

# 3-Input 2-Output 3-Circuit Video Switch Monolithic IC MM1238

## Outline

This IC is a video switch developed for large and medium-sized high quality TVs, with 3-input and 2-output circuits. It is suitable for BS, JSB, CS or M-N (Muse NTSC conversion) comparator switching. The BS-CS decoder can be used as a W decoder.

## Features

- One of the two video signal outputs is for external output, and has a 6dB amp, 75Ω, 1V<sub>P-P</sub>
- Input impedance
 

Video circuits 1~3	15kΩ
Audio circuits 1~3	68kΩ
- Crosstalk
 

Video	-60dB (at 4.43MHz)
Audio	-80dB (at 1kHz)
Video : Audio	-70dB (at 100kHz)
- Frequency response
 

10MHz (6dB, 75Ω, amp only, 7MHz)
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- Power supply voltage
 

8.0V~13.0V
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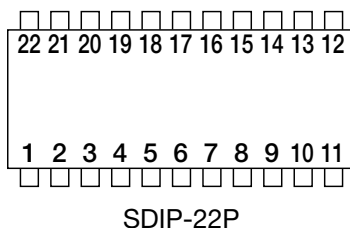
## Package

SDIP-22A (MM1238XD)

## Applications

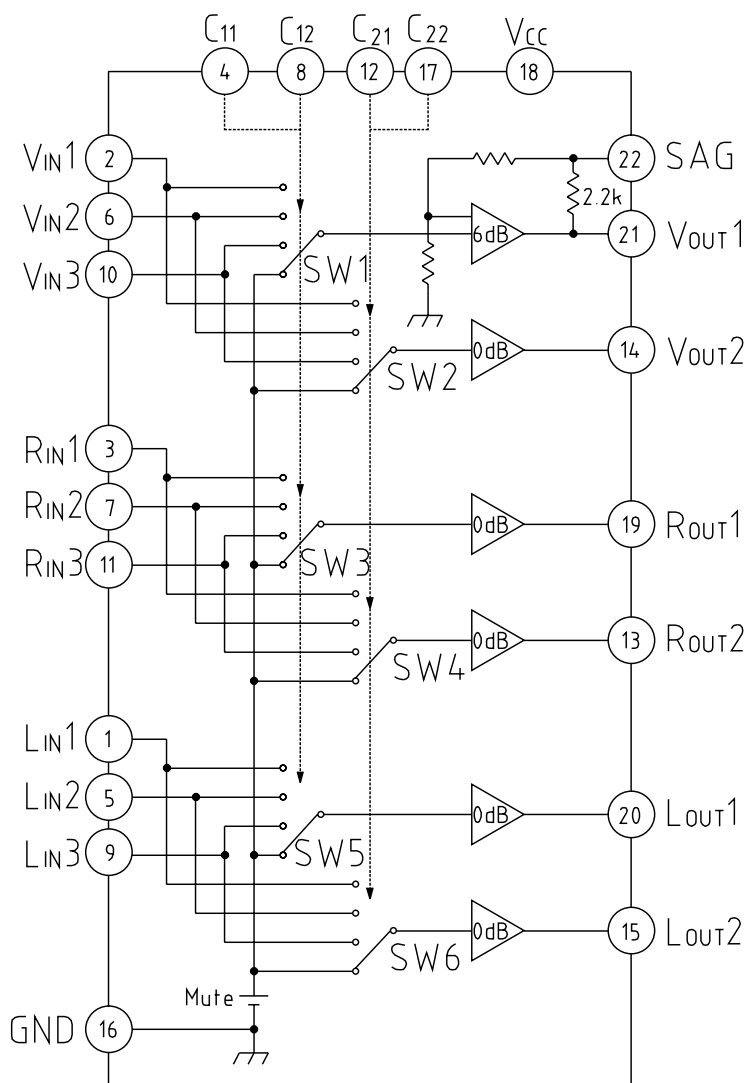
- TV
- Free-standing VCR
- Other video equipment

## Pin Assignment



Pin no.	Pin name	Function	Pin no.	Pin name	Function
1	LIN1	Audio LIN1	12	C21	SW2 control
2	VIN1	Video IN1	13	Rout2	Audio Rout2
3	RIN1	Audio RIN1	14	Vout2	Video OUT2
4	C11	SW1 control	15	Lout2	Audio Lout2
5	LIN2	Audio LIN2	16	GND	GND
6	VIN2	Video IN2	17	C22	SW2 control
7	RIN2	Audio RIN2	18	Vcc	Power supply
8	C12	SW1 control	19	Rout1	Audio Rout1
9	LIN3	Audio LIN3	20	Lout1	Audio Lout1
10	VIN3	Video IN3	21	Vout1	Video OUT1
11	RIN3	Audio RIN3	22	SAG	Sag pin

