Ordering number : ENN2740B

Monolithic Linear IC

LA7955

Video Switch for TV / VCR Use

Overview

The LA7955 Video Switch IC is used to switch the video and audio signals of TVs, VCRs and similar equipment. Separate pin layouts for the video and audio systems facilitate board design. Tow signals can be selected from the three input signals in a symmetrical arrangement using a control signal. Law impedance lines (V_{CC}, GND and control input) between the input and output pins minimize crosstalk caused by the high frequency of the video section. The LA7955 operates on a 12V power supply and is available in 20-pin plastic slim DIPs.

Functions

- Video applications : 3 inputs, 2 outputs
- Audio applications : 3 inputs, 2 outputs × 2 (L, R) channels
- Built-in muting circuits for 2 left and right audio output channels

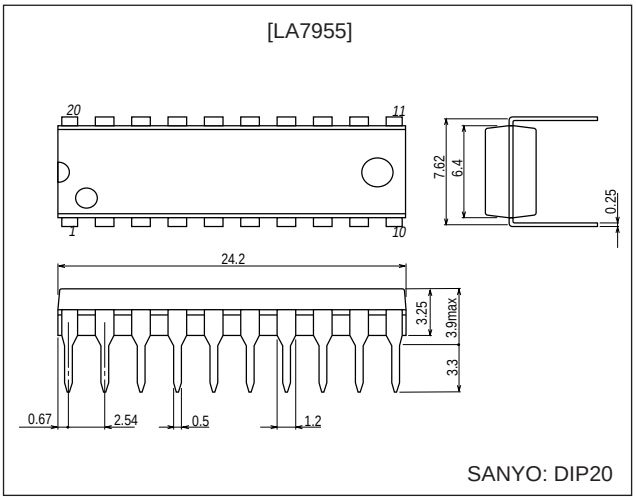
Features

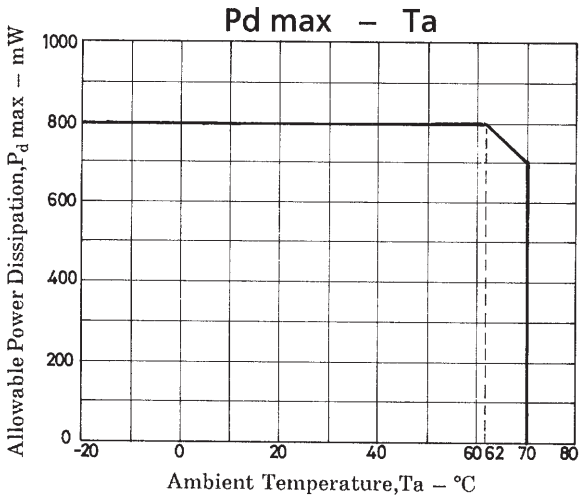
- Separate video and audio pin layouts
- Built-in 6dB video amps
- Wideband characteristics
- Minimal video and audio crosstalk
- 12V power supply
- 20-pin plastic slim DIP

Package Dimensions

unit : mm

3021B-DIP20





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D2599TH (OT)/N1892TH/7110TS/6028MO, TS No. 2740-1/6

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Supply Voltage	V_6max		14.4	V
Maximum Control Signal Voltage	V_4max V_8max V_{10}max		14.4	V
Allowable Power Dissipation	Pd max	Ta ≤ 70°C	700	mW
Operating Temperature	Topr		–20 to +70	°C
Storage Temperature	Tstg		–55 to +125	°C

