

# S Video Amplifier Monolithic IC MM1024

## Outline

This is a video amp IC that supports S and also has border and superimpose functions.

Amp gain is as follows : 6dB for Y signal amplification, 10dB for C signal amplification and 6dB for composite signal amplification. A 75Ω driver is built in.

## Features

1. Supports S-VHS
2. Built-in superimpose function (character and border levels)
3. Built-in Y-C mix circuit
4. Vertical/horizontal sync signal output pin
5. Amp gain : 6dB for Y signal, 10dB for C signal and 6dB for composite signal
6. Built-in clamp circuit (for Y signal only)
7. 75Ω driver built in
8. Frequency response   Y : 7MHz  
                                  C : 5MHz
9. Power supply voltage 4.7V~5.3V

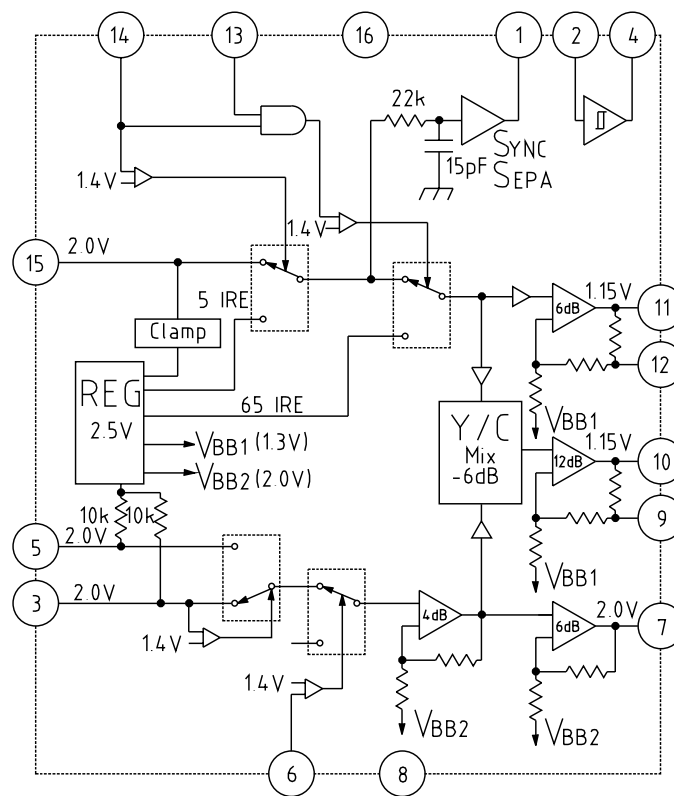
## Package

SOP-16A (MM1024AF)

## Applications

1. TV
2. VCR
3. VCR with camera
4. Other video equipment

Block Diagram



Pin Description

Pin no.	Pin name	Function
1	R	Integrates sync signal and inputs to Schmidt circuit
2	C	
3	PB <sub>IN</sub>	Chroma signal input pin for other than playback
4	V <sub>SYNC</sub> OUT	Vertical sync signal output pin
5	PB <sub>IN</sub>	Chroma signal input pin for playback
6	Chroma mute input	Chroma mute signal input pin
7	CHROMA OUT	Chroma signal output pin
8	GND	
9	SUG	Anti-sag pin
10	VIDEO OUT	Composite video signal output pin
11	Y <sub>OUT</sub>	Y (luminance) signal output pin
12	SUG	Anti-sag pin
13	Character input	Character input pin for superimpose
14	Bordering input	Bordering input pin
15	Y <sub>RO</sub> VIDEO IN	Luminance or video signal input pin
16	V <sub>CC</sub>	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-20~+75	°C
Power supply voltage	V <sub>CC</sub> max.	7	V
Allowable loss	P <sub>d</sub>	350	mW

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, Vcc=5.0V, pulse level 0V, SW1 : A, SW2 :

Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units
Operating power supply voltage	V <sub>CC</sub>	V <sub>CC</sub>		4.7	5.0	5.3	V
Consumption current	I <sub>d</sub>	-	SG-1, SG-2, SG-3 : No signal Measure with DC ammeter.		25.0	33.0	mA
<b>Y amp output</b>							
Voltage gain	G <sub>v1</sub>	TP11	SG-1, sweep signal 1V <sub>P-P</sub> , 0.1MHz	5.5	6.0	6.5	dB
Differential gain	DG1	TP10	SG-1, staircase wave, 1V <sub>P-P</sub> APL=10, 50, 90%		1.0	3.0	%
Differential phase	DP1	TP10	SG-1, staircase wave, 1V <sub>P-P</sub> APL=10, 50, 90%		1.0	3.0	deg
Frequency characteristic	fc1	TP11	SG-1, sweep signal, 1V <sub>P-P</sub> 5MHz/0.1MHz *1	-1.0	0	1.0	dB
<b>Video amp output</b>							
Voltage gain	G <sub>v2</sub>	TP8	SG-1 sweep signal 1V <sub>P-P</sub> , 0.1MHz	5.5	6.0	6.5	dB
Differential gain	DG2	TP9	SG-1, staircase wave 1V <sub>P-P</sub> APL=10, 50, 90%		1.0	3.0	%
Differential phase	DP2	TP9	SG-1, staircase wave, 1V <sub>P-P</sub> APL=10, 50, 90%		1.0	3.0	deg
Frequency characteristic	fc2	TP8	SG-1 sweep signal 1V <sub>P-P</sub> 5MHz/0.1MHz *2	-1.0	0	1.0	dB
<b>Chroma amp</b>							
Voltage gain	G <sub>v3</sub>	TP7	SG-2, sine wave, 0.2V <sub>P-P</sub> , 0.1MHz	9.0	10.0	11.0	dB
Frequency characteristic	fc3	TP7	SG-2, sine wave, 0.2V <sub>P-P</sub> 5MHz/0.1MHz *3	-1.0	0	1.0	dB
<b>Crosstalk</b>							
Crosstalk 1 Y <sub>IN</sub> → C <sub>OUT</sub>	C <sub>T1</sub>	TP7	SG-1, sine wave, 1.0V <sub>P-P</sub> , 4MHz *2		-36	-30	dB
Crosstalk 2 P <sub>B</sub> → Y <sub>OUT</sub>	C <sub>T2</sub>	TP11	SG-2, sine wave, 0.2V <sub>P-P</sub> , 4MHz *3		-42	-36	dB
Crosstalk 3 P <sub>B</sub> → Y <sub>OUT</sub>	C <sub>T3</sub>	TP11	SG-3, sine wave, 0.2V <sub>P-P</sub> , 4MHz SW2 : A *3		-42	-36	dB
Crosstalk 4 P <sub>B</sub> → C <sub>OUT</sub>	C <sub>T4</sub>	TP7	SG-1, sine wave, 0.2V <sub>P-P</sub> , 4MHz *4		-50	-40	dB
<b>Superimpose</b>							
Edge level Y	V <sub>EDY</sub>	TP10	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> , TP13, pulse level, 5V	0	5	10	IRE
Edge level V	V <sub>EDV</sub>	TP9	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> , TP13, pulse level, 5V	0	5	10	IRE
Character level Y	V <sub>CHY</sub>	TP10	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> , TP12, 13, pulse level, 5V	60	65	70	IRE
Character level V	V <sub>CHV</sub>	TP9	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> , TP12, 13 pulse level 5V	60	65	70	IRE
<b>Input threshold voltage</b>							
Bordering input	V <sub>TH1</sub>	TP13	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> , TP13, pulse level, L→H *5	0.7	1.4	2.1	V
Character input	V <sub>TH2</sub>	TP12	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> TP12, 13, pulse level, L→H *5	0.7	1.4	2.1	V
Chroma mute input	V <sub>TH3</sub>	TP5	SG-2, sine wave, 0.1V <sub>P-P</sub> , 4MHz TP5, pulse level, L→H *6	0.7	1.4	2.1	V
<b>Sync separation</b>							
Sync separation level	V <sub>SEPA</sub>	TP14	SG-1, staircase wave (no chroma signal) 1V <sub>P-P</sub> SG-1, SYNC level, max→min *7	55	110	165	mV
Schmitt trigger threshold voltage	V <sub>TH4H</sub>	TP1	TP1, DC voltage, 0V→H *8	1.9	2.1	2.3	V
	V <sub>TH4L</sub>		TP1, DC voltage, 5V→L *8	1.1	1.3	1.5	V
Vertical sync output voltage	V <sub>VH</sub>	TP3	TP1, DC voltage, 5V→L *9	4.8	5.0		V
	V <sub>VL</sub>		TP1, DC voltage, 0V→H *9		0.2	0.4	V

- Notes : \*1 1.Voltage gain  $G_{v1}$ ,  $G_{v2}$ ,  $G_{v3}$   
 Given SG-1 input as  $V_1$  and TP11 output signal as  $V_2$ ,  $G_{v1}$  is obtained as follows.  
 The same applies for  $G_{v2}$  and  $G_{v3}$ .

$$G_{v1}=20\text{LOG} \frac{V_2}{V_1} \text{ [dB]}$$

- 2.Frequency response  $f_{c1}$ ,  $f_{c2}$ ,  $f_{c3}$

For the same conditions as the  $G_{v1}$  measurement, given TP11 output for 0.1MHz as  $V_3$ , and for 5MHz as  $V_4$ ,  $f_{c1}$  is obtained as follows. The same applies for  $f_{c2}$  and  $f_{c3}$ .

$$f_{c1}=20\text{LOG} \frac{V_4}{V_3} \text{ [dB]}$$

- \*2 Crosstalk  $Y_{IN} \rightarrow C_{OUT}$   $C_{T1}$

Given TP14 input signal as  $V_5$  and TP7 output signal as  $V_6$ ,  $C_{T1}$  is obtained as follows.

