

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 $5\sim 13\text{V}$
4. Frequency response 10MHz

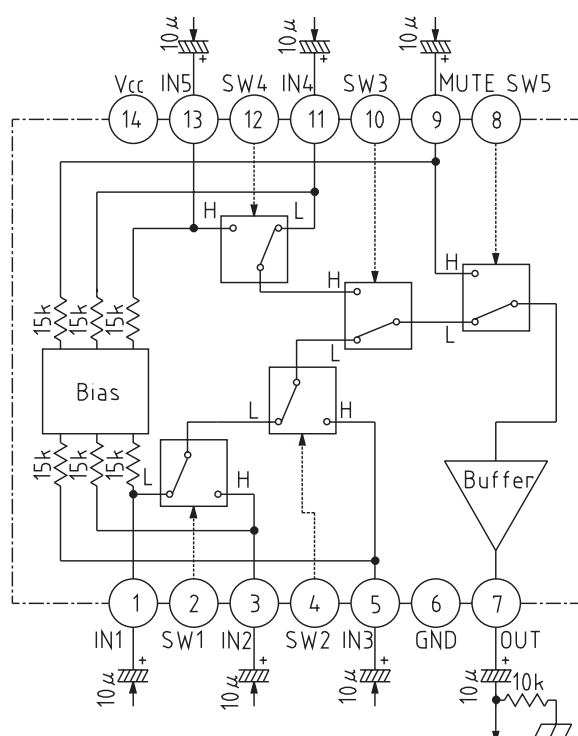
Package

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		12	SW4	
5	IN3		13	IN5	
6	GND		14	Vcc	
7	OUT				

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. $APL=10\sim 90\%$
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
	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

