S Video Amplifier
Monolithic IC MM1029

Outline

This is a video amp IC that supports S and also has a superimpose function.
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
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. Built-in monitor cut function
8. 75Ω driver built in
9. Frequency response — Y : 7MHz, C : 5MHz
10. Power supply voltage — 4.7V~5.3V

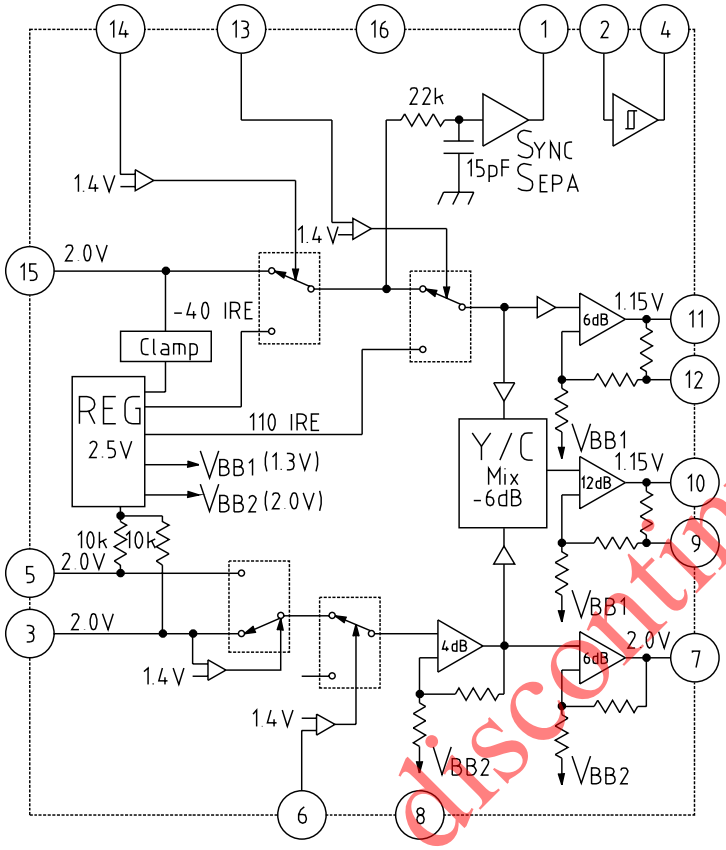
Package

SOP-16A (MM1029AF)

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	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	Monitor cut V insert	Monitor cut V insert pin
15	YOR VIDEO IN	Luminance or video signal input pin
16	VCC	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T_{STG}	−40~+125	°C
Operating temperature	T_{OPR}	−20~+75	°C
Power supply voltage	V_{CC} max.	7	V
Allowable loss	Pd	350	mW

Electrical Characteristics (Except where noted otherwise, Ta=25°C, V_{CC}=5.0V, pulse level 0V, SW1 : A, SW2 : B)

Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units
Operating power supply voltage	V_{CC}	V_{CC}		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	G_{V1}	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	G_{V2}	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 ✶1	−1.0	0	1.0	dB
Chroma amp output							
Voltage gain	G_{V3}	TP7	SG–2 Sine wave 0.2V_{P-P}, 0.1MHz	9.0	10.0	11.0	dB
Frequency characteristic	fc3	TP7	SG–2 Sine wave 0.2V_{P-P} 5MHz/0.1MHz ✶1	−1.0	0	1.0	dB
Crosstalk							
Crosstalk 1 Y_{IN} → C_{OUT}	C_{T1}	TP7	SG–1 Sine wave 1.0V_{P-P}, 4MHz ✶2		−36	−30	dB
Crosstalk 2 $\overline{P_B}$ → Y_{OUT}	C_{T2}	TP11	SG–2 Sine wave 0.2V_{P-P}, 4MHz ✶3		−42	−36	dB
Crosstalk 3 P_B → Y_{OUT}	C_{T3}	TP11	SG–3 Sine wave 0.2V_{P-P}, 4MHz ✶3		−42	−36	dB
Crosstalk 4 P_B → C_{OUT}	C_{T4}	TP7	SG–1 Sine wave 0.2V_{P-P}, 4MHz ✶4		−50	−40	dB
Superimpose							
V insertion level Y	V_{MCY}	TP10	SG–1 Staircase wave (no chroma signal) 1V_{P-P} TP13 Pulse level 5V	−45	−40	−35	IRE
V insertion level V	V_{MCV}	TP9	SG–1 Staircase wave (no chroma signal) 1V_{P-P} TP13 Pulse level 5V	−45	−40	−35	IRE
Character level Y	V_{CHY}	TP10	SG–1 Staircase wave (no chroma signal) 1V_{P-P} TP12 Pulse level 5V	105	110	115	IRE
Character level V	V_{CHV}	TP9	SG–1 Staircase wave (no chroma signal) 1V_{P-P} TP12 Pulse level 5V	105	110	115	IRE
Input threshold voltage							
V insertion input	V_{TH1}	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	V_{TH2}	TP12	SG–1 Staircase wave (no chroma signal) 1V_{P-P} TP12 Pulse level L→H ✶5	0.7	1.4	2.1	V
Chroma mute input	V_{TH3}	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	V_{SEPA}	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	V_{TH4H}	TP1	TP1 DC voltage 0V→H ✶8	1.9	2.1	2.3	V
	V_{TH4L}		TP1 DC voltage 5V→L ✶8	1.1	1.3	1.5	V
Vertical sync output voltage	V_{VH}	TP3	TP1 DC voltage 5V→L ✶9	4.8	5.0		V
	V_{VL}		TP1 DC voltage 0V→H ✶9		0.2	0.4	V

