



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

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		15	V
Allowable power dissipation	P_d 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	$^\circ\text{C}$

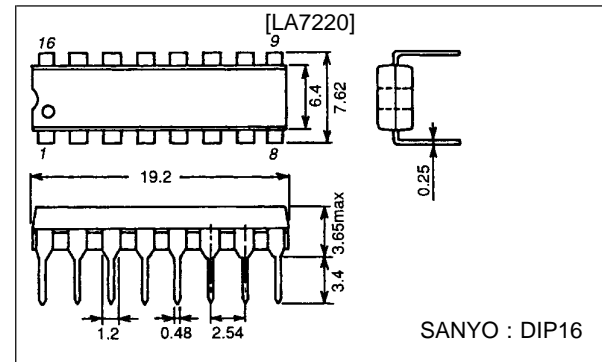
Operating Conditions at $T_a = 25^\circ\text{C}$

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

Package Dimensions

unit : mm

3006B-DIP16



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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 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 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		ΔV_{ped}	V_{CTL} (Pins 10, 13, 15) = 0 to 12 V, (Note 1)	-100		0 + 100	mV
Maximum input voltage		$V_{IN\ max}$	$R_g = 600\ \Omega$, $f = 1\text{ kHz}$, $R_L = \infty$, THD = 1%, (Note 1)	5.0			V _{p-p}
2nd harmonic voltage		H2	$R_g = 50\ \Omega$, 4.0 V_{p-p} , $f = 1\text{ MHz}$, $R_L = \infty$, (Note 1)	-46	-55		dB
3rd harmonic voltage		H3	$R_g = 50\ \Omega$, 4.0 V_{p-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 V_{p-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 V_{p-p} , $f = 1\text{ kHz}$, $R_L = \infty$, series resistance $10\text{ k}\Omega$, (Note 3)		-60		dB
Control pin flow-in current		I_{CTL}	(Note 1)		8		μA
Input impedance		Z_{IN}	(Note 1)		10		k Ω
Output impedance		Z_{OUT}	(Note 1)		29		Ω
Pin voltage	(Pin 1)	V_{pin1}	$V_{pin15} = 0\text{ V}$ $V_{pin15} = 12\text{ V}$	Test point: V14	7.9		V
	(Pin 2)	V_{pin2}		Test point: V2	7.2		V
	(Pin 5)	V_{pin5}	$V_{pin13} = 0\text{ V}$ $V_{pin13} = 12\text{ V}$	Test point: V16	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}	$V_{pin10} = 0\text{ V}$ $V_{pin10} = 12\text{ V}$	Test point: V18	7.9		V
	(Pin 9)	V_{pin9}	$V_{pin10} = 0\text{ V}$ $V_{pin10} = 12\text{ V}$	Test point: V17	7.9		V
	(Pin 12)	V_{pin12}	$V_{pin13} = 0\text{ V}$ $V_{pin13} = 12\text{ V}$	Test point: V15	7.9		V
	(Pin 16)	V_{pin16}	$V_{pin15} = 0\text{ V}$ $V_{pin15} = 12\text{ V}$	Test point: V13	7.9		V

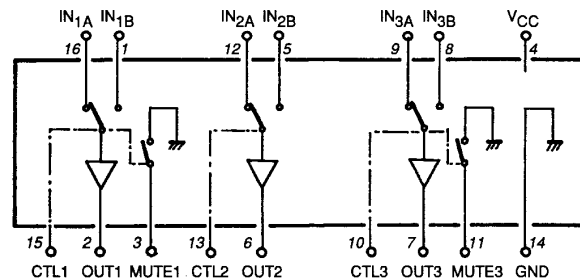
Note 1. Measurements are made for each of 1ch, 2ch, 3ch using input A and input B.

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.