Operating Conditions at Ta = 25°C

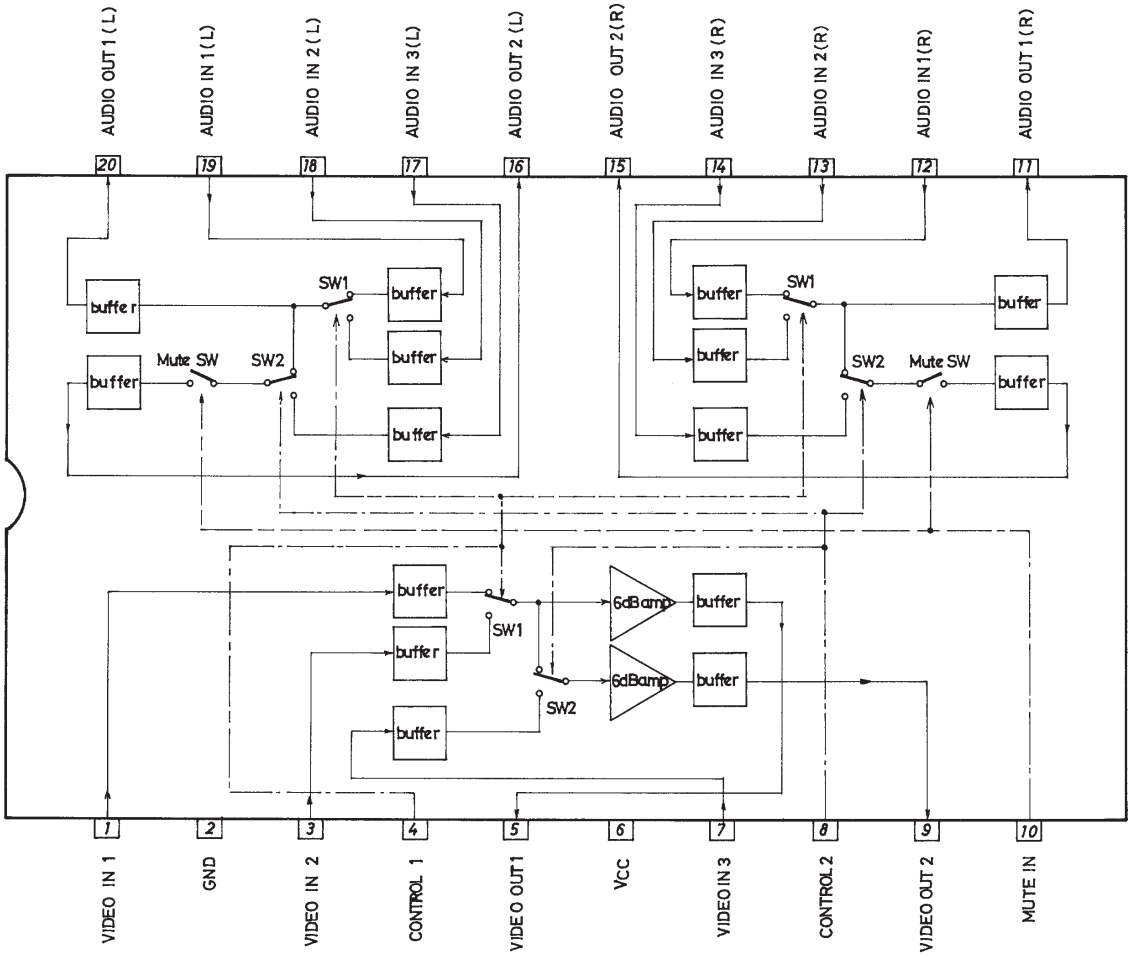
Parameter	Symbol	Conditions	Ratings	Unit
Recommended Supply Voltage	V_{CC}		12	V
Operating Supply Voltage Range	V_{CC} op		8 to 13.2	Vs

