

6-Input 1-Output Video Switch Monolithic IC MM1140

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Outline

This is a high performance 6-input 1-output video switch IC for TV/BS signal switching. It is ideal for integrating multi-input circuits into one chip.

Features

- 1. Mute function (mute pin: enable to input)
- 2. Crosstalk -70dB (at 4.43MHz)
- 3. Supply voltage 4.75~13.5V
- 4. Frequency response 10MHz

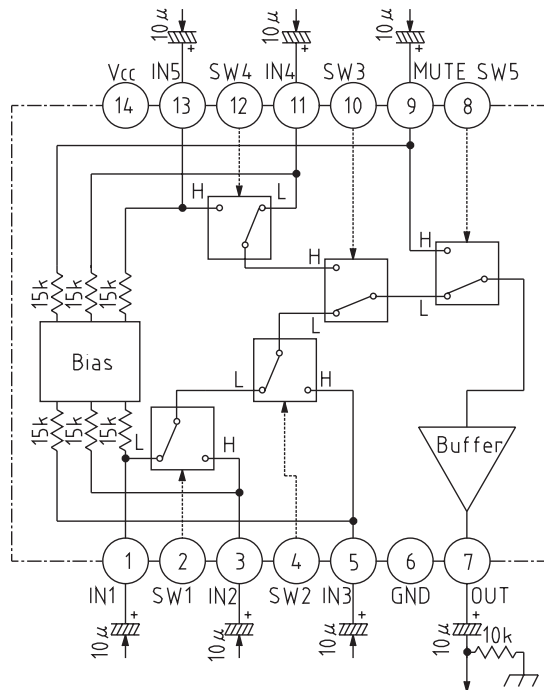
Package

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		11	IN4	
4	SW2				
5	IN3		12	SW4	
6	GND		13	IN5	
7	OUT				
			14	Vcc	

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}	15	V
Allowable loss	P _d	350	mW

Electrical Characteristics (Except where noted otherwise, Ta=25°C, V_{CC}=5.0V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Operating power supply voltage range	V _{CC}		4.75	5.0	13.0	V
Consumption current	I _d	Refer to Measuring Circuit		9.0	13.0	mA
Voltage gain	G _v	Refer to Measuring Circuit	-0.5	0	+0.5	dB
Frequency characteristic	F _c	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 _T	Refer to Measuring Circuit		-70	-60	dB
Total harmonic distortion	THD	Refer to Measuring Circuit		0.01	0.3	%
Output offset voltage	V _{off}	Refer to Measuring Circuit			±30	mV
Switch input voltage	H	V _{IH}	Refer to Measuring Circuit	2.1		V
	L	V _{IL}	Refer to Measuring Circuit		0.7	V
Input impedance	R _i			15		kΩ
Output impedance	R _o			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=10~90%	
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
	1	1	1	1	1	0	0	0	0	0	1
3	Conditions 2					0	0	0	0	0	0
4	2	0	0	0	0	0	0	0	0	0	0
5	0	2	0	0	0	0	0	0	0	0	0
6	0	0	2	0	0	0	0	0	0	0	0
7	0	0	1	2	0	0	0	0	0	0	0
8	0	0	0	0	2	0	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

