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

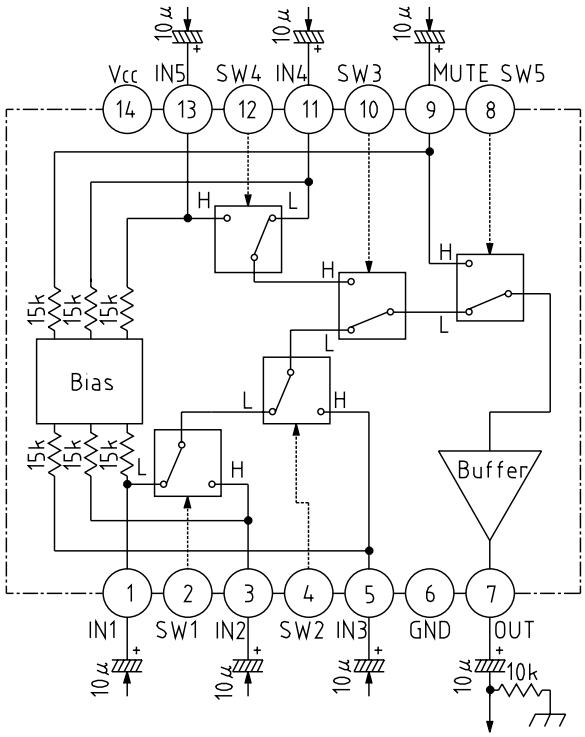
Package

SOP-14B (MM1140XF)

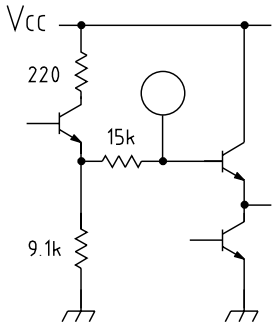
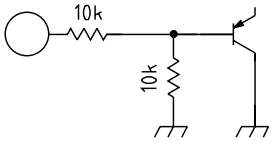
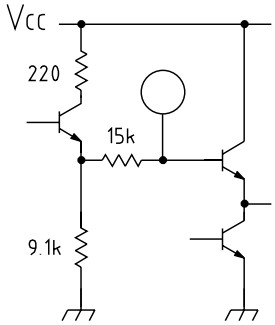
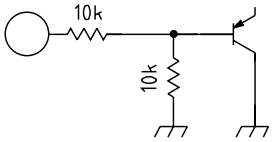
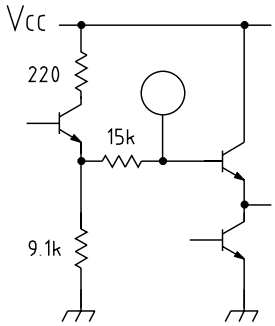
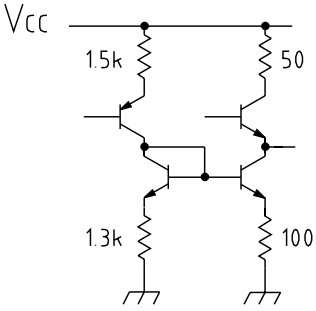
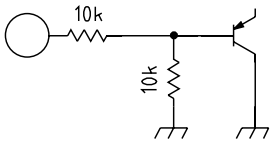
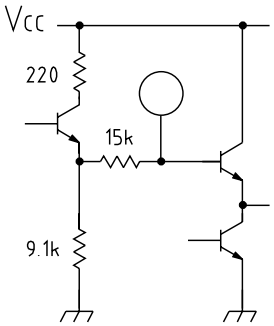
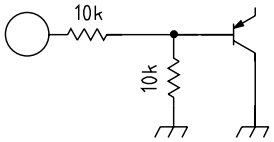
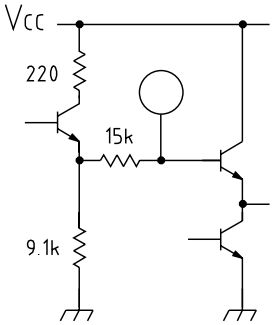
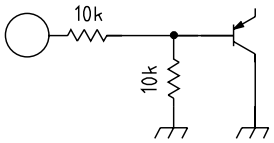
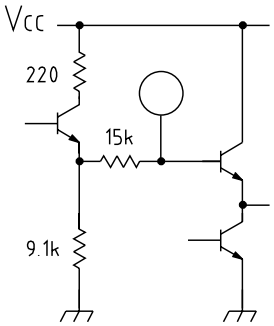
Applications

1. TV
2. VCR
3. Other video equipment

Block Diagram



Pin Description

Pin no.	Pin name	Internal equivalent circuit diagram
1	IN1	
2	SW1	
3	IN2	
4	SW2	
5	IN3	
6	GND	
7	OUT	
8	SW5	
9	MUTE	
10	SW3	
11	IN4	
12	SW4	
13	IN5	
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	Pd	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		Id	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		Voff	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		Ri			15		kΩ
Output impedance		Ro			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		Id	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 V1 and TP14 voltage as V2. G_V=20LOG (V2/V1) dB
Frequency characteristic		F_C	2	For the above G_V measurement, given TP14 voltage for 10MHz as V3, F_C is obtained from the following formula. F_C=20LOG (V3/V2) 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		Voff	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 V4 and TP14 voltage as V5, C_T is obtained from the following formula. C_T=20LOG (V5/V4) dB
Switch 1 input voltage	H	$V_{IH}1$	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 $V_{IH}1$. Gradually lower from VC3=V_{CC}. TP1 voltage when TP6 voltage is output on TP13 is $V_{IL}1$.
	L	$V_{IL}1$		
Switch 2 input voltage	H	$V_{IH}2$	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 $V_{IH}2$. Gradually lower from VC3=V_{CC}. TP2 voltage when TP6 voltage is output on TP13 is $V_{IL}2$.
	L	$V_{IL}2$		
Switch 3 input voltage	H	$V_{IH}3$	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 $V_{IH}3$. Gradually lower from VC3=V_{CC}. TP3 voltage when TP6 voltage is output on TP13 is $V_{IL}3$.
	L	$V_{IL}3$		
Switch 4 input voltage	H	$V_{IH}4$	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 $V_{IH}4$. Gradually lower from VC3=V_{CC}. TP4 voltage when TP9 voltage is output on TP13 is $V_{IL}4$.
	L	$V_{IL}4$		
Switch 5 input voltage	H	$V_{IH}5$	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 $V_{IH}5$. Gradually lower from VC3=V_{CC}. TP5 voltage when TP6 voltage is output on TP13 is $V_{IL}5$.
	L	$V_{IL}5$		

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