## Block Diagram



SW Logic

Control input		Output signal		
C11	C12	Vout1	Rout1	Lout1
L	L	Mute	Mute	Mute
L	H	VIn1	RIn1	LIn1
H	L	VIn2	RIn2	LIn2
H	H	VIn3	RIn3	LIn3

Control input		Output signal		
C21	C22	Vout2	Rout2	Lout2
L	L	Mute	Mute	Mute
L	H	VIn1	RIn1	LIn1
H	L	VIn2	RIn2	LIn2
H	H	VIn3	RIn3	LIn3

## Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-20~+75	°C
Power supply voltage	V <sub>CC</sub>	15	V
Allowable loss	P <sub>d</sub>	800	mW

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, V<sub>CC</sub>= 8V~13V)

Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units
Operating power supply voltage	V <sub>CC</sub>	V <sub>CC</sub>		8.0		13.0	V
Consumption current	I <sub>CC1</sub>		V <sub>CC</sub> =9V		22.0	29.0	mA
	I <sub>CC2</sub>		V <sub>CC</sub> =12V		25.0	33.0	mA
<b>V<sub>OUT1</sub> output</b>							
Voltage gain	G <sub>V1</sub>	TP7	SG2 : Sine wave 1V <sub>P-P</sub> , 0.1MHz	5.7	6.2	6.7	dB
Frequency characteristic	F <sub>V1</sub>	TP7	SG2 : Sweep signal 1V <sub>P-P</sub> 7MHz/0.1MHz	-1.0	0	1.0	dB
Differential gain	DG1	TP8	SG2 : Staircase wave 1V <sub>P-P</sub> APL=10, 50, 90%		0	3	%
Differential phase	DP1	TP8	SG2 : Staircase wave 1V <sub>P-P</sub> APL=10, 50, 90%		0	3	deg
<b>R<sub>OUT1</sub> output</b>							
Voltage gain	G <sub>R1</sub>	TP5	SG3 : Sine wave 2.5V <sub>P-P</sub> , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	THD <sub>R1</sub>	TP5	SG3 : Sine wave 2.5V <sub>P-P</sub> , 1kHz		0.01	0.1	%
Mute noise	V <sub>NM1</sub>	TP5	15kHz band during mute select		180		μVrms
Output noise voltage	V <sub>NR1</sub>	TP5	15kHz band during pin select		3	50	μVrms
<b>L<sub>OUT1</sub> output</b>							
Voltage gain	G <sub>L1</sub>	TP6	SG1 : Sine wave 2.5V <sub>P-P</sub> , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	THD <sub>L1</sub>	TP6	SG1 : Sine wave 2.5V <sub>P-P</sub> , 1kHz		0.01	0.1	%
Mute noise	V <sub>NM2</sub>	TP6	15kHz band during mute select		180		μVrms
Output noise voltage	V <sub>NL1</sub>	TP6	15kHz band during pin select		3	50	μVrms
<b>V<sub>OUT2</sub> output</b>							
Voltage gain	G <sub>V2</sub>	TP2	SG2 : Sine wave 1V <sub>P-P</sub> , 0.1MHz	-0.5	0	0.5	dB
Frequency characteristic	F <sub>V2</sub>	TP2	SG2 : Sweep signal 1V <sub>P-P</sub> 10MHz/0.1MHz	-1.0	0	1.0	dB
Differential gain	DG2	TP3	SG2 : Staircase wave 1V <sub>P-P</sub> APL=10, 50, 90%		0	3	%
Differential phase	DP2	TP3	SG2 : Staircase wave 1V <sub>P-P</sub> APL=10, 50, 90%		0	3	deg
<b>R<sub>OUT2</sub> output</b>							
Voltage gain	G <sub>R2</sub>	TP1	SG3 : Sine wave 2.5V <sub>P-P</sub> , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	THD <sub>R2</sub>	TP1	SG3 : Sine wave 2.5V <sub>P-P</sub> , 1kHz		0.01	0.1	%
Mute noise	V <sub>NM3</sub>	TP1	15kHz band during mute select		180		μVrms
Output noise voltage	V <sub>NR2</sub>	TP1	15kHz band during pin select		3	50	μVrms
<b>L<sub>OUT2</sub> output</b>							
Voltage gain	G <sub>L2</sub>	TP4	SG1 : Sine wave 2.5V <sub>P-P</sub> , 1kHz	-0.5	0	0.5	dB
Total harmonic distortion	THD <sub>L2</sub>	TP4	SG1 : Sine wave 2.5V <sub>P-P</sub> , 1kHz		0.01	0.1	%
Mute noise	V <sub>NM4</sub>	TP4	15kHz band during mute select		180		μVrms
Output noise voltage	V <sub>NR2</sub>	TP4	15kHz band during pin select		3	50	μVrms
<b>Output offset voltage</b>							
V <sub>OUT1</sub>	V <sub>OFF1</sub>	TP7	V <sub>OUT1</sub> pin DC level difference during switching		0	±30	mV
V <sub>OUT2</sub>	V <sub>OFF2</sub>	TP2	V <sub>OUT2</sub> pin DC level difference during switching		0	±15	mV
R <sub>OUT1</sub>	V <sub>OFF3</sub>	TP5	R <sub>OUT1</sub> pin DC level difference during switching		0	±15	mV
R <sub>OUT2</sub>	V <sub>OFF4</sub>	TP1	R <sub>OUT2</sub> pin DC level difference during switching		0	±15	mV
L <sub>OUT1</sub>	V <sub>OFF5</sub>	TP6	L <sub>OUT1</sub> pin DC level difference during switching		0	±15	mV
L <sub>OUT2</sub>	V <sub>OFF6</sub>	TP4	L <sub>OUT2</sub> pin DC level difference during switching		0	±15	mV

