



LA7220

## Electronic Switch for VCR/Audio Use

## Overview

The LA7220 is a 3-channel 2-position high-performance analog switch having wide application from audio band to video band. It is also provided with 2 channels of muting function.

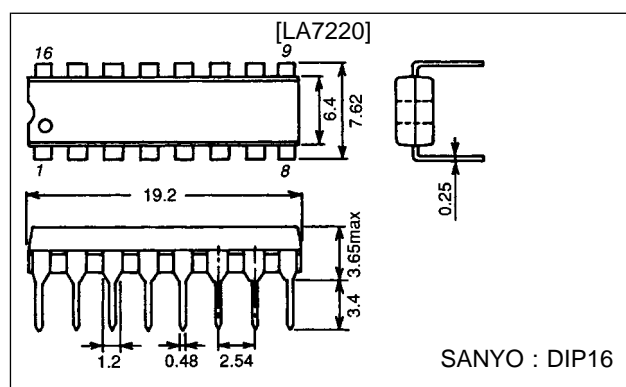
## Features

- 3-channel 2-position switch
- Wide input dynamic range
- Low distortion
- Good frequency characteristic
- Muting available

## Package Dimensions

unit : mm

3006B-DIP16



## Specifications

Maximum Ratings at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		15	V
Allowable power dissipation	$P_d \text{ max}$	$T_a \leq 65^\circ\text{C}$	500	mW
Operating temperature	$T_{opr}$		-20 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

Operating Conditions at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		12	V
Operating voltage range	$V_{CCop}$		9 to 13	V

Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12 \text{ V}$ 

Parameter	Symbol	Conditions	min	typ	max	Unit
Current drain	$I_{CC}$			30.0	39.9	mA
Total harmonic distortion	THD	$R_g = 600 \Omega$ , $4.5 \text{ V}_{p-p}$ , $f = 1 \text{ kHz}$ , $R_L = \infty$ , (Note 1)		0.007	0.1	%
Noise voltage	$V_{NO}$	$R_g = 600 \Omega$ , $f = 20 \text{ Hz to } 20 \text{ kHz}$ , $R_L = \infty$ , (Note 1)		-93	-80	dBs
Crosstalk	1ch	CR1	Input 1: $R_g = 50 \Omega$ , $2 \text{ V}_{p-p}$ , $f = 3.58 \text{ MHz}$ , Input 2: $R_g = 500 \Omega$ , (Note 2)		-50	dB
	2ch	CR2	Input 1: $R_g = 50 \Omega$ , (Note 2)	-60		dB
	3ch	CR3	Input 1: $R_g = 50 \Omega$ , (Note 2)	-50		dB
Pedestal level	$\Delta V_{ped}$	$V_{CTL}$ (Pins 10, 13, 15) = 0 to 12 V, (Note 1)	-100		0 + 100	mV
Maximum input voltage	$V_{IN \text{ max}}$	$R_g = 600 \Omega$ , $f = 1 \text{ kHz}$ , $R_L = \infty$ , THD = 1%, (Note 1)	5.0			V <sub>p-p</sub>

