

2-Input 2-Output Video Switch Monolithic IC MM1120

November 24, 2004

Outline

This IC is a high-performance video switch IC for video/audio signal switching incorporating three 2-input 2-output circuits. It is ideal for TV/BS switching.

Features

- 1. One video signal circuit and two audio signal circuits
- 2. Includes one 75Ω driver circuit
- 3. Current consumption 17mA typ. (V_{CC}=12V)
- 4. Operating supply voltage range 8~13V
- 5. Frequency response 10MHz (V_{OUT1}), 7MHz (V_{OUT2})
- 6. Crosstalk Video signal circuit: 60dB (at 4.43MHz)
Audio signal circuit: 80dB (at 1kHz)

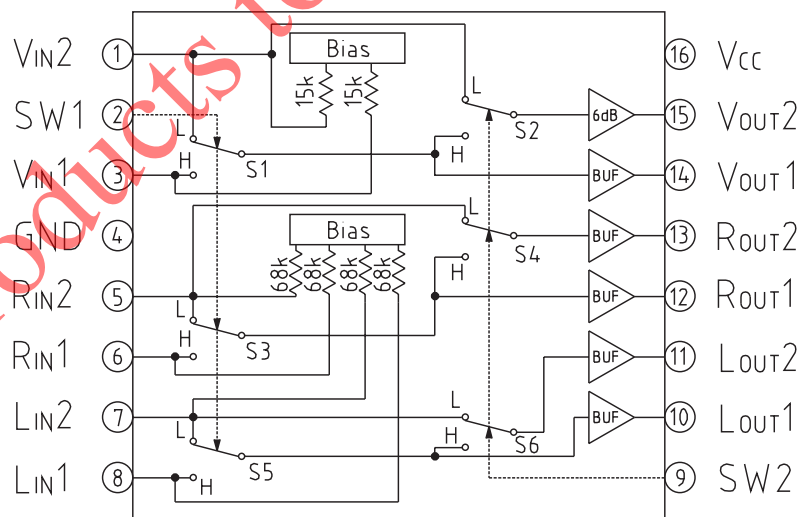
Package

SSOP-16A (MM1120XF)

Applications

- 1. TVs with built-in BS

Block Diagram

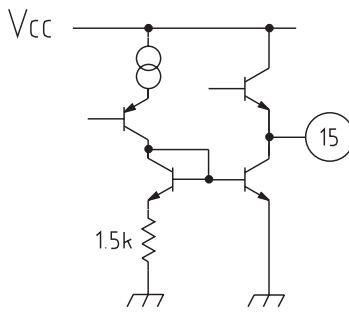


Control input truth table

| SW1 | SW2 | OUT1 | OUT2 |
|-----|-----|------|------|
| L | L | IN2 | IN2 |
| L | H | IN2 | IN1 |
| 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 |

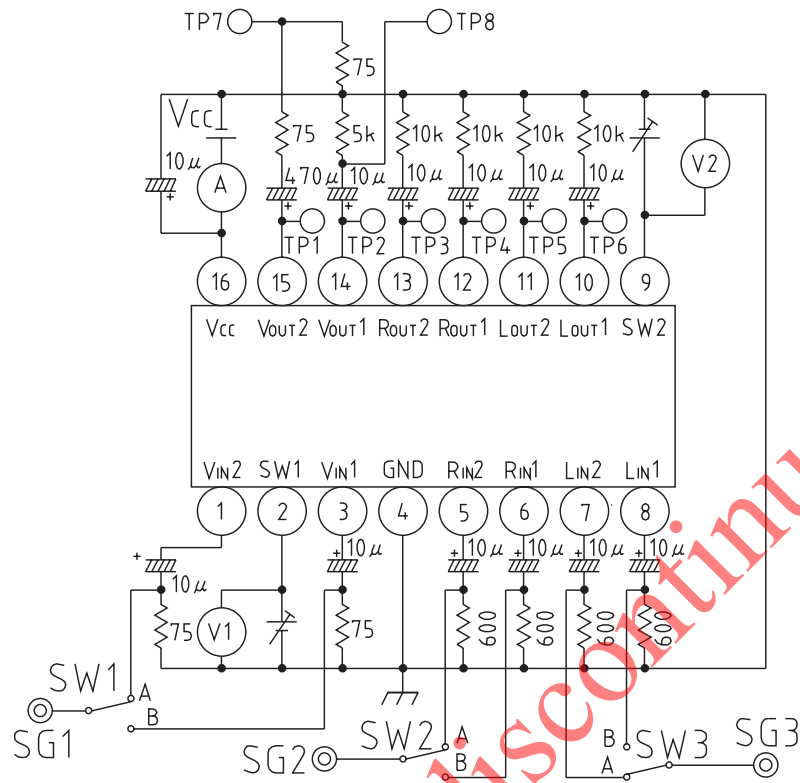
*1 Crosstalk

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



Products to be discontinued