

**LA4510****240mW AF Power Amplifier****Applications**

- Especially suited for use in 3V micro cassette recorder, mini cassette recorder, headphone stereo applications.

Features

- Operating supply voltage range : 2 to 5V.
- Low current dissipation (7mA typ/ $V_{CC}=3V$).
- Output power :
240mW typ at $V_{CC}=3V$, $R_L=4\Omega$, THD=10%
40mW typ at $V_{CC}=3V$, $R_L=32\Omega$, THD=10%
- Built-in muting circuit to be operated at the time of power switch ON capable of varying starting time and making pop noise low.
- Soft clipping.

Specifications**Absolute Maximum Ratings** at $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\ max}$		6.0	V
Maximum output current	$I_{O\ peak}$		570	mA
Allowable power dissipation	$P_d\ max$		700	mW
Operating temperature	T_{opr}		-10 to +60	$^\circ C$
Storage temperature	T_{stg}		-55 to +150	$^\circ C$

Operating Conditions at $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings		Unit
Recommended supply voltage	V_{CC}		3.0	4.5	V
Recommended load resistance	R_L		4 to 32	8 to 32	Ω

Operating Characteristics at $T_a = 25^\circ C$, $V_{CC}=3.0V$, $R_L=4\Omega$, $f=1kHz$, See Sample Application Circuit 1.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO1}	No signal		7	12	mA
	I_{CCO2}	No signal, $V_{CC}=4.5V$		8.5	15	mA
Voltage gain	V_G	$R_1=100\Omega$	42	45	48	dB
Output power	P_O	THD=10%	200	240		mW
Total harmonic distortion	THD	$P_O=100mW$		0.4	1.5	%
Output noise voltage	V_{NO}	$R_g=1k\Omega$, BW=20Hz to 20kHz		0.2	0.5	mV
Output ripple voltage	V_{rp}	$R_g=0$, $f_R=100Hz$, $V_R=50mV$		0.7		mV

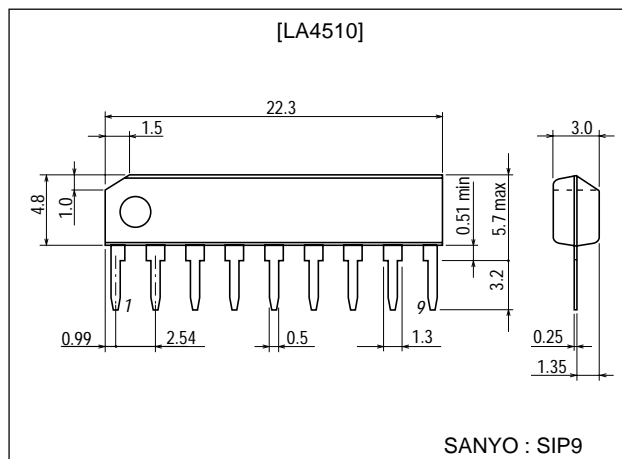
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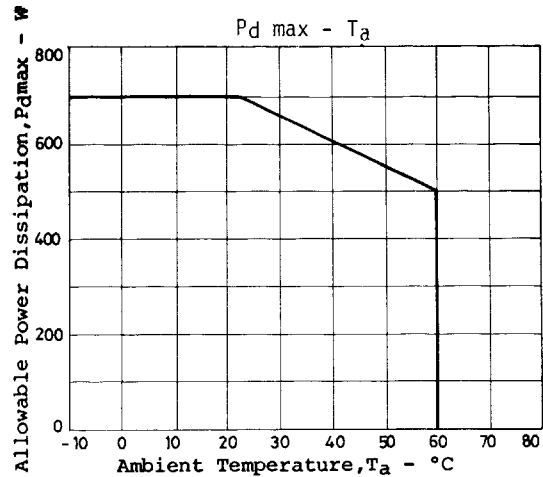
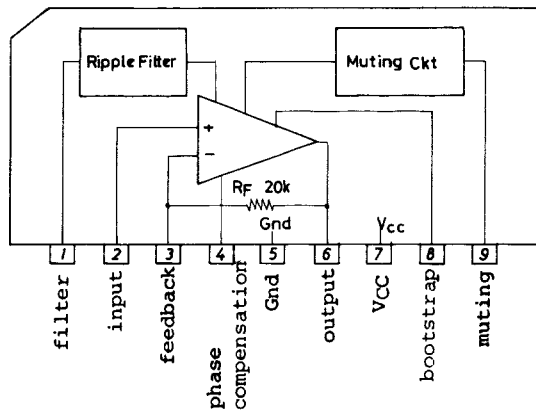
Package Dimensions

