

# 6-Input 1-Output Video Switch Monolithic IC MM1140

## Outline

This is a 6-input, 1-output high performance video switch for TV/BS signal switching. It is ideal for use when multiple input circuits are needed on 1 chip.

## Features

- 1. Built-in mute function (mute pin : input possible)
- 2. Crosstalk -70dB (at 4.43MHz)
- 3. Power supply voltage 5~13V
- 4. Frequency response 10MHz

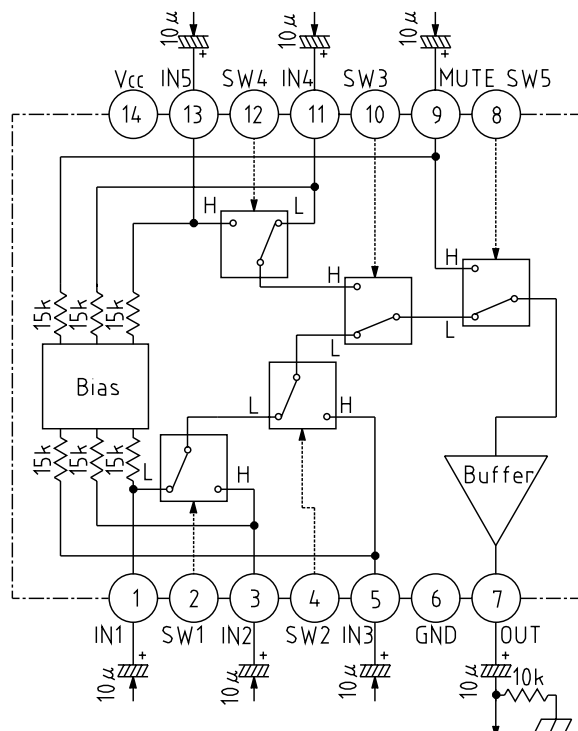
## Package

SOP-14B (MM1140XF)

## Applications

- 1. TV
- 2. VCR
- 3. Other video equipment

## Block Diagram



Pin Description

Pin no.	Pin name	Internal equivalent circuit diagram	Pin no.	Pin name	Internal equivalent circuit diagram
1	IN1		8	SW5	
			9	MUTE	
2	SW1		10	SW3	
3	IN2				
4	SW2		11	IN4	
5	IN3				
6	GND		12	SW4	
7	OUT				
			13	IN5	
			14	Vcc	

**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>	350	mW

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, V<sub>CC</sub>=5.0V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Operating power supply voltage range	V <sub>CC</sub>		4.75	5.0	13.0	V
Consumption current	I <sub>d</sub>	Refer to Measuring Circuit		9.0	13.0	mA
Voltage gain	G <sub>v</sub>	Refer to Measuring Circuit	-0.5	0	+0.5	dB
Frequency characteristic	F <sub>c</sub>	Refer to Measuring Circuit	-1	0	+1	dB
Differential gain	DG	Refer to Measuring Circuit		0	±3	%
Differential phase	DP	Refer to Measuring Circuit		0	±3	deg
Crosstalk	C <sub>T</sub>	Refer to Measuring Circuit		-70	-60	dB
Total harmonic distortion	THD	Refer to Measuring Circuit		0.01	0.3	%
Output offset voltage	V <sub>off</sub>	Refer to Measuring Circuit			±30	mV
Switch input voltage	H	V <sub>IH</sub>	Refer to Measuring Circuit	2.1		V
	L	V <sub>IL</sub>	Refer to Measuring Circuit		0.7	V
Input impedance	R <sub>i</sub>			15		kΩ
Output impedance	R <sub>o</sub>			25		Ω