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Parameter		Symbol	Conditions	min	typ	max	Unit
2nd harmonic voltage		H2	$R_g = 50 \Omega$ , 4.0 Vp-p, $f = 1 \text{ MHz}$ , $R_L = \infty$ , (Note 1)	-46	-55		dB
3rd harmonic voltage		H3	$R_g = 50 \Omega$ , 4.0 Vp-p, $f = 1 \text{ MHz}$ , $R_L = \infty$ , (Note 1)	-46	-55		dB
Switch changeover voltage		$V_{CTLS}$	(Note 1)	2.6	3.1	4.0	V
Mute threshold voltage		$V_{ML}$	Low level, (Note 3)	1.1	1.5	1.9	V
		$V_{MH}$	High level, (Note 3)	6.6	7.3	8.0	V
Crosstalk between channels	1ch		$R_g = 500 \Omega$ , $R_L = \infty$ , other channel input $R_g = 50 \Omega$ , 2 Vp-p, $f = 3.58 \text{ MHz}$ , (Note 4)	-50	-68		dB
	2ch			-50	-68		dB
	3ch			-50	-68		dB
Mute compression ratio			$R_g = 600 \Omega$ , 2 Vp-p, $f = 1 \text{ kHz}$ , $R_L = \infty$ , series resistance 10 k $\Omega$ , (Note 3)		-60		dB
Control pin flow-in current		$I_{CTL}$	(Note 1)		8		$\mu\text{A}$
Input impedance		$Z_{IN}$	(Note 1)		10		k $\Omega$
Output impedance		$Z_{OUT}$	(Note 1)		29		$\Omega$
Pin voltage	(Pin 1)	$V_{pin1}$	$V_{pin15} = 0 \text{ V}$	Test point: V14	7.9		V
			$V_{pin15} = 12 \text{ V}$		7.9		V
	(Pin 2)	$V_{pin2}$		Test point: V2	7.2		V
	(Pin 5)	$V_{pin5}$	$V_{pin13} = 0 \text{ V}$	Test point: V16	7.9		V
			$V_{pin13} = 12 \text{ V}$		7.9		V
	(Pin 6)	$V_{pin6}$		Test point: V5	7.2		V
	(Pin 7)	$V_{pin7}$		Test point: V7	7.2		V
	(Pin 8)	$V_{pin8}$	$V_{pin10} = 0 \text{ V}$	Test point: V18	7.9		V
			$V_{pin10} = 12 \text{ V}$		7.9		V
	(Pin 9)	$V_{pin9}$	$V_{pin10} = 0 \text{ V}$	Test point: V17	7.9		V
			$V_{pin10} = 12 \text{ V}$		7.9		V
	(Pin 12)	$V_{pin12}$	$V_{pin13} = 0 \text{ V}$	Test point: V15	7.9		V
$V_{pin13} = 12 \text{ V}$			7.9			V	
(Pin 16)	$V_{pin16}$	$V_{pin15} = 0 \text{ V}$	Test point: V13	7.9		V	
		$V_{pin15} = 12 \text{ V}$		7.9		V	

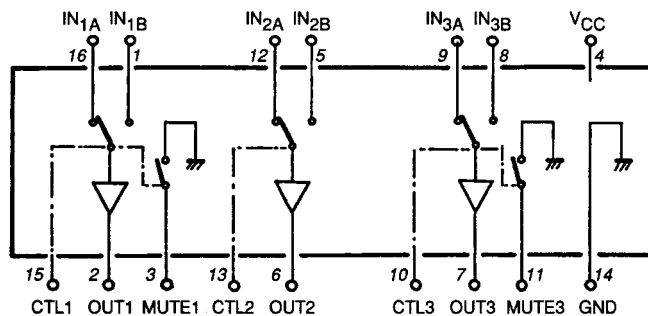
Note 1. Measurements are made for each of 1ch, 2ch, 3ch using input A and input B.

Input A:  $V_{CTL}$  (pins 10, 13, 15) is 12 V at the measurement mode.

Input B:  $V_{CTL}$  is 0 V at the measurement mode.

