

2-Input 2-Output Video Switch Monolithic IC MM1120

Outline

This is a 2-input, 2-output 3-circuit high performance video switch IC for video/audio signal switching. It is ideal for use in TV/BS switching.

Features

- 1. 1 video signal circuit, 2 audio signal circuits
- 2. 1 built-in 75Ω driver circuit
- 3. Current consumption 17mA typ.
- 4. Operating power supply voltage range 9~12V
- 5. Frequency response 10MHz (V_{OUT1}), 7MHz (V_{OUT2})
- 6. Crosstalk Video signal circuit : 60dB (at 4.43MHz)
Audio signal circuit : 80dB (at 1kHz)

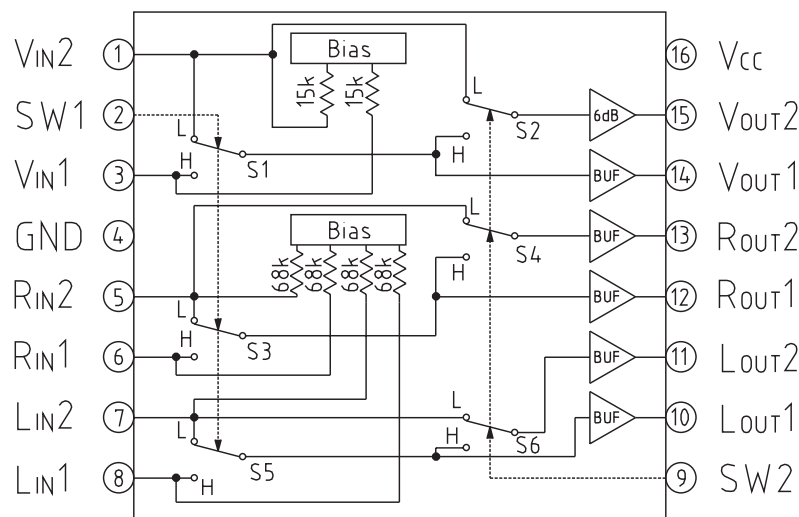
Package

SSOP-16A (MM1120XF)

Applications

- 1. TV with built-in BS

Block Diagram



Control input truth table

SW1	SW2	OUT1	OUT1
L	L	IN2	IN2
L	H	IN2	IN2
H	L	IN1	IN2
H	H	IN1	IN1

Pin Description

Pin no.	Pin name	Function	Internal equivalent circuit diagram
1 3	V _{IN}	Video input	
2 9	SW	Switch	
4	GND	Ground	
5 6 7 8	R _{IN} and L _{IN}	Audio input	
10 11 12 13	R _{OUT} and L _{OUT}	Audio output	
14	V _{OUT1}	Video output 1	

15	V _{out2}	Video output 2	
16	V _{cc}	Power supply	

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.}	15	V
Allowable loss	P _d	500	mW

Electrical Characteristics (Except where noted otherwise, Ta=25°C, V_{cc}=8V~13V, V₁=0V, V₂=0V, SG-1, SG-2, SG-3, no signal)

Item	Symbol	Measurement pin	Measurement conditions	Min.	Typ.	Max.	Units
Operating power supply voltage	V _{CC}	V _{CC}		8.00		13.0	V
Consumption current	I _{CC1}		V _{CC} =9V		16.0	21.0	mA
	I _{CC2}		V _{CC} =12V		17.0	22.0	mA
V_{IN1}-V_{OUT1} V₁=V₂=V_{CC}, SW1 : B, V_{IN2}-V_{OUT1}, SW1 : A							
Voltage gain	G _{V1}	TP2	SG1 : Sine wave 1V _{P-P} , 0.1MHz	-0.5	0	0.5	dB
Frequency characteristic	F _{C1}		SG1 : Sweep signal 1.0V _{P-P} , 10MHz/0.1MHz	-1.0	0	1.0	dB
Differential gain	D _{G1}	TP8	SG1: Staircase wave 1V _{P-P} APL=10, 50, 90%		0	±3	%
Differential phase	D _{P1}		SG1: Staircase wave 1V _{P-P} APL=10, 50, 90%		0	±3	deg
V_{IN2}-V_{OUT2} SW1 : A, V_{IN1}-V_{OUT2} V₁=V₂=V_{CC}, SW1 : B							
Voltage gain	G _{V2}	TP1	SG1 : Sine wave 1V _{P-P} , 0.1MHz	5.5	6.0	6.5	dB
Frequency characteristic	F _{C2}		SG1 : Sweep signal 1.0V _{P-P} , 7MHz/0.1MHz	-1.0	0	1.0	dB
Differential gain	D _{G2}	TP7	SG1 : Staircase wave 1V _{P-P} APL=10, 50, 90%		0	±3	%
Differential phase	D _{P2}		SG1 : Staircase wave 1V _{P-P} APL=10, 50, 90%		0	±3	deg
R_{IN1}-R_{OUT1} V₁=V₂=V_{CC}, SW2 : B, R_{IN2}-R_{OUT1} SW2 : A							
Voltage gain	G _{V3}	TP4	SG2 : Sine wave 2.5V _{P-P} , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	T _{HD1}		SG2 : Sine wave 2.5V _{P-P} , 1kHz		0.01	0.1	%
Output noise voltage	V _{N1}		15kHz band		3	50	μVrms
R_{IN2}-R_{OUT2} SW2 : A, R_{IN1}-R_{OUT2} V₁=V₂=V_{CC}, SW2 : B							
Voltage gain	G _{V4}	TP3	SG2 : Sine wave 2.5V _{P-P} , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	T _{HD2}		SSG2 : Sine wave 2.5V _{P-P} , 1kHz		0.01	0.1	%
Output noise voltage	V _{N2}		15kHz band		3	50	μVrms