Operating Characteristics at Ta = 25°C, V_{CC} = 12V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent Current	I_{CC}		35	43	57	mA
Video Input Bias Voltage	V_1, V_3, V_7		4.4	4.7	5.0	V
Video Output Bias Voltage	V_5, V_9		6.2	6.8	7.4	V
Video Input Impedance	Z_1, Z_3, Z_7	f = 1 kHz	15	21	27	kΩ
Video Output Impedance	Z_5, Z_9	f = 1 kHz		42		Ω
Video Voltage Gain	G_{VV}	Vin = 1 Vp-p (sine wave), f = 0.1 MHz	5.6	6.1	6.6	dB
Video Frequency Bandwidth	BW_V	Vin = 0.7 Vp-p (sine wave), –3 dB band for 0.1 MHz	10			MHz
Output Noise Voltage	Vn_V	Rg = 75 Ω, 10 MHz band		0.3	1.0	mVrms
Video Crosstalk (between inputs 1 and 2)	CT_{V1}	Rg = 75 Ω, f = 3.58 MHz	45	50		dB
Video Crosstalk (between inputs 1/2 and 3)	CT_{V2}	Rg = 75 Ω, f = 3.58 MHz	45	50		dB
Video Output Hum Rejection	HR_V	f = 50 Hz, Rg = 75 Ω	18	23		dB
Audio Input Bias Voltage	V_{12}, V_{13}, V_{14}, V_{17}, V_{18}, V_{19}		4.5	5.1	5.7	V
Audio Output Bias Voltage	V_{11}, V_{15}, V_{18}, V_{20}		3.2	3.8	4.4	V
Audio Input Impedance (inputs 1 and 2)	Z_{12}, Z_{13}, Z_{15}, Z_{19}	f = 1 kHz	47	68	88	kΩ
Audio Input Impedance (input 3)	Z_{14}, Z_{17}	f = 1 kHz	51	74	95	kΩ
Audio Output Impedance	Z_{11}, Z_{15}, Z_{16}, Z_{20}			75		Ω
Audio Voltage Gain	G_{VA}	f = 1 kHz, Vin = 500 mVrms	–0.5	–0.02	+0.5	dB
Audio Frequency Bandwidth	BW_A	–1 dB band (Vin = 500 mVrms) for f = 1 kHz gain	100			kHz
Total Harmonic Distortion	THD	f = 1 kHz, Vin = 500 mVrms		0.03	0.2	%
Output Noise Voltage	Vn_A	Rg = 600 Ω, 20 Hz to 20 kHz bandwidth		10	50	μVrms
Audio Crosstalk (between inputs 1 and 2)	CT_{A1}	Rg = less than 4.7 kΩ, f = 1 kHz (Vin = 500 mVrms)	75	90		dB
Audio Crosstalk (between inputs 1/2 and 3)	CT_{A2}	Rg = less than 4.7 kΩ, f = 1 kHz (Vin = 500 mVrms)	75	90		dB
Audio Crosstalk (between L and R channels)	CT_{AS}	Rg = 4.7 kΩ, f = 1 kHz (Vin = 500 mVrms)	72	82		dB
Mute Noise	V_{OAM}	f = 1 kHz, Vin = 500 mVrms		0.02	0.1	mVrms
Audio Hum Rejection 1	HR1	Input Rg = 4.7 kΩ	40	46		dB
Audio Hum Rejection 2	HR2	Input open	28	39		dB
Switching Control Signal Input High Threshold Voltage	V_{4TH}, V_{8TH}		1.1	1.4	1.7	V
Switching Control Signal Input Leak Current	I_{4L}, I_{8L}				–3	μA
Mute Input High Threshold Voltage	V_{10TH}		1.1	1.4	1.7	V
Mute Input Leak Current	I_{10L}				–3	μA

Note: The current flowing to the IC is positive and current from the IC is negative.

