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 ($V_{OUT}1$), 7MHz ($V_{OUT}2$)
6. Crosstalk   Video signal circuit : 60dB (at 4.43MHz)
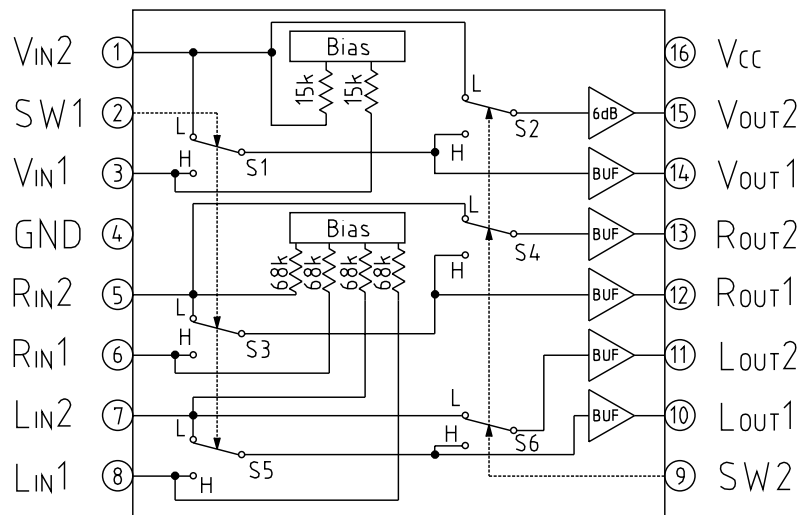   Audio signal circuit : 80dB (at 1kHz)

Package

SSOP-16A (MM1120XF)

Applications

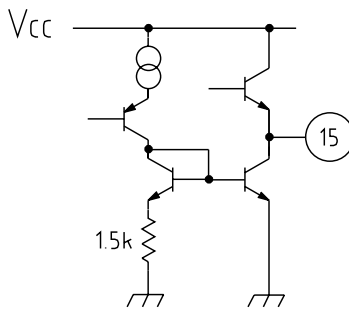1. TV with built-in BS

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_{OUT}1	Video output 1	

15	V$_{OUT}$2	Video output 2	
16	V$_{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	Pd	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	Icc1		V$_{CC}$=9V		16.0	21.0	mA
	Icc2		V$_{CC}$=12V		17.0	22.0	mA
V$_{IN}$1−V$_{OUT}$1 V1=V2=V$_{CC}$, SW1 : B, V$_{IN}$2−V$_{OUT}$1, SW1 : A							
Voltage gain	G$_V$1	TP2	SG1 : Sine wave 1V$_{P-P}$, 0.1MHz	−0.5	0	0.5	dB
Frequency characteristic	Fc1		SG1 : Sweep signal 1.0V$_{P-P}$ 10MHz/0.1MHz	−1.0	0	1.0	dB
Differential gain	D$_G$1	TP8	SG1: Staircase wave 1V$_{P-P}$ APL=10, 50, 90%		0	±3	%
Differential phase	D$_P$1		SG1: Staircase wave 1V$_{P-P}$ APL=10, 50, 90%		0	±3	deg
V$_{IN}$2−V$_{OUT}$2 SW1 : A, V$_{IN}$1−V$_{OUT}$2 V1=V2=V$_{CC}$, SW1 : B							
Voltage gain	G$_V$2	TP1	SG1 : Sine wave 1V$_{P-P}$, 0.1MHz	5.5	6.0	6.5	dB
Frequency characteristic	Fc2		SG1 : Sweep signal 1.0V$_{P-P}$, 7MHz/0.1MHz	−1.0	0	1.0	dB
Differential gain	D$_G$2	TP7	SG1 : Staircase wave 1V$_{P-P}$ APL=10, 50, 90%		0	±3	%
Differential phase	D$_P$2		SG1 : Staircase wave 1V$_{P-P}$ APL=10, 50, 90%		0	±3	deg
R$_{IN}$1−R$_{OUT}$1 V1=V2=V$_{CC}$, SW2 : B, R$_{IN}$2−R$_{OUT}$1 SW2 : A							
Voltage gain	G$_V$3	TP4	SG2 : Sine wave 2.5V$_{P-P}$, 1kHz	−0.5	0	0.5	dB
Total harmonic distortion	T$_{HD}$1		SG2 : Sine wave 2.5V$_{P-P}$, 1kHz		0.01	0.1	%
Output noise voltage	V$_N$1		15kHz band		3	50	µVrms
R$_{IN}$2−R$_{OUT}$2 SW2 : A, R$_{IN}$1−R$_{OUT}$2 V1=V2=V$_{CC}$, SW2 : B							
Voltage gain	G$_V$4	TP3	SG2 : Sine wave 2.5V$_{P-P}$, 1kHz	−0.5	0	0.5	dB
Total harmonic distortion	T$_{HD}$2		SSG2 : Sine wave 2.5V$_{P-P}$, 1kHz		0.01	0.1	%
Output noise voltage	V$_N$2		15kHz band		3	50	µVrms

