

KA9270

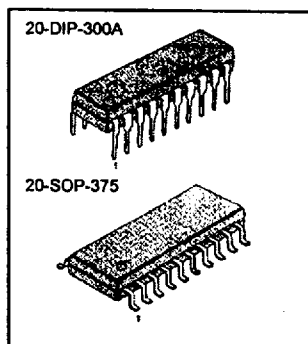
AUDIO FILTER

INTRODUCTION

The KA9270 is a monolithic integrated circuit designed for audio filter. It is used in compact disc player, digital audio tape recorder, etc.

FEATURES

- Functions:
 - * Buffer for impedance matching
 - * Low pass filter
 - * De-emphasis control
 - * Mute control
 - * Reference voltage circuit ($1/2 V_{CC}$ AMP)
- Gain adjustable of audio output
- Minimum number of external parts required
- Recommend operation supply voltage range : 5.0 ~ 12.0V



Device	Package	Operating Temperature
KA9270	20-DIP-300A	20°C ~ +75°C
KA9270D	20-SOP-375	

BLOCK DIAGRAM

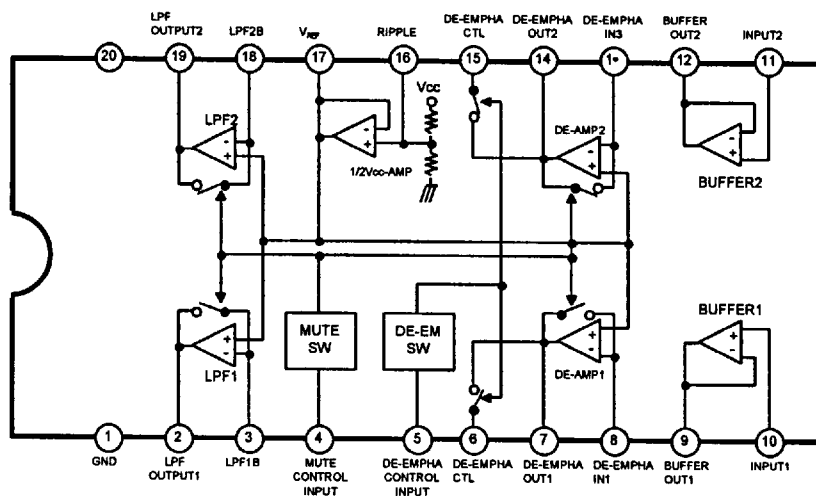


Fig. 1

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ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	18	V
Power Dissipation	P_D	550	μW
Operating Temperature	T_{OPR}	$-20 \sim +75$	$^\circ\text{C}$
Storage Temperature	T_{STG}	$-45 \sim +150$	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS

($T_a = 25^\circ\text{C}$, $V_{CC} = 8\text{V}$, $f = 1\text{KHz}$, $R_L = 10\text{K}\Omega$, De-emphasis: off, Mute: off, S1 & S2: off, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Quiescent Circuit Current	I_{CC}	$V_i = 0$	1	4	6	mA
Maximum Output Voltage	V_{OM}	THD = 1%	1.8	2.1		Vrms
Total Harmonic Distortion	THD	$V_o = 0\text{dBm}$	$f = 100\text{Hz}$	0.01	0.05	%
			$f = 1\text{KHz}$	0.01	0.05	
			$f = 10\text{KHz}$	0.05	0.1	
			$f = 16\text{KHz}$	0.1	0.2	
			$f = 20\text{KHz}$	0.1	0.2	
Frequency Characteristics	f_v	$V_o = 6\text{dBm}$	$f = 100\text{Hz}$	-0.1	0	dB
			$f = 1\text{KHz}$	0	0	
			$f = 10\text{KHz}$	-0.5	0	
			$f = 16\text{KHz}$	-1.0	0	
			$f = 20\text{KHz}$	-1.5	0	
Cross Talk	CT	$V_o = 0\text{dBm}$	$f = 100\text{Hz}$	70	80	dB
			$f = 1\text{KHz}$	65	75	
			$f = 10\text{KHz}$	60	65	
Signal to Noise Ratio	S/N	$V_o = 0\text{dBm}$, $R_o = 600\Omega$ 20KHz LPF	73	80		dB
Channel Balance	CB	$V_o = 0\text{dBm}$	-1.0	0	1.0	dB
Open Loop Gain	G_{VO}	$V_i = 900\text{mVrms}$	-2.6	-0.6	1.0	dB
Gain Adjusting Range	G_{VR}	$V_i = 900\text{mV}$, S1, S2: ON	4.5	6		dB
Mute Attenuation Ratio	ATT MUTE	$V_i = 900\text{mV}$, Mute SW: ON	40	50		dB
De-emphasis	DE _{EMPH}	De-emphasis: ON	$f = 1\text{KHz}$	-0.87	-0.37	dB
			$f = 5\text{KHz}$	-6.03	-4.53	
			$f = 16\text{KHz}$	-10.53	-9.03	