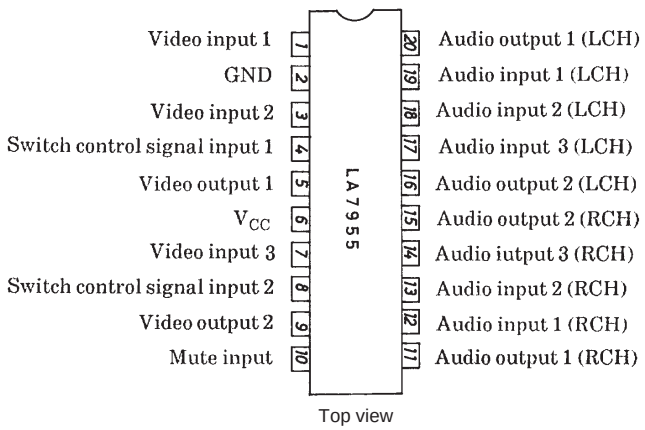
Equivalent Circuit Block Diagram



Switching Truth Table

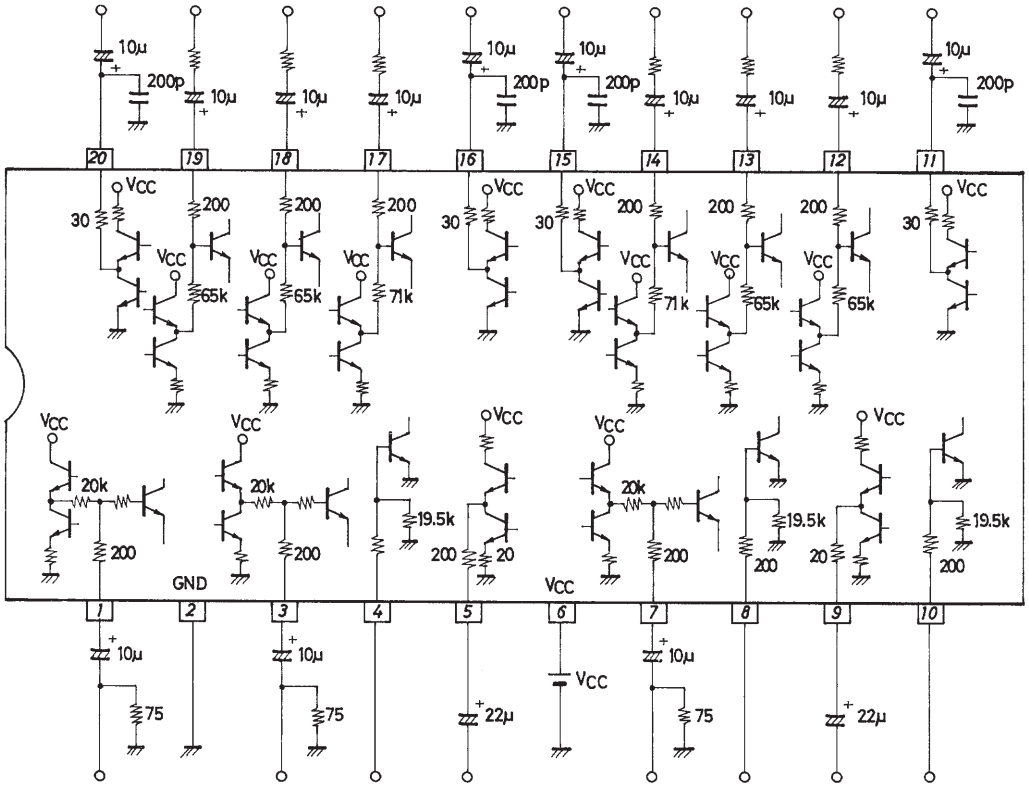
CONTROL 1 (PIN 4)	CONTROL 2 (PIN 8)	MUTE IN (PIN10)	VIDEO OUT		AUDIO OUT			
			1	2	1 L	2 L	1 R	2 R
L	L	L	IN 1	IN 1	IN 1	IN 1	IN 1	IN 1
L	H	L	IN 1	IN 3	IN 1	IN 3	IN 1	IN 3
H	L	L	IN 2	IN 2	IN 2	IN 2	IN 2	IN 2
H	H	L	IN 2	IN 3	IN 2	IN 3	IN 2	IN 3
L	L	H	IN 1	IN 1	IN 1	—	IN 1	—
L	H	H	IN 1	IN 3	IN 1	—	IN 1	—
H	L	H	IN 2	IN 2	IN 2	—	IN 2	—
H	H	H	IN 2	IN 3	IN 2	—	IN 2	—

Pin Assignments



Top view

Sample Application Circuit

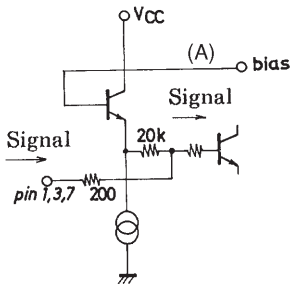


Unit (resistance:Ω, capacitance:F)

Circuit and Operational Description

1. Video Input circuit

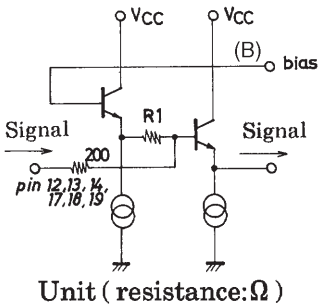
The video input circuit shown in the figure on the right has an input impedance of approximately 20 kΩ. The input bias voltage is determined by the bias at point (A), however, the voltage at this point fluctuates according to V_{CC}.