L$_{IN}$1−L$_{OUT}$1 V1=V2=V$_{CC}$, SW3 : B, L$_{IN}$2−L$_{OUT}$1 SW3 : A							
Voltage gain	G$_V$5	TP6	SG3 : Sine wave 2.5V$_{P-P}$, 1kHz	−0.5	0	0.5	dB
Total harmonic distortion	T$_{HD}$3	TP6	SG3 : Sine wave 2.5V$_{P-P}$, 1kHz		0.01	0.1	%
Output noise voltage	V$_N$3		15kHz band		3	50	µVrms
L$_{IN}$2−L$_{OUT}$2 SW3 : A, L$_{IN}$1−L$_{OUT}$2 V1=V2=V$_{CC}$, SW3 : B							
Voltage gain	G$_V$6	TP5	SG3 : Sine wave 2.5V$_{P-P}$, 1kHz	−0.5	0	0.5	dB
Total harmonic distortion	T$_{HD}$4	TP5	SG3 : Sine wave 2.5V$_{P-P}$, 1kHz		0.01	0.1	%
Output noise voltage	V$_N$4		15kHz band		3	50	µVrms
Output offset voltage							
V$_{OUT}$1	Voff1	TP2	DC level difference when V1=0V and V1=Vcc		0	±15	mV
V$_{OUT}$2	Voff2	TP1	DC level difference when V2=0V and V2=Vcc		0	±30	mV
R$_{OUT}$1	Voff3	TP4	DC level difference when V1=0V and V1=Vcc		0	±15	mV
R$_{OUT}$2	Voff4	TP3	DC level difference when V2=0V and V2=Vcc		0	±15	mV
L$_{OUT}$1	Voff5	TP6	DC level difference when V1=0V and V1=Vcc		0	±15	mV
L$_{OUT}$2	Voff6	TP5	DC level difference when V2=0V and V2=Vcc		0	±15	mV
Input impedance							
V$_{IN}$	Ri1		V$_{IN}$1 and V$_{IN}$2		15		kΩ
R$_{IN}$	Ri2		R$_{IN}$1 and R$_{IN}$2		68		kΩ
L$_{IN}$	Ri3		L$_{IN}$1 and L$_{IN}$2		68		kΩ
Output impedance							
V$_{OUT}$1	Ro1				50		Ω
R$_{OUT}$	Ro2		R$_{OUT}$1 and R$_{OUT}$2		100		Ω
L$_{OUT}$	R03		L$_{OUT}$2 and L$_{OUT}$2		100		Ω
Crosstalk *1							
V$_{IN}$→V$_{OUT}$	C$_T$1	TP7	SG1 : Sine wave 1V$_{P-P}$, 4.43MHz ① V1=V$_H$, V2=V$_L$, SW1 : B ② V1=V2=V$_H$, SW1 : A		−60	−50	dB
V$_{IN}$→V$_{OUT}$	C$_T$2	TP2	SG1 : Sine wave 1V$_{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$_T$3	TP3	SG2 : Sine wave 2.5V$_{P-P}$, 1kHz ① V1=V$_H$, V2=V$_L$, SW2 : B ② V1=V2=V$_H$, SW2 : A		−80	−70	dB
R$_{IN}$→R$_{OUT}$	C$_T$4	TP4	SG2 : Sine wave 2.5V$_{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$_T$5	TP5	SG3 : Sine wave 2.5V$_{P-P}$, 1kHz ① V1=V$_H$, V2=V$_L$, SW3 : B ② V1=V2=V$_H$, SW3 : A		−80	−70	dB
L$_{IN}$→L$_{OUT}$	C$_T$6	TP6	SG3 : Sine wave 2.5V$_{P-P}$, 1kHz ① V1=V$_L$, V2=V$_H$, SW3 : B ② V1=V$_H$, V2=V$_L$, SW3 : A		−80	−70	dB
V$_{IN}$1→R$_{OUT}$2	C$_T$7	TP3	SG1 : Sine wave 1V$_{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$_{OUT}$

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

Measuring Circuit