* Note: De-emphasis input conditions: $V_o = 0\text{dBm}$
De-emphasis off position

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TEST CIRCUIT

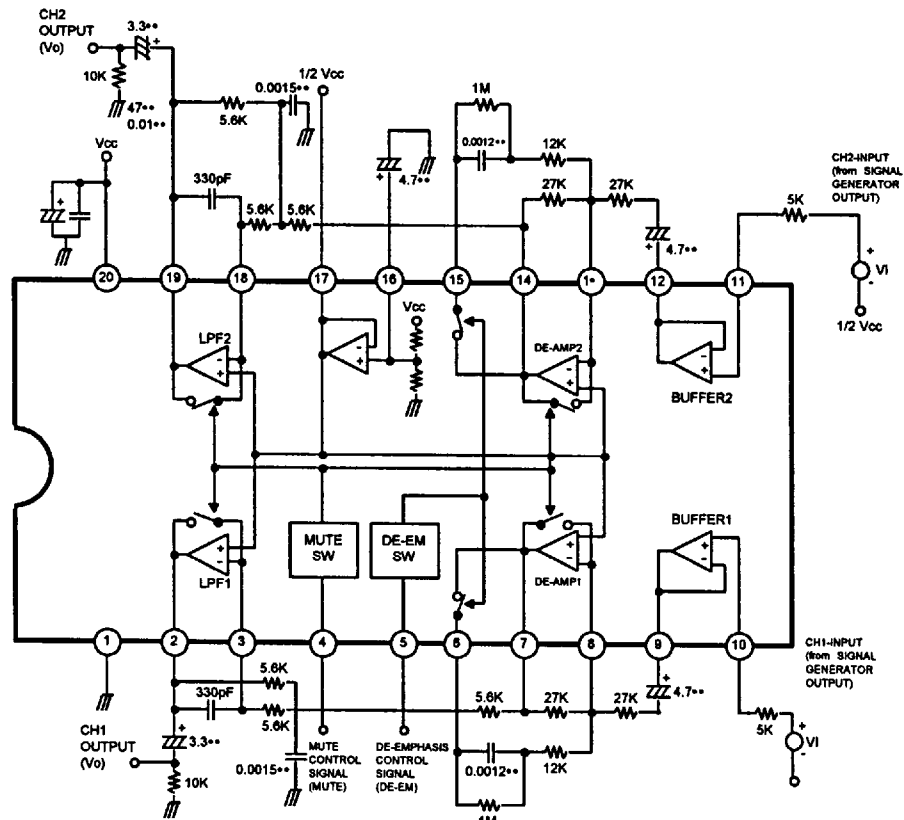


Fig. 2

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APPLICATION INFORMATION

1. BUFFER

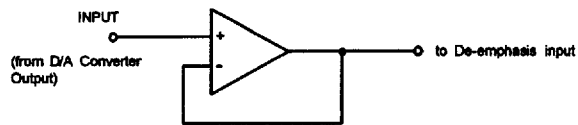


Fig. 3

It is used for impedance matching, between D/A converter output and de-emphasis input.