Unit (resistance:Ω)

2. Audio input circuit

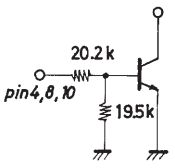
The audio input circuit is shown in the figure on the right. The impedance of audio inputs 1 and 2 (Pins 12, 13,18, and 19) is approximately 65 kΩ, and that of audio input 3 (Pins 14 and 17), approximately 71 kΩ. Although the input bias voltage is determined by the bias at point (B), the voltage at point (B) is supplied from a low-noise Zener diode voltage regulator circuit and is not dependent on V_{CC}.



Unit (resistance:Ω)

3. Control signal input circuit

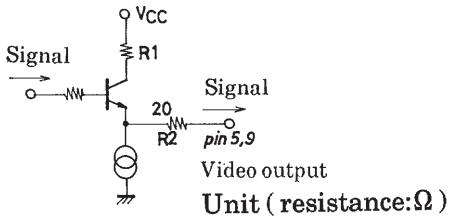
The circuit at input pins for the switching and muting circuits are shown in the figure on the right. The threshold voltage is approximately 1.4 V.



Unit (resistance:Ω)

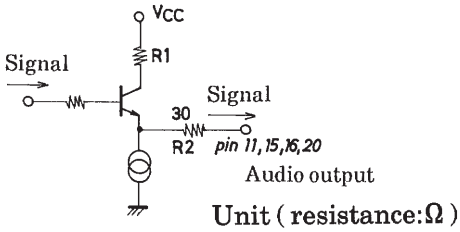
4. Video Output Circuit

The video output is emitter follower output.

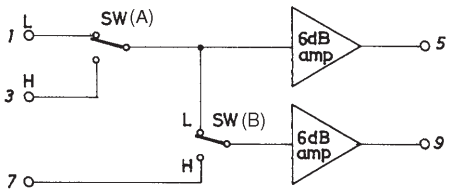


5. Audio output circuit

The audio output is emitter follower output.



6. Video switch operation

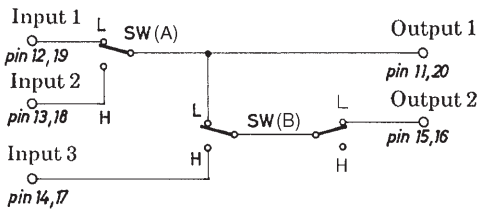


SW (A) is switched by the voltage of switching control input signal 1 (Pin 4), and SW (B), by the voltage of Switching control input signal 2 (Pin 8). In addition, there are amplifiers (with 75 Ω terminating output pins) with a gain of 6 dB at the pre-output stages of Pins 5 and 9. However, an external buffer is required when shorted with a 75 Ω resistor.

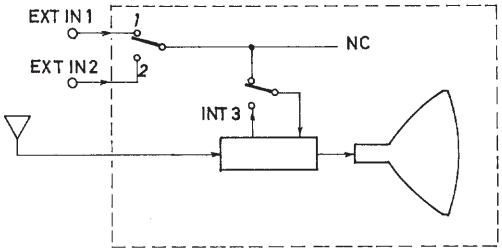
7. Audio switch operation

SW (A) is switched by the voltage of switching control input signal 1 (Pin 4), and SW (B), by the voltage of switching control input signal 2 (Pin 8). Setting the must input voltage (Pin 10) to H turns the muting switch ON and cutting output 2.

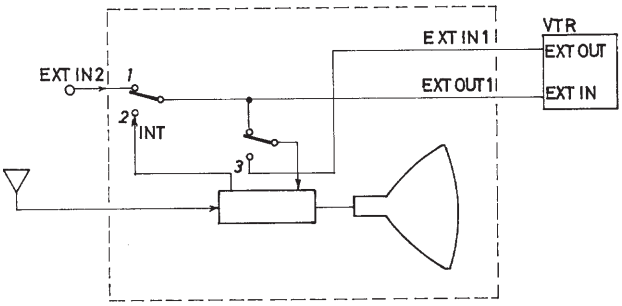
Two pairs of audio switches are built in, allowing use in equipment designs for multiplex broadcast systems.



• Application Example 1 (TV with two video inputs)



• Application Example 2 (TV with video inputs and VCR)



※ Audio output 2 is ideal for TV outputs as it has a built-in muting switch.