pin No.(FP)	Name	DC voltage (V)	Peripheral circuit of pins	Rmarks
1 3 6	Vcc1(R) Vcc1(G) Vcc1(B)	5.0	-	
2 5 7	Input1(R) Input1(G) Input1(B)	1.5		Input signal with low impedance.
8 9	Input1(H) Input1(V)	-		Input pulse between 2V and 5V. 
10,12,15,20,26, 29,34	GND	GND	-	

DESCRIPTION PIN (cont.)

Pin No.(FP)	Name	DC voltage (V)	Peripheral circuit of pins	Rmarks
11 13 16	Input2(R) Input2(G) Input2(B)	1.5		Input signal with low impedance.
17 18	Input2(H) Input2(V)	-		Input pulse between 2V and 5V. 
19	Switch	2.6		Switch by OPEN and GND.
21 22	Output(V) Output(H)	-		Output impedance is built-in.
24	Vcc (H,V,Switch)	5	-	
4,14,23,32,33	NC	-	-	
25 27 30 35	Output (sync on G) Output(B) Output(G) Output(R)	1.15 2.05		Output impedance is built-in.
28 31 36	Vcc2(R) Vcc2(G) Vcc2(B)	5	-	