2. DE-EMPHASIS

a) De-emphasis operation condition

Control Input	De-emphasis Operation
High	ON
Low	OFF

b) De-emphasis characteristic at the de-emphasis ON

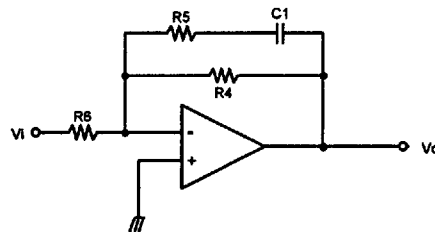


Fig. 4 Equivalent Circuit of De-emphasis ON Mode

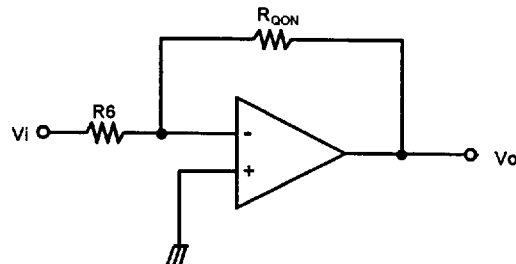
$$A_v \approx R_4 / R_5$$

$$T_1 = C_1 (R_4 + R_5)$$

$$T_2 = C_1 \times R_5$$

The de-emphasis characteristics is dependent on the external parts value.

3. MUTE



* Where:
 R_{oon} = Internal TR
 ON resistance

Fig. 5 Equivalent Circuit of Mute Switch ON Mode

Mute attenuation [M (att)] ratio is as follow;

$$M (att) = 20 \log \frac{V_o}{V_i}$$

$$= 20 \log \frac{R_{oon}}{R_6} \text{ (dB)}$$

4. LOW PASS FILTER

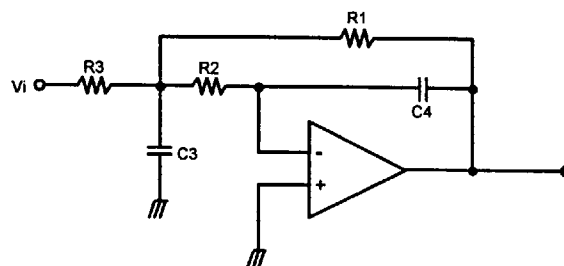


Fig. 6 Equivalent Circuit of LPF

Cut off frequency (F_c) is as follow:

