

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

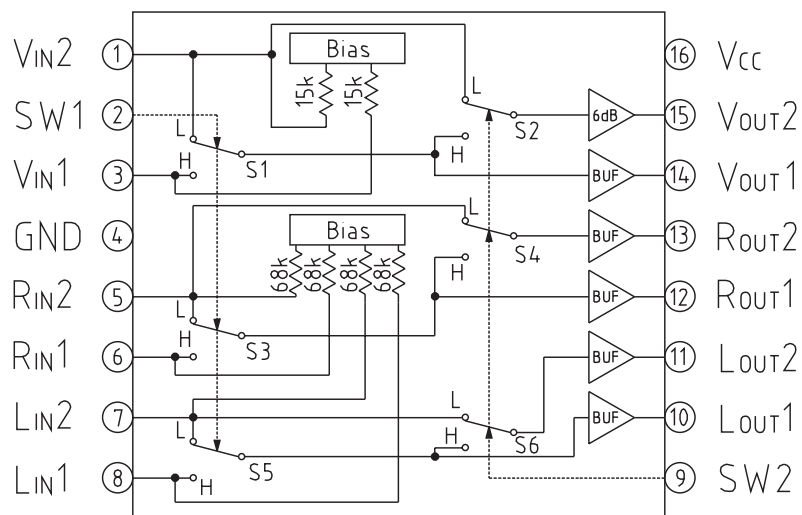
Package

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} V ₁ =V ₂ =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} V ₁ =V ₂ =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} V ₁ =V ₂ =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} V ₁ =V ₂ =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 2.5VP-P, 1kHz	–0.5	0	0.5	dB
Total harmonic distortion	THD3		SG3 : Sine wave 2.5VP-P, 1kHz		0.01	0.1	%
Output noise voltage	VN3		15kHz band		3	50	µVrms
LIN2 –LOUT2 SW3 : A, LIN1 –LOUT2 V1=V2=VCC, SW3 : B							
Voltage gain	Gv6	TP5	SG3 : Sine wave 2.5VP-P, 1kHz	–0.5	0	0.5	dB
Total harmonic distortion	THD4		SG3 : Sine wave 2.5VP-P, 1kHz		0.01	0.1	%
Output noise voltage	VN4		15kHz band		3	50	µVrms
Output offset voltage							
VOUT1	Voff1	TP2	DC level difference when V1=0V and V1=Vcc		0	±15	mV
VOUT2	Voff2	TP1	DC level difference when V2=0V and V2=Vcc		0	±30	mV
ROUT1	Voff3	TP4	DC level difference when V1=0V and V1=Vcc		0	±15	mV
ROUT2	Voff4	TP3	DC level difference when V2=0V and V2=Vcc		0	±15	mV
LOUT1	Voff5	TP6	DC level difference when V1=0V and V1=Vcc		0	±15	mV
LOUT2	Voff6	TP5	DC level difference when V2=0V and V2=Vcc		0	±15	mV
Input impedance							
VIN	Ri1		VIN1 and VIN2		15		kΩ
RIN	Ri2		RIN1 and RIN2		68		kΩ
LIN	Ri3		LIN1 and LIN2		68		kΩ
Output impedance							
VOUT1	Ro1				50		Ω
ROUT	Ro2		ROUT1 and ROUT2		100		Ω
LOUT	R03		LOUT2 and LOUT2		100		Ω
Crosstalk *1							
VIN→VOUT	CT1	TP7	SG1 : Sine wave 1VP-P, 4.43MHz ① V1=VH, V2=VL, SW1 : B ② V1=V2=VH, SW1 : A		–60	–50	dB
	CT2	TP2	SG1 : Sine wave 1VP-P, 4.43MHz ① V1=VL, V2=VH, SW1 : B ② V1=VH, V2=VL, SW1 : A		–60	–50	dB
RIN→ROUT	CT3	TP3	SG2 : Sine wave 2.5VP-P, 1kHz ① V1=VH, V2=VL, SW2 : B ② V1=V2=VH, SW2 : A		–80	–70	dB
	CT4	TP4	SG2 : Sine wave 2.5VP-P, 1kHz ① V1=VL, V2=VH, SW2 : B ② V1=VH, V2=VL, SW2 : A		–80	–70	dB
LIN→LOUT	CT5	TP5	SG3 : Sine wave 2.5VP-P, 1kHz ① V1=VH, V2=VL, SW3 : B ② V1=V2=VH, SW3 : A		–80	–70	dB
	CT6	TP6	SG3 : Sine wave 2.5VP-P, 1kHz ① V1=VL, V2=VH, SW3 : B ② V1=VH, V2=VL, SW3 : A		–80	–70	dB
VIN1→ROUT2	CT7	TP3	SG1 : Sine wave 1VP-P, 4.43MHz 1 V1=VH, V2=VL, SW1 : B		–55	–45	dB
Switch input voltage							
Switch input voltage H	VIH		IC internal switch H level	2.1			V
Switch input voltage L	VIL		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