Input impedance							
$V_{IN}$	$R_{IV}$		$V_{IN1} \sim V_{IN3}$		15		k $\Omega$
$R_{IN}$	$R_{IR}$		$R_{IN1} \sim R_{IN3}$		68		k $\Omega$
$L_{IN}$	$R_{IL}$		$L_{IN1} \sim L_{IN3}$		68		k $\Omega$
Output impedance							
$V_{OUT}$	$V_{OV}$		$V_{OUT2}$		50		$\Omega$
$R_{OUT}$	$V_{OR}$		$R_{OUT1}$ and $R_{OUT2}$		50		$\Omega$
$L_{OUT}$	$V_{OL}$		$L_{OUT1}$ and $L_{OUT2}$		50		$\Omega$
Crosstalk							
$V_{IN} \rightarrow V_{OUT}$	$CT_{VV}$		SG2 : 1V <sub>P-P</sub> , 4.43MHz *1		-60	-50	dB
$R_{IN} \rightarrow R_{OUT}$	$CT_{RR}$		SG3 : 2.5V <sub>P-P</sub> , 1kHz *2		-80	-70	dB
$L_{IN} \rightarrow L_{OUT}$	$CT_{LL}$		SG1 : 2.5V <sub>P-P</sub> , 1kHz *3		-80	-70	dB
$V_{IN} \rightarrow R_{OUT}$	$CT_{RV}$		SG2 : 1V <sub>P-P</sub> , 100kHz *4		-70	-60	dB
$V_{IN} \rightarrow L_{OUT}$	$CT_{LV}$		SG2 : 1V <sub>P-P</sub> , 100kHz *5		-70	-60	dB
Switch input voltage							
SW input voltage H	$V_{IH}$		Switching H level for each IC SW	2.1			V
SW input voltage L	$V_{IL}$		Switching L level for each IC SW			0.7	V
Input dynamic range							
$V_{IN} \rightarrow V_{OUT}$	D1		$V_{CC}=12V$ , SG1 : sine wave, 1kHz	2.6			$V_{P-P}$
$R_{IN} \rightarrow R_{OUT}$	D2		$V_{CC}=12V$ , SG2 : sine wave, 1kHz Total higher harmonic distortion=0.5%	2.0			V <sub>rms</sub>
$L_{IN} \rightarrow L_{OUT}$	D3		$V_{CC}=12V$ , SG3 : sine wave, 1kHz Total higher harmonic distortion=0.5%	2.0			V <sub>rms</sub>

\*1 Crosstalk ( $V_{IN} \rightarrow V_{OUT}$ )

Input a 1V<sub>P-P</sub>, 4.43MHz sine wave to SG2.