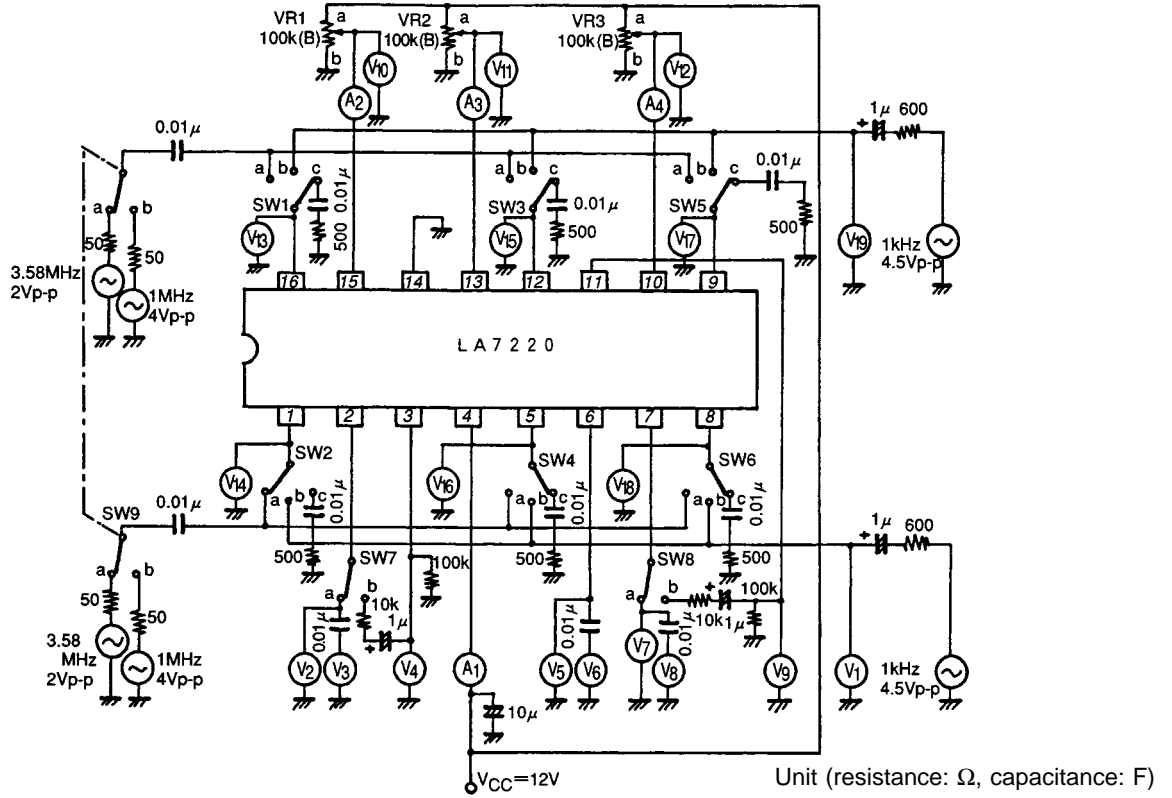
2. Measurements are made using input A and B.
3. Measurements are made for 1ch, 3ch.
4. Measurements are made for each of 1ch, 2ch, 3ch using input A and B on other channels.

## Equivalent Circuit Block Diagram



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## Test Circuit



## Test Conditions

Item	Symbol	SW, VR mode											Test point	
		SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	VR1	VR2		VR3
Current drain	$I_{CC}$	c	c	c	c	c	c	a	a	a	b	b	b	A1
Total harmonic distortion	1chA	THD	b	c	c	c	c	a	a	a	a	b	b	V3
	1chB	THD	c	b	c	c	c	a	a	a	b	b	b	V3
	2chA	THD	c	c	b	c	c	a	a	a	b	a	b	V6
	2chB	THD	c	c	c	b	c	a	a	a	b	b	b	V6
	3chA	THD	c	c	c	c	b	a	a	a	b	b	a	V8
	3chB	THD	c	c	c	c	c	b	a	a	a	b	b	b
Noise	1chA	$V_{NO}$	c	c	c	c	c	a	a	a	a	b	b	V3
	1chB	$V_{NO}$	c	c	c	c	c	a	a	a	b	b	b	V3
	2chA	$V_{NO}$	c	c	c	c	c	a	a	a	b	a	b	V6
	2chB	$V_{NO}$	c	c	c	c	c	a	a	a	b	b	b	V6
	3chA	$V_{NO}$	c	c	c	c	c	a	a	a	b	b	a	V8
	3chB	$V_{NO}$	c	c	c	c	c	a	a	a	b	b	b	V8
Crosstalk	1chA	CR	c	a	c	c	c	a	a	a	a	b	b	V3
	1chB	CR	a	c	c	c	c	a	a	a	b	b	b	V3
	2chA	CR	c	c	c	a	c	a	a	a	b	a	b	V6
	2chB	CR	c	c	a	c	c	a	a	a	b	b	b	V6
	3chA	CR	c	c	c	c	c	a	a	a	b	b	a	V8
	3chB	CR	c	c	c	c	a	c	a	a	a	b	b	b
Pedestal level	1ch	$\Delta V_{PED}$	c	c	c	c	c	a	a	a	a/b	b	b	V2
	2ch	$\Delta V_{PED}$	c	c	c	c	c	a	a	a	b	a/b	b	V5
	3ch	$\Delta V_{PED}$	c	c	c	c	c	a	a	a	b	b	a/b	V7