$$f_c = \frac{1}{2\pi\sqrt{R_2 R_1 C_3 C_4}} \text{ (Hz)}$$

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APPLICATION CIRCUIT

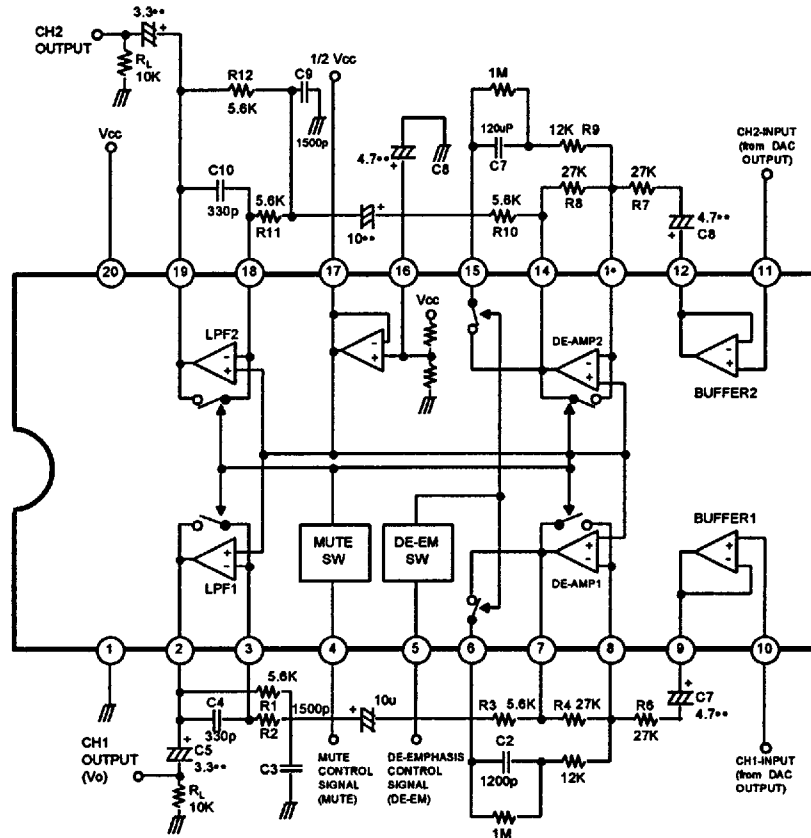
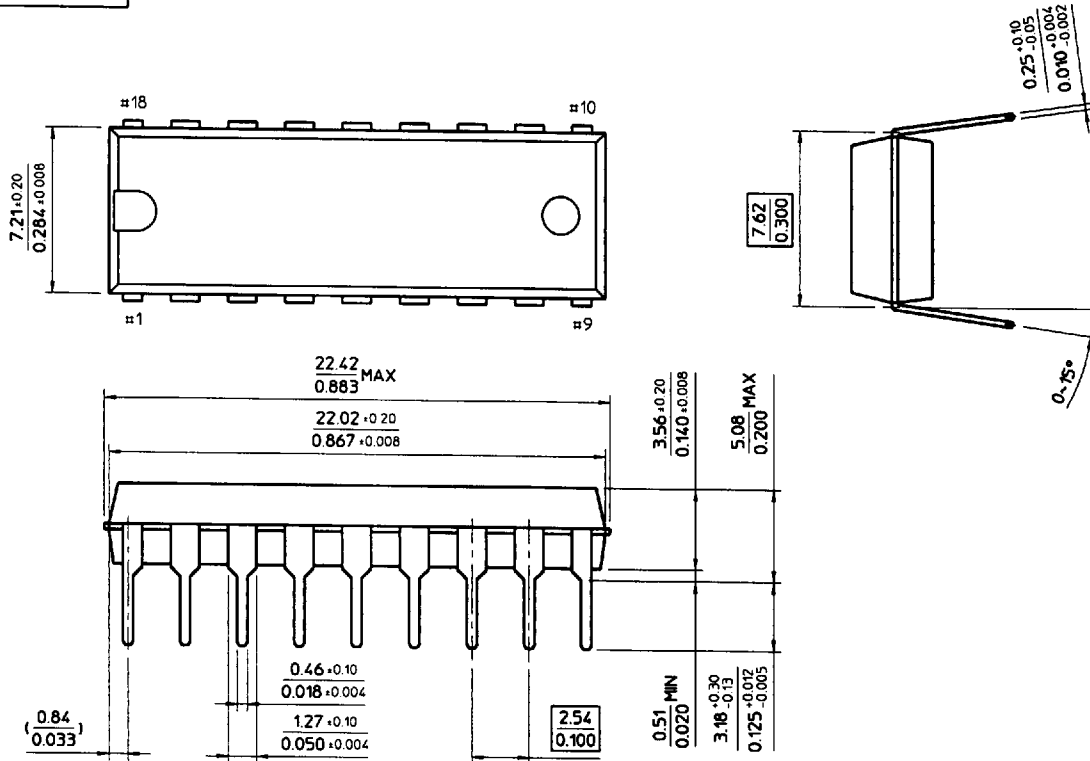