Obtain  $CT_{VV}$  using the following formula given output amplitude for combinations other than those below for SW control pin as  $V_{O1}$ , and for the combinations below as  $V_{O2}$ .

$$CT_{VV} = 20 \times \log (V_{O2}/V_{O1}) \text{ dB}$$

1.  $CT_{VV1}$

2.  $CT_{VV2}$

Measuring pin	Switch status				
	S2	V1	V2	V3	V4
TP8	A	L	L	L	H
	A	H	L	L	H
	A	H	H	L	H
	B	L	L	H	L
	B	L	H	H	L
	B	H	H	H	L
	C	L	L	H	H
	C	L	H	H	H
	C	H	L	H	H

Measuring pin	Switch status				
	S2	V1	V2	V3	V4
TP3	A	L	H	L	L
	A	L	H	H	L
	A	L	H	H	H
	B	H	L	L	L
	B	H	L	L	H
	B	H	L	H	H
	C	H	H	L	L
	C	H	H	L	H
	C	H	H	H	L

\*2 Crosstalk ( $R_{IN} \rightarrow R_{OUT}$ )

Input a  $2.5V_{P-P}$ , 1kHz sine wave to SG3.

Obtain  $C_{TRR}$  using the following formula given output amplitude for combinations other than those below for SW control pin as  $V_{o3}$ , and for the combinations below as  $V_{o4}$ .

$$C_{TRR} = 20 \times \log (V_{o4}/V_{o3}) \text{ dB}$$

1.  $C_{TRR1}$

Measuring pin	Switch status				
	S3	V1	V2	V3	V4
TP5	A	L	L	L	H
	A	H	L	L	H
	A	H	H	L	H
	B	L	L	H	L
	B	L	H	H	L
	B	H	H	H	L
	C	L	L	H	H
	C	L	H	H	H
	C	H	L	H	H

2.  $C_{TRR2}$

Measuring pin	Switch status				
	S3	V1	V2	V3	V4
TP1	A	L	H	L	L
	A	L	H	H	L
	A	L	H	H	H
	B	H	L	L	L
	B	H	L	L	H
	B	H	L	H	H
	C	H	H	L	L
	C	H	H	L	H
	C	H	H	H	L

\*3 Crosstalk ( $L_{IN} \rightarrow L_{OUT}$ )

Input a  $2.5V_{P-P}$ , 1kHz sine wave to SG3.

Obtain  $C_{TLL}$  using the following formula given output amplitude for combinations other than those below for SW control pin as  $V_{o5}$ , and for the combinations below as  $V_{o6}$ .

$$C_{TLL} = 20 \times \log (V_{o6}/V_{o5}) \text{ dB}$$

1.  $C_{TLL1}$

Measuring pin	Switch status				
	S1	V1	V2	V3	V4
TP6	A	L	L	L	H
	A	H	L	L	H
	A	H	H	L	H
	B	L	L	H	L
	B	L	H	H	L
	B	H	H	H	L
	C	L	L	H	H
	C	L	H	H	H
	C	H	L	H	H

2.  $C_{TLL2}$

Measuring pin	Switch status				
	S1	V1	V2	V3	V4
TP4	A	L	H	L	L
	A	L	H	H	L
	A	L	H	H	H
	B	H	L	L	L
	B	H	L	L	H
	B	H	L	H	H
	C	H	H	L	L
	C	H	H	L	H
	C	H	H	H	L

\*4 Crosstalk ( $V_{IN-ROUT}$ ,  $L_{OUT}$ )

Input a 1Vp-p, 100kHz sine wave to SG2.

Obtain  $C_{TRV}$  ( $C_{TLV}$ ) using the following formula given output amplitude for combinations other than those below for SW control pin as  $V_{O7}$ , and for the combinations below as  $V_{O8}$ .

$$C_{TRV} (C_{TLV}) = 20 \times \log (V_{O8}/V_{O7}) \text{ dB}$$

1.  $C_{TRV}$

Measuring pin	Switch status				
	S2	V1	V2	V3	V4
TP5	A	L	H	L	H
	B	H	L	H	L
	C	H	H	H	H
TP1	A	L	H	L	H
	B	H	L	H	L
	C	H	H	H	H

2.  $C_{TLV}$

Measuring pin	Switch status				
	S2	V1	V2	V3	V4
TP6	A	L	H	L	H
	B	H	L	H	L
	C	H	H	H	H
TP4	A	L	H	L	H
	B	H	L	H	L
	C	H	H	H	H

Measuring Circuit