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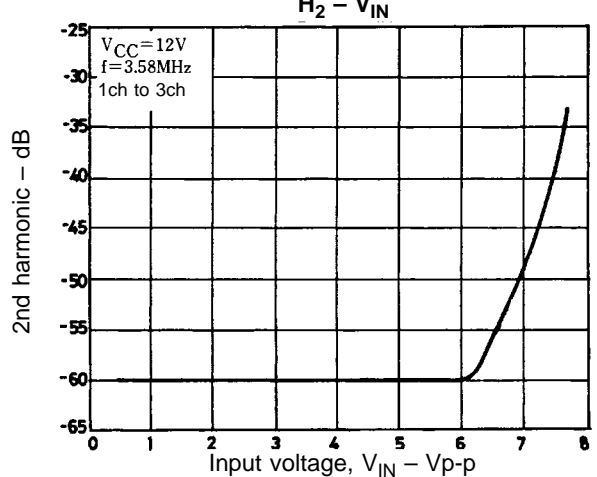
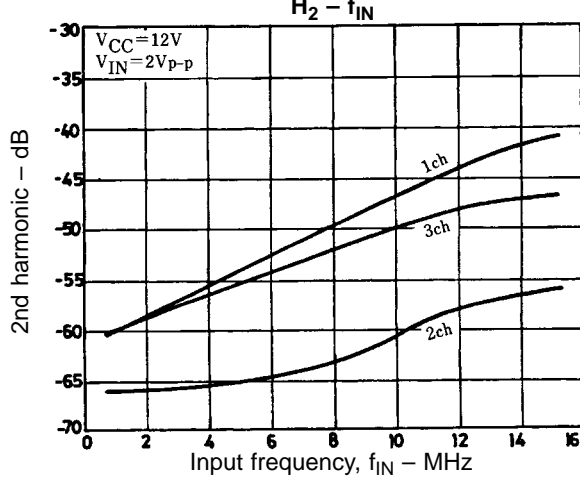
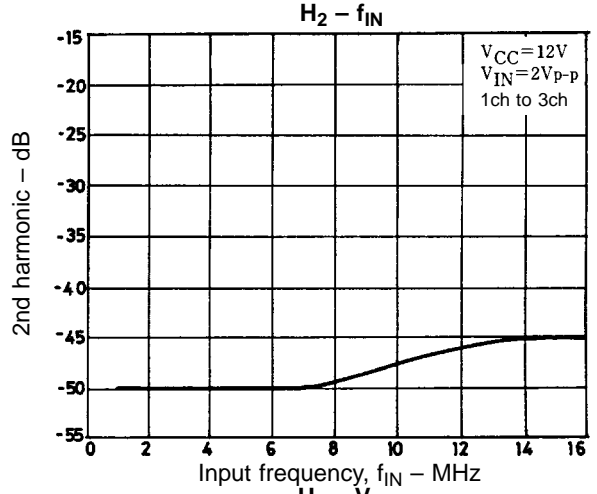
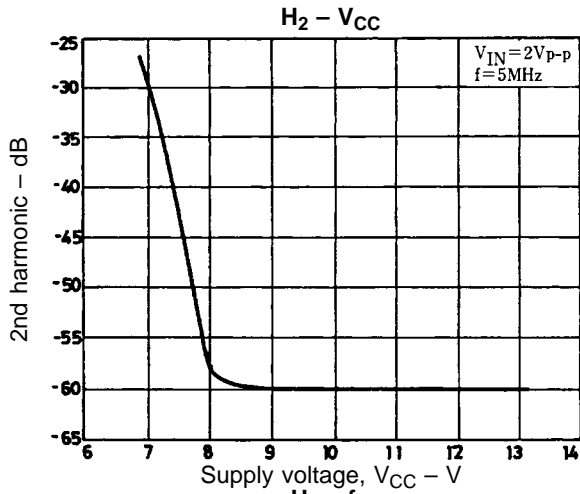
Item	Symbol	SW, VR mode											Test point		
		SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	VR1	VR2		VR3	
Maximum input voltage	1chA	$V_{IN\ max}$	b	c	c	c	c	c	a	a	a	a	b	b	V19
	1chB	$V_{IN\ max}$	c	b	c	c	c	c	a	a	a	b	b	b	V1
	2chA	$V_{IN\ max}$	c	c	b	c	c	c	a	a	a	b	a	b	V19
	2chB	$V_{IN\ max}$	c	c	c	b	c	c	a	a	a	b	b	b	V1
	3chA	$V_{IN\ max}$	c	c	c	c	b	c	a	a	a	b	b	a	V19
	3chB	$V_{IN\ max}$	c	c	c	c	c	b	a	a	a	b	b	b	V1
2nd harmonic voltage	1chA	H2-1	a	c	c	c	c	c	a	a	b	a	b	b	V3
	1chB	H2-1	c	a	c	c	c	c	a	a	b	b	b	b	V3
	2chA	H2-2	c	c	a	c	c	c	a	a	b	b	a	b	V6
	2chB	H2-2	c	c	c	a	c	c	a	a	b	b	b	b	V6
	3chA	H2-3	c	c	c	c	a	c	a	a	b	b	b	a	V8
	3chB	H2-3	c	c	c	c	c	a	a	a	b	b	b	b	V8
3rd harmonic voltage	1chA	H3-1	a	c	c	c	c	c	a	a	b	a	b	b	V3
	1chB	H3-1	c	a	c	c	c	c	a	a	b	b	b	b	V3
	2chA	H3-2	c	c	a	c	c	c	a	a	b	b	a	b	V6
	2chB	H3-2	c	c	c	a	c	c	a	a	b	b	b	b	V6
	3chA	H3-3	c	c	c	c	a	c	a	a	b	b	b	a	V8
	3chB	H3-3	c	c	c	c	c	a	a	a	b	b	b	b	V8
Switch changeover voltage	1ch	$V_{CTLS}$	a	a	c	c	c	c	a	a	a	Var*	b	b	V10