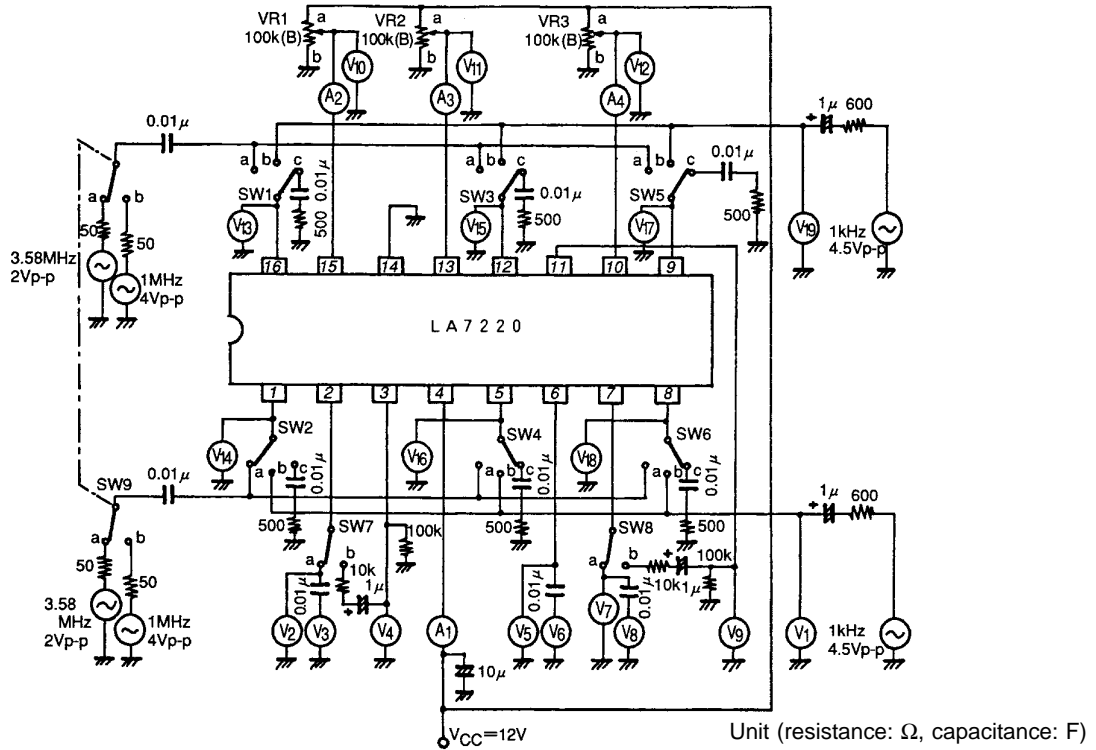
- Measurements are made using input A and B.
- Measurements are made for 1ch, 3ch.
- Measurements are made for each of 1ch, 2ch, 3ch using input A and B on other channels.

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	c	a	a	a	a	b	b	V3
	1chB THD	c	b	c	c	c	c	a	a	a	b	b	b	V3
	2chA THD	c	c	b	c	c	c	a	a	a	b	a	b	V6
	2chB THD	c	c	c	b	c	c	a	a	a	b	b	b	V6
	3chA THD	c	c	c	c	b	c	a	a	a	b	b	a	V8
	3chB THD	c	c	c	c	c	b	a	a	a	b	b	b	V8
Noise	1chA V_{NO}	c	c	c	c	c	c	a	a	a	a	b	b	V3
	1chB V_{NO}	c	c	c	c	c	c	a	a	a	b	b	b	V3
	2chA V_{NO}	c	c	c	c	c	c	a	a	a	b	a	b	V6
	2chB V_{NO}	c	c	c	c	c	c	a	a	a	b	b	b	V6
	3chA V_{NO}	c	c	c	c	c	c	a	a	a	b	b	a	V8
	3chB V_{NO}	c	c	c	c	c	c	a	a	a	b	b	b	V8
Crosstalk	1chA CR	c	a	c	c	c	c	a	a	a	a	b	b	V3
	1chB CR	a	c	c	c	c	c	a	a	a	b	b	b	V3
	2chA CR	c	c	c	a	c	c	a	a	a	b	a	b	V6
	2chB CR	c	c	a	c	c	c	a	a	a	b	b	b	V6
	3chA CR	c	c	c	c	c	a	a	a	a	b	b	a	V8
	3chB CR	c	c	c	c	a	c	a	a	a	b	b	b	V8
Pedestal level	1ch ΔV_{PED}	c	c	c	c	c	c	a	a	a	a/b	b	b	V2
	2ch ΔV_{PED}	c	c	c	c	c	c	a	a	a	b	a/b	b	V5
	3ch ΔV_{PED}	c	c	c	c	c	c	a	a	a	b	b	a/b	V7