unit:mm

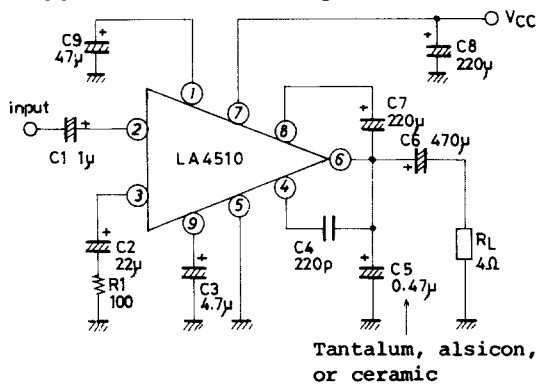
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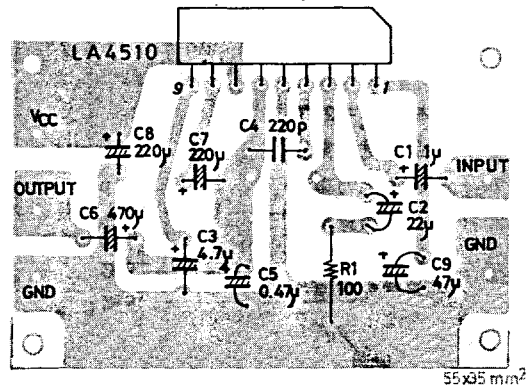
Equivalent Circuit Block Diagram



Sample Application Circuit 1 : Speaker load



Unit (resistance: Ω , capacitance: F)

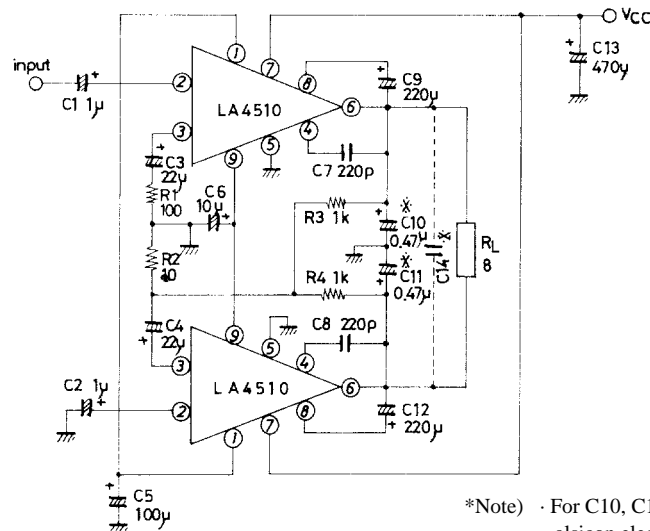


Sample printed circuit pattern (Cu-foiled area)

