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. 75 Ω 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	С	integrates syne signal and inputs to seminut circuit			
3	PBin	Chroma signal input pin for other than playback			
4	VSYNC OUT	Vertical sync signal output pin			
5	PBin	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	Yout	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	Yro Video in	Luminance or video signal input pin			
16	Vcc				

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units	
Storage temperature	Tstg	-40~+125	°C	
Operating temperature	Topr	-20~+75	°C	
Power supply voltage	Vcc max.	7	V	
Allowable loss	Pd	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.	Тур.	Max.	Units	
Operating power supply voltage	Vcc	Vcc		4.7	5.0	5.3	V	
Consumption current	Id	_	SG-1, SG-2, SG-3 : No signal Measure with DC ammeter.		25.0	33.0	mA	
Y amp output						_		
Voltage gain	Gv1	TP11	SG–1, sweep signal 1V _{P-P} , 0.1MHz	5.5	6.0	6.5	dB	
Differential gain	DG1	TP10	SG-1, staircase wave, 1V _{P-P} APL=10, 50, 90%		1.0	3.0	%	
Differential phase	DP1	TP10	SG–1, staircase wave, 1V _{P-P} APL=10, 50, 90%		1.0	3.0	deg	
Frequency characteristic	fc1	TP11	SG–1, sweep signal, 1V _{P-P} 5MHz/0.1MHz * 1	-1.0	0	1.0	dB	
Video amp output			~~~					
Voltage gain	Gv2	TP8	SG-1 sweep signal 1V _{P-P} , 0.1MHz	5.5	6.0	6.5	dB	
Differential gain	DG2	TP9	SG–1, staircase wave 1V _{P-P} APL=10, 50, 90%		1.0	3.0	%	
Differential phase	DP2	TP9	SG–1, staircase wave, 1V _{P-P} APL=10, 50, 90%		1.0	3.0	deg	
Frequency characteristic	fc2	TP8	SG–1 sweep signal 1V _{P-P} 5MHz/0.1MHz *2	-1.0	0	1.0	dB	
Chroma amp		(TD)		0.0	10.0		10	
Voltage gain	Gv3	ТР7	SG-2, sine wave, 0.2VP-P, 0.1MHz	9.0	10.0	11.0	dB	
Frequency characteristic	fc3	TP7	SG-2, sine wave, 0.2VP-P 5MHz/0.1MHz *3	-1.0	0	1.0	dB	
	Cm1	TD7	SC 1 sine were 1 Was AMHz +2		26	20	JD	
$\frac{\text{Crosstalk 1 Fin} \rightarrow \text{Court}}{\text{Crosstalk 2 Pr} \rightarrow \text{Vourt}}$	Ст2	TP11	SG-2 sine wave $0.2V_{P-P}$ 4MHz *2		-30 -42	-30	dB	
$Crosstalk 3 P_B \rightarrow Y_{OUT}$	Ст3	TP11	SG-3, sine wave, 0.2VP-P, 4MHz SW2 : A *3		-42	-36	dB	
Crosstalk 4 P _B → C _{OUT}	Ст4	TP7	SG–1, sine wave,0.2V _{P-P} , 4MHz *4		-50	-40	dB	
Edge level Y	VEDY	TP10	SG–1, staircase wave (no chroma signal) 1VP-P, TP13, pulse level, 5V	0	5	10	IRE	
Edge level V	VEDV	TP9	SG–1, staircase wave (no chroma signal) 1V _{P-P} , TP13, pulse level, 5V	0	5	10	IRE	
Character level Y	VCHY	TP10	SG–1, staircase wave (no chroma signal) 1V _{P-P} , TP12, 13, pulse level, 5V	60	65	70	IRE	
Character level V	VCHV	TP9	SG–1, staircase wave (no chroma signal) 1V _{P-P} , TP12, 13 pulse level 5V	60	65	70	IRE	
Input threshold voltage	1	1				1		
Bordering input	VTH1	TP13	SG–1, staircase wave (no chroma signal) 1V _{P-P} , TP13, pulse level, L→H ★5	0.7	1.4	2.1	V	
Character input	VTH2	TP12	SG-1, staircase wave (no chroma signal) $1V_{P-P}TP12$, 13, pulse level, $L \rightarrow H *5$	0.7	1.4	2.1	V	
Chroma mute input	VTH3	TP5	SG–2, sine wave, 0.1V _{P-P} , 4MHz TP5, pulse level, L→H *6	0.7	1.4	2.1	V	
Sync separation								
Sync separation level	VSEPA	TP14	SG-1, staircase wave (no chroma signal) 1V _{P-P} SG-1, SYNC level, max→min *7	55	110	165	mV	
Schmitt trigger threshold voltage	Vth4h Vth4l	TP1	TP1, DC voltage, $0V \rightarrow H *8$ TP1, DC voltage, $5V \rightarrow L *8$	1.9 1.1	2.1 1.3	2.3 1.5	V V	
Vertical sync output voltage	Vvh Vvl	TP3	TP1, DC voltage, $5V \rightarrow L *9$ TP1, DC voltage, $0V \rightarrow H *9$	4.8	5.0 0.2	0.4	V V	

Notes: *1 1.Voltage gain Gv1, Gv2, Gv3

Given SG-1 input as V1 and TP11 output signal as V2, Gv1 is obtained as follows. The same applies for Gv2 and Gv3.

GV1=20LOG
$$\frac{V2}{V1}$$
 [dB]

2.Frequency response fc1, fc2, fc3

For the same conditions as the G_{V1} measurement, given TP11 output for 0.1MHz as V3, and for 5MHz as V1, Fc1 is obtained as follows. The same applies for fc2 and fc3.

fc1=20LOG
$$\frac{V4}{V3}$$
 [dB]

*2 Crosstalk $Y_{IN} \rightarrow C_{OUT} C_T1$

Given TP14 input signal as V5 and TP7 output signal as V6, CT1 is obtained as follows.

$$C_T = 20 LOG \frac{V6}{V5} [dB]$$

*3 Crosstalk $\overline{P_B}$, $P_B \rightarrow Y_{OUT}$ CT2, CT3

Give TP2 and TP4 input signals as V7, and TP11 output signal as V8, C_{T2} and C_{T3} are obtained as follows.

$$C_{T}2=20LOG \quad \frac{V8}{V7} \text{ [dB]}$$

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 $PB \rightarrow COUT$ CT4

Given TP4 input signal as V9 and TP7 output signal as V10, CT4 is obtained as follows.

$$C_{T}4=20LOG \quad \frac{V10}{V9} [dB]$$

- *5 Input threshold voltage Bordering input, character input VTH1, VTH2 For the same conditions as VEDY and VCHY measurement, raise TP13 and TP12 pulse levels gradually. TP13 and TP12 pulse levels when bordering signal and character signal appear on TP11 are, respectively, VTH1 and VTH2.
- *6 Input threshold voltage Chroma mute input VTH3 Gradually raise TP5 pulse level. TP5 pulse level when a sine wave is no longer output on TP7 is VTH3.
- *7 Sync separation level VSEPA

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 VTH4H, VTH4L Impress external DC voltage on TP1 and gradually raise from 0V. TP1 level when TP3 level goes from high to low is VTH4H. Gradually lower from 5V. TP1 level when TP3 level goes from low to high is VTH4L.
- *9 Vertical sync output voltage VvH, VvL TP3 low level for Tтн4н measurement is VvL, and TP3 high level for Vтн4L is Vvh.

Measuring Circuit



Application Circuits