**Measuring Procedures** (Except where noted otherwise,  $V_{CC}=5.0V$ ,  $VC1=V_{CC}$ ,  $VC2=0V$ )

Item	Symbol	Switch state	Measuring Procedure	
Consumption current	$I_d$	1	Connect a DC ammeter to the $V_{CC}$ pin and measure. $V_{CC}$ is 5V and the ammeter is shorted for use in subsequent measurements.	
Voltage gain	$G_v$	2	Input a $2.0V_{P-P}$ , 100kHz sine wave to SG, and obtain $G_v$ from the following formula given TP12 voltage as $V_1$ and TP14 voltage as $V_2$ . $G_v=20\text{LOG}(V_2/V_1)$ dB	
Frequency characteristic	$F_c$	2	For the above $G_v$ measurement, given TP14 voltage for 10MHz as $V_3$ , $F_c$ is obtained from the following formula. $F_c=20\text{LOG}(V_3/V_2)$ dB	
Differential gain	DG	2	Input a $2.0V_{P-P}$ staircase wave to SG, and measure differential gain at TP14. $APL=10\sim 90\%$	
Differential phase	DP	2	Proceed as for DG, and measure differential phase.	
Total harmonic distortion	THD	2	Input a $2.5V_{P-P}$ , 1kHz sine wave to SG, connect a distortion meter to TP14 and measure.	
Output offset voltage	$V_{off}$	3	Measure the DC voltage difference of each switch status at TP13.	
Crosstalk	$C_T$	9	Assume $VC1=2.1V$ , $VC2=0.7V$ . Input a $2.0V_{P-P}$ , 4.43MHz sine wave to SG, and given TP12 voltage as $V_4$ and TP14 voltage as $V_5$ , $C_T$ is obtained from the following formula. $C_T=20\text{LOG}(V_5/V_4)$ dB	
Switch 1 input voltage	H	$V_{IH1}$	4	Impress different optional DC voltages on TP6 and TP7. Gradually raise from $VC3=0V$ . TP1 voltage when TP7 voltage is output on TP13 is $V_{IH1}$ . Gradually lower from $VC3=V_{CC}$ . TP1 voltage when TP6 voltage is output on TP13 is $V_{IL1}$ .
	L	$V_{IL1}$		
Switch 2 input voltage	H	$V_{IH2}$	5	Impress different optional DC voltages on TP6 and TP8. Gradually raise from $VC3=0V$ . TP2 voltage when TP8 voltage is output on TP13 is $V_{IH2}$ . Gradually lower from $VC3=V_{CC}$ . TP2 voltage when TP6 voltage is output on TP13 is $V_{IL2}$ .
	L	$V_{IL2}$		
Switch 3 input voltage	H	$V_{IH3}$	6	Impress different optional DC voltages on TP6 and TP9. Gradually raise from $VC3=0V$ . TP3 voltage when TP9 voltage is output on TP13 is $V_{IH3}$ . Gradually lower from $VC3=V_{CC}$ . TP3 voltage when TP6 voltage is output on TP13 is $V_{IL3}$ .
	L	$V_{IL3}$		
Switch 4 input voltage	H	$V_{IH4}$	7	Impress different optional DC voltages on TP9 and TP10. Gradually raise from $VC3=0V$ . TP4 voltage when TP10 voltage is output on TP13 is $V_{IH4}$ . Gradually lower from $VC3=V_{CC}$ . TP4 voltage when TP9 voltage is output on TP13 is $V_{IL4}$ .
	L	$V_{IL4}$		
Switch 5 input voltage	H	$V_{IH5}$	8	Impress different optional DC voltages on TP6 and TP11. Gradually raise from $VC3=0V$ . TP5 voltage when TP11 voltage is output on TP13 is $V_{IH5}$ . Gradually lower from $VC3=V_{CC}$ . TP5 voltage when TP6 voltage is output on TP13 is $V_{IL5}$ .
	L	$V_{IL5}$		

**Switch Conditions Table**

Conditions	SW										
	Control switching					Input switching					
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	0	0	0
	1	1	0	0	0	0	0	1	0	0	0
	1	1	1	0	0	0	0	0	1	0	0
	1	1	1	1	0	0	0	0	0	1	0
2	1	1	1	1	1	0	0	0	0	0	1
	1	1	1	1	1	0	0	0	0	0	1
	Conditions 2					0	0	0	0	0	0
	4	2	0	0	0	0	0	0	0	0	0
	5	0	2	0	0	0	0	0	0	0	0
6	0	0	2	0	0	0	0	0	0	0	
7	0	0	1	2	0	0	0	0	0	0	
8	0	0	0	0	2	0	0	0	0	0	
9	Combination of all control switching and input switching when no signal is output to TP14.										

**Control Input-Output Table**

SW					OUT
1	2	3	4	5	
L	L	L	-	L	IN1
H	L	L	-	L	IN2
-	H	L	-	L	IN3
-	-	H	L	L	IN4
-	-	H	H	L	IN5
-	-	-	-	H	MUTE

Measuring Circuit