Notes : *1 1. Voltage gain $G_{V}1$, $G_{V}2$, $G_{V}3$
Given SG-1 input as V1 and TP11 output signal as V2, $G_{V}1$ is obtained as follows.
The same applies for $G_{V}2$ and $G_{V}3$.

$$G_{V}1=20LOG\ \frac{V2}{V1}\ [dB]$$

2. Frequency response $f_{C}1$, $f_{C}2$, $f_{C}3$
For the same conditions as the $G_{V}1$ measurement, given TP11 output for 0.1MHz as V3, and for 5MHz as V1, $F_{C}1$ is obtained as follows. The same applies for $f_{C}2$ and $f_{C}3$.

$$F_{C}1=20LOG\ \frac{V4}{V3}\ [dB]$$

*2 Crosstalk Yin → C_{OUT} $C_{T}1$
Given TP14 input signal as V5 and TP7 output signal as V6, $C_{T}1$ is obtained as follows.

$$C_{T}1=20LOG\ \frac{V6}{V5}\ [dB]$$

*3 Crosstalk $\overline{P_{B}}$, P_{B} → Y_{OUT} $C_{T}2$, $C_{T}3$
Give TP2 and TP4 input signals as V7, and TP11 output signal as V8, $C_{T}2$ and $C_{T}3$ are obtained as follows.

$$C_{T}2=20LOG\ \frac{V8}{V7}\ -4^{*1}\ [dB]$$

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

*4 Crosstalk PB → C_{OUT} $C_{T}4$
Given TP4 input signal as V9 and TP7 output signal as V10, CT4 is obtained as follows.

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

*5 Input threshold voltage V insert input, character input $V_{TH}1$, $V_{TH}2$
For the same conditions as V_{MCY} and V_{CHY} measurement, raise TP13 and TP12 pulse levels gradually. TP13 and TP12 pulse levels when V insert signal and character signal appear on TP11 are, respectively, $V_{TH}1$ and $V_{TH}2$.

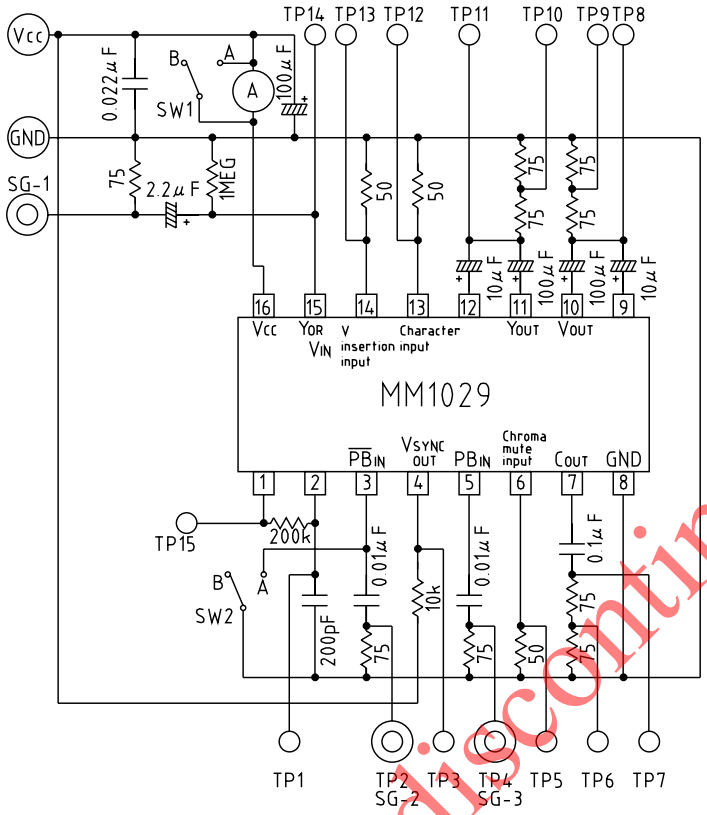
*6 Input threshold voltage Chroma mute input $V_{TH}3$
Gradually raise TP5 pulse level. TP5 pulse level when a sine wave is no longer output on TP7 is $V_{TH}3$.

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

*8 Schmidt trigger threshold level $V_{TH}4H$, $V_{TH}4L$
Impress external DC voltage on TP1 and gradually raise from 0V. TP1 level when TP3 level goes from high to low is $V_{TH}4H$. Gradually lower from 5V. TP1 level when TP3 level goes from low to high is $V_{TH}4L$.

*9 Vertical sync output voltage V_{VH}, V_{VL}
TP3 low level for $T_{TH}4H$ measurement is V_{VL}, and TP3 high level for $V_{TH}4L$ is V_{VH}.

Measuring Circuit



Application Circuits