$$C_{T1}=20\text{LOG} \frac{V_6}{V_5} \text{ [dB]}$$

- \*3 Crosstalk  $\overline{P_B}$ ,  $P_B \rightarrow Y_{OUT}$   $C_{T2}$ ,  $C_{T3}$

Give TP2 and TP4 input signals as  $V_7$ , and TP11 output signal as  $V_8$ ,  $C_{T2}$  and  $C_{T3}$  are obtained as follows.

$$C_{T2}=20\text{LOG} \frac{V_8}{V_7} \text{ [dB]}$$

1.When C is input to compare between  $Y_{IN} \rightarrow C_{OUT}$  and  $C_{IN} \rightarrow Y_{OUT}$ , subtract the 4dB amp portion from crosstalk.

- \*4 Crosstalk  $P_B \rightarrow C_{OUT}$   $C_{T4}$

Given TP4 input signal as  $V_9$  and TP7 output signal as  $V_{10}$ ,  $C_{T4}$  is obtained as follows.

$$C_{T4}=20\text{LOG} \frac{V_{10}}{V_9} \text{ [dB]}$$

- \*5 Input threshold voltage Bordering input, character input  $V_{TH1}$ ,  $V_{TH2}$

For the same conditions as  $V_{EDY}$  and  $V_{CHY}$  measurement, raise TP13 and TP12 pulse levels gradually. TP13 and TP12 pulse levels when bordering signal and character signal appear on TP11 are, respectively,  $V_{TH1}$  and  $V_{TH2}$ .

- \*6 Input threshold voltage Chroma mute input  $V_{TH3}$

Gradually raise TP5 pulse level. TP5 pulse level when a sine wave is no longer output on TP7 is  $V_{TH3}$ .

- \*7 Sync separation level  $V_{SEPA}$

Gradually reduce SG-1 SYNC level from maximum to minimum. Measure the SYNC signal level at TP14 when a sync separation signal is no longer output on TP15 to obtain  $V_{SEPA}$ .

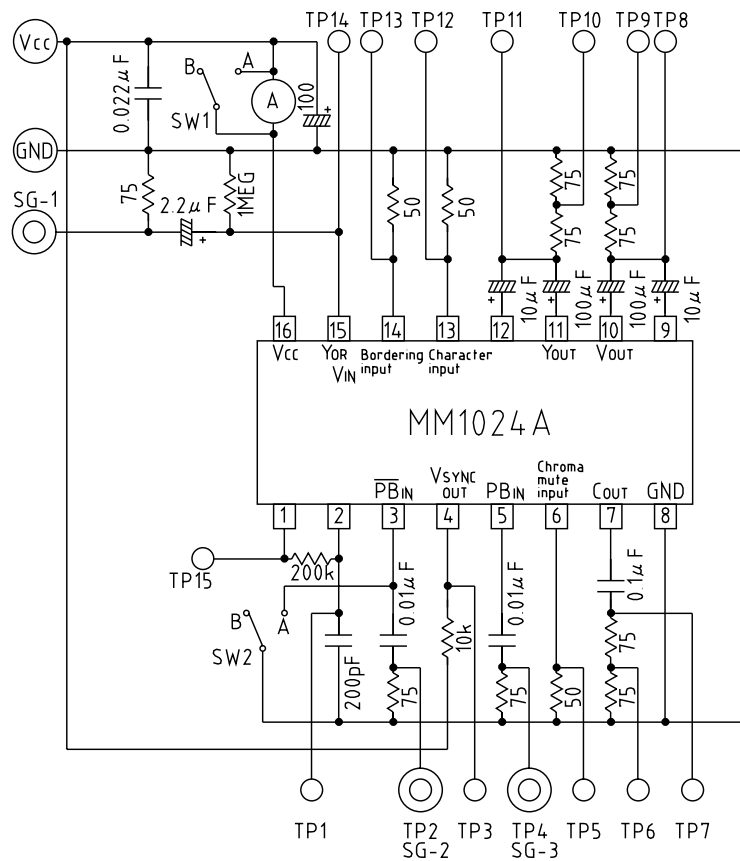
- \*8 Schmidt trigger threshold level  $V_{TH4H}$ ,  $V_{TH4L}$

Impress external DC voltage on TP1 and gradually raise from 0V. TP1 level when TP3 level goes from high to low is  $V_{TH4H}$ . Gradually lower from 5V. TP1 level when TP3 level goes from low to high is  $V_{TH4L}$ .

- \*9 Vertical sync output voltage  $V_{VH}$ ,  $V_{VL}$

TP3 low level for  $V_{TH4H}$  measurement is  $V_{VL}$ , and TP3 high level for  $V_{TH4L}$  is  $V_{VH}$ .

Measuring Circuit



Application Circuits