Fig. 7

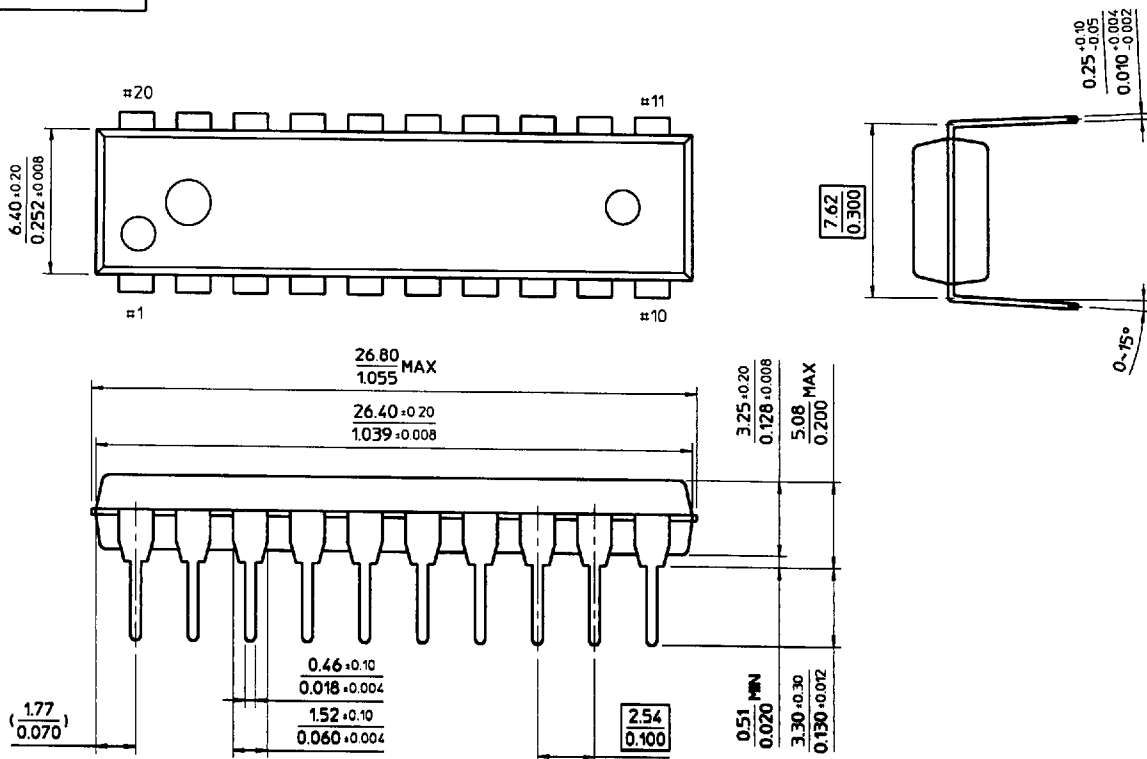
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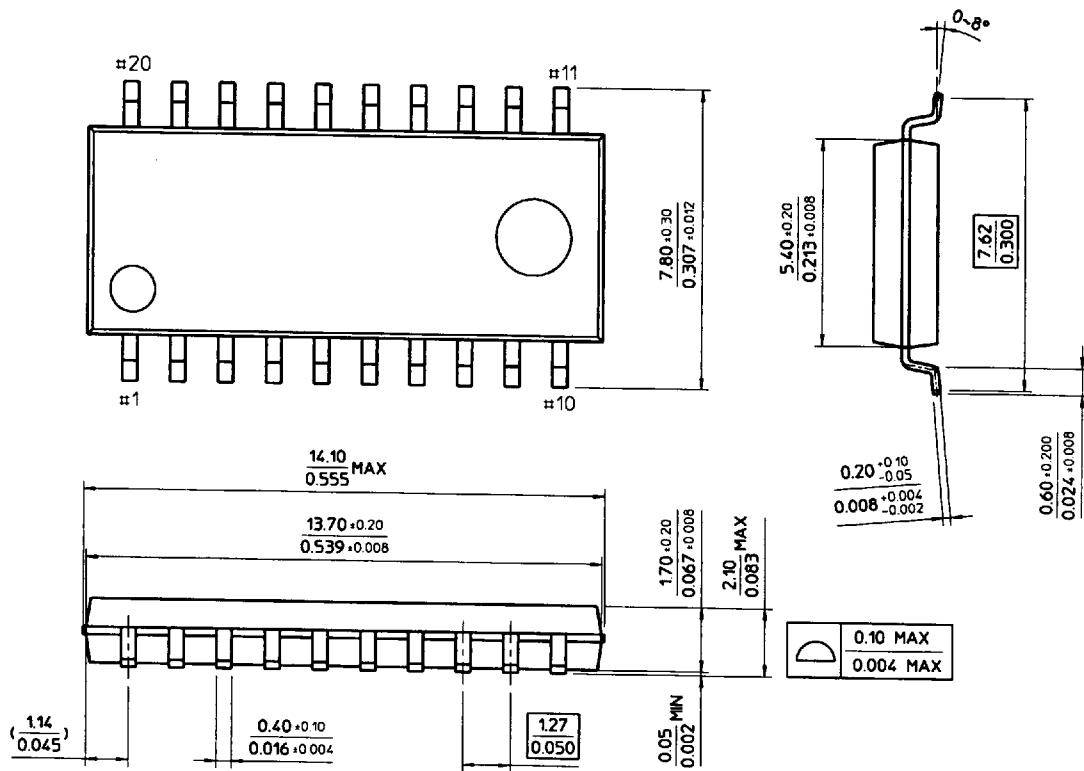
18-DIP-300B



20-DIP-300A



20-SOP-300



20-SOP-375