	2ch	$V_{CTLS}$	c	c	a	a	c	c	a	a	a	b	Var*	b	V11
	3ch	$V_{CTLS}$	c	c	c	c	a	a	a	a	a	b	b	Var*	V12
Mute threshold	1ch	$V_{ML}$	b	b	c	c	c	c	b	a	a	Var*	b	b	V10
	1ch	$V_{MH}$	b	b	c	c	c	c	b	a	a	Var*	b	b	V10
	3ch	$V_{ML}$	c	c	c	c	b	b	a	b	a	b	b	Var*	V12
	3ch	$V_{MH}$	c	c	c	c	b	b	a	b	a	b	b	Var*	V12
Crosstalk between channels	1ch		c	c	c	c	a	c	a	a	a	a	a	a	V3
	1ch		c	c	c	c	c	a	a	a	a	a	a	b	V3
	1ch		c	c	c	c	a	c	a	a	a	a	b	a	V3
	1ch		c	c	c	c	c	a	a	a	a	a	b	b	V3
	1ch		c	c	a	c	c	c	a	a	a	b	a	a	V3
	1ch		c	c	a	c	c	c	a	a	a	b	a	b	V3
	1ch		c	c	c	a	c	c	a	a	a	b	b	a	V3
	1ch		c	c	c	a	c	c	a	a	a	b	b	b	V3
	2ch		c	c	c	c	a	c	a	a	a	a	a	a	V6
	2ch		c	c	c	c	c	a	a	a	a	a	a	b	V6
	2ch		c	c	c	c	a	c	a	a	a	b	a	a	V6
	2ch		c	c	c	c	c	a	a	a	a	b	a	b	V6
	2ch		a	c	c	c	c	c	a	a	a	a	b	a	V6
	2ch		a	c	c	c	c	c	a	a	a	a	b	b	V6
	2ch		c	a	c	c	c	c	a	a	a	b	b	a	V6
	2ch		c	a	c	c	c	c	a	a	a	b	b	b	V6
	3ch		c	c	a	c	c	c	a	a	a	a	a	a	V8
	3ch		c	c	c	a	c	c	a	a	a	a	b	a	V8
	3ch		c	c	a	c	c	c	a	a	a	b	a	a	V8
	3ch		c	c	c	a	c	c	a	a	a	b	b	a	V8
	3ch		a	c	c	c	c	c	a	a	a	a	a	b	V8
	3ch		a	c	c	c	c	c	a	a	a	a	b	b	V8
	3ch		c	a	c	c	c	c	a	a	a	b	a	b	V8
	3ch		c	a	c	c	c	c	a	a	a	b	b	b	V8
Mute compression ratio	1ch		b	b	c	c	c	c	b	a	a	Var*	b	b	V4
	3ch		c	c	c	c	b	b	a	b	a	b	b	Var*	V9