LIN1 –LOUT1 V1=V2=VCC, SW3 : B, LIN2 –LOUT1 SW3 : A							
Voltage gain	Gv5	TP6	SG3 : Sine wave 2.5V _{P-P} , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	T _{HD3}		SG3 : Sine wave 2.5V _{P-P} , 1kHz		0.01	0.1	%
Output noise voltage	V _{N3}		15kHz band		3	50	μV _{rms}
LIN2 –LOUT2 SW3 : A, LIN1 –LOUT2 V1=V2=VCC, SW3 : B							
Voltage gain	Gv6	TP5	SG3 : Sine wave 2.5V _{P-P} , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	T _{HD4}		SG3 : Sine wave 2.5V _{P-P} , 1kHz		0.01	0.1	%
Output noise voltage	V _{N4}		15kHz band		3	50	μV _{rms}
Output offset voltage							
V _{OUT1}	V _{off1}	TP2	DC level difference when V1=0V and V1=V _{CC}		0	±15	mV
V _{OUT2}	V _{off2}	TP1	DC level difference when V2=0V and V2=V _{CC}		0	±30	mV
R _{OUT1}	V _{off3}	TP4	DC level difference when V1=0V and V1=V _{CC}		0	±15	mV
R _{OUT2}	V _{off4}	TP3	DC level difference when V2=0V and V2=V _{CC}		0	±15	mV
L _{OUT1}	V _{off5}	TP6	DC level difference when V1=0V and V1=V _{CC}		0	±15	mV
L _{OUT2}	V _{off6}	TP5	DC level difference when V2=0V and V2=V _{CC}		0	±15	mV
Input impedance							
V _{IN}	R _{i1}		V _{IN1} and V _{IN2}		15		kΩ
R _{IN}	R _{i2}		R _{IN1} and R _{IN2}		68		kΩ
L _{IN}	R _{i3}		L _{IN1} and L _{IN2}		68		kΩ
Output impedance							
V _{OUT1}	R _{o1}				50		Ω
R _{OUT}	R _{o2}		R _{OUT1} and R _{OUT2}		100		Ω
L _{OUT}	R _{o3}		L _{OUT2} and L _{OUT2}		100		Ω
Crosstalk *1							
V _{IN} → V _{OUT}	C _{T1}	TP7	SG1 : Sine wave 1V _{P-P} , 4.43MHz ① V1=V _H , V2=V _L , SW1 : B ② V1=V2=V _H , SW1 : A		-60	-50	dB
	C _{T2}	TP2	SG1 : Sine wave 1V _{P-P} , 4.43MHz ① V1=V _L , V2=V _H , SW1 : B ② V1=V _H , V2=V _L , SW1 : A		-60	-50	dB
R _{IN} → R _{OUT}	C _{T3}	TP3	SG2 : Sine wave 2.5V _{P-P} , 1kHz ① V1=V _H , V2=V _L , SW2 : B ② V1=V2=V _H , SW2 : A		-80	-70	dB
	C _{T4}	TP4	SG2 : Sine wave 2.5V _{P-P} , 1kHz ① V1=V _L , V2=V _H , SW2 : B ② V1=V _H , V2=V _L , SW2 : A		-80	-70	dB
L _{IN} → L _{OUT}	C _{T5}	TP5	SG3 : Sine wave 2.5V _{P-P} , 1kHz ① V1=V _H , V2=V _L , SW3 : B ② V1=V2=V _H , SW3 : A		-80	-70	dB
	C _{T6}	TP6	SG3 : Sine wave 2.5V _{P-P} , 1kHz ① V1=V _L , V2=V _H , SW3 : B ② V1=V _H , V2=V _L , SW3 : A		-80	-70	dB
V _{IN1} → R _{OUT2}	C _{T7}	TP3	SG1 : Sine wave 1V _{P-P} , 4.43MHz 1 V1=V _H , V2=V _L , SW1 : B		-55	-45	dB
Switch input voltage							
Switch input voltage H	V _{IH}		IC internal switch H level	2.1			V
Switch input voltage L	V _{IL}		IC internal switch L level			0.7	V

*1 Crosstalk

V_H=2.1V, V_L=0.7V

C_T is obtained by the following formula given input signal is V_{IN} and output signal is V_{OUT}

$$C_T = 20 \log \frac{V_{OUT}}{V_{IN}} \text{ [dB]}$$

Measuring Circuit