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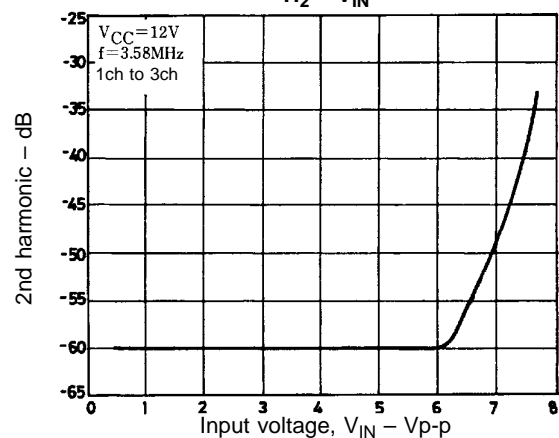
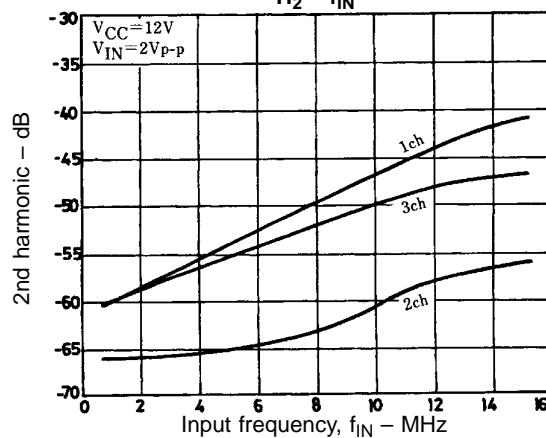
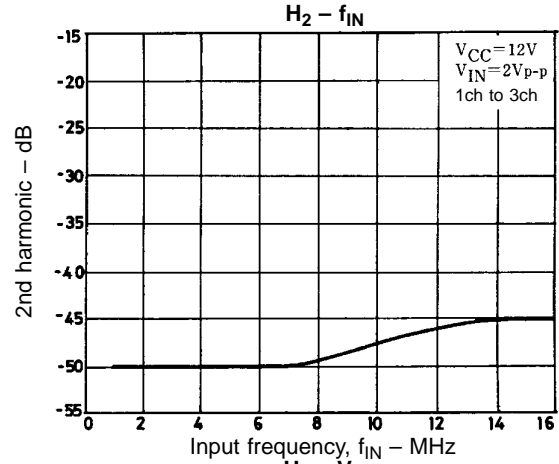
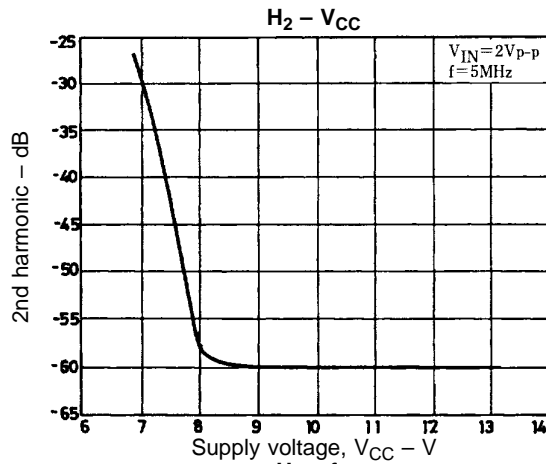
Item	Symbol	SW, VR mode											Test point		
		SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	VR1	VR2		VR3	
Maximum input voltage	1chA	$V_{IN\ max}$	b	c	c	c	c	c	a	a	a	a	b	b	V19
	1chB	$V_{IN\ max}$	c	b	c	c	c	c	a	a	a	b	b	b	V1
	2chA	$V_{IN\ max}$	c	c	b	c	c	c	a	a	a	b	a	b	V19
	2chB	$V_{IN\ max}$	c	c	c	b	c	c	a	a	a	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	c	b	a	a	a	b	b	b
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	c	a	a	a	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	c	a	a	a	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	a	a	a	a	b	b	A2
	2ch	I _{CTL2}	c	c	c	c	c	c	a	a	a	a	b	a	A3
	3ch	I _{CTL3}	c	c	c	c	c	c	a	a	a	a	b	b	A4
Pin voltage	(Pin 1)	V _{pin1}	c	c	c	c	c	c	a	a	a	a	b	b	V14
	(Pin 1)	V _{pin1}	c	c	c	c	c	c	a	a	a	a	b	b	V14
	(Pin 2)	V _{pin2}	c	c	c	c	c	c	a	a	a	a	b	b	V2
	(Pin 5)	V _{pin5}	c	c	c	c	c	c	a	a	a	a	b	b	V16
	(Pin 5)	V _{pin5}	c	c	c	c	c	c	a	a	a	a	b	a	V16
	(Pin 6)	V _{pin6}	c	c	c	c	c	c	a	a	a	a	b	b	V5
	(Pin 7)	V _{pin7}	c	c	c	c	c	c	a	a	a	a	b	b	V7
	(Pin 8)	V _{pin8}	c	c	c	c	c	c	a	a	a	a	b	b	V18
	(Pin 8)	V _{pin8}	c	c	c	c	c	c	a	a	a	a	b	b	V18
	(Pin 9)	V _{pin9}	c	c	c	c	c	c	a	a	a	a	b	b	V17
	(Pin 9)	V _{pin9}	c	c	c	c	c	c	a	a	a	a	b	b	V17
	(Pin 12)	V _{pin12}	c	c	c	c	c	c	a	a	a	a	b	b	V15
	(Pin 12)	V _{pin12}	c	c	c	c	c	c	a	a	a	a	b	a	V15
	(Pin 16)	V _{pin16}	c	c	c	c	c	c	a	a	a	a	b	b	V13
	(Pin 16)	V _{pin16}	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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