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Item	Symbol	SW,VR mode												Test point		
		SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	VR1	VR2	VR3			
Control pin flow-in current	1ch	$I_{CTL1}$	c	c	c	c	c	c	c	a	a	a	a	b	b	A2
	2ch	$I_{CTL2}$	c	c	c	c	c	c	c	a	a	a	b	a	b	A3
	3ch	$I_{CTL3}$	c	c	c	c	c	c	c	a	a	a	b	b	a	A4
Pin voltage	(Pin 1)	$V_{pin1}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V14
	(Pin 1)	$V_{pin1}$	c	c	c	c	c	c	c	a	a	a	a	b	b	V14
	(Pin 2)	$V_{pin2}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V2
	(Pin 5)	$V_{pin5}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V16
	(Pin 5)	$V_{pin5}$	c	c	c	c	c	c	c	a	a	a	b	a	b	V16
	(Pin 6)	$V_{pin6}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V5
	(Pin 7)	$V_{pin7}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V7
	(Pin 8)	$V_{pin8}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V18
	(Pin 8)	$V_{pin8}$	c	c	c	c	c	c	c	a	a	a	b	b	a	V18
	(Pin 9)	$V_{pin9}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V17
	(Pin 9)	$V_{pin9}$	c	c	c	c	c	c	c	a	a	a	b	b	a	V17
	(Pin 12)	$V_{pin12}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V15
	(Pin 12)	$V_{pin12}$	c	c	c	c	c	c	c	a	a	a	b	a	b	V15
	(Pin 16)	$V_{pin16}$	c	c	c	c	c	c	c	a	a	a	b	b	b	V13
	(Pin 16)	$V_{pin16}$	c	c	c	c	c	c	c	a	a	a	a	b	b	V13

(Note) Var\*: While monitoring pins 2, 6, 7, adjust so that the minimum output is obtained.

Mute Threshold: While monitoring pins 3, 11, measure the minimum and maximum values of V10, V12 when the minimum output is obtained.



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