Description of external parts

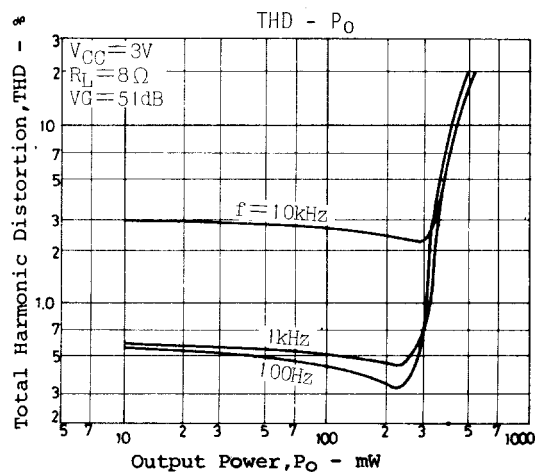
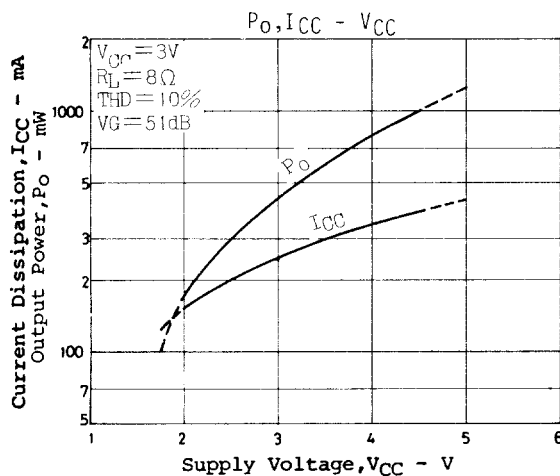
- C1 (1 μ F) • Input capacitor (Coupling capacitor for input signal)
Decreasing the capacitance value lowers the frequency response at low frequencies.
- C2 (22 μ F) • Feedback capacitor (Bypass of feedback signal)
Decreasing the capacitance value lowers the frequency response at low frequencies ; increasing the capacitance value makes the starting time later.
- C3 (4.7 μ F) • Muting capacitor
Decreasing the capacitance value makes the starting time earlier ; removing C3 causes pop noise.
Increasing the capacitance value makes the starting time later.
- C4 (220pF) • Phase compensation capacitor (Phase compensation by local feedback) Decreasing the capacitance value causes the frequency response to extend at high frequencies, and thereby oscillation is liable to occur. Increasing the capacitance value worsens distortion factor at high frequencies.
- C5 (0.47 μ F) • Oscillation blocking capacitor
Decreasing the capacitance value causes oscillation to liable to occur. Using an ordinary electrolytic capacitor may cause oscillation to occur at a low temperature. Use a tantalum or alsicon electrolytic capacitor that is good in temperature characteristic.
- C6 (470 μ F) • Output capacitor (Cutoff of DC to speaker)
Decreasing the capacitance value causes insufficient power at low frequencies.
- C7 (220 μ F) • Bootstrap capacitor (Feedback from output stage)
Decreasing the capacitance value causes insufficient power at low frequencies, especially when voltage is reduced.
- C8 (220 μ F) • Power capacitor (Drop in power impedance)
Decreasing the capacitance value causes motor noise, etc. to be entered easily. Removing C8 may cause oscillation to occur.
- C9 (47 μ F) • Capacitor for ripple filter (Filter for bias voltage)
Decreasing the capacitance value causes the circuit to be subjected to the influence of power supply, and thereby ripple is liable to occur.
- r_i (100 Ω) • Feedback resistor (Setting of voltage gain)
Decreasing the resistance value increases voltage gain, but worsens distortion factor, and thereby gain varies. Increasing the resistance value causes oscillation to liable to occur.

Sample Application Circuit 3 : Bridge



*Note) · For C10, C11, use tantalum or
alsicon electrolytic capacitor.
· If oscillation occurs, add C14
(0.1 to 0.2μ ceramic capacitor).

Unit (resistance: Ω , capacitance: F)



Proper Cares in Using IC

· Maximum ratings

If the IC is used in the vicinity of the maximum ratings, even a slight variation in conditions may cause the maximum ratings to be exceeded, thereby leading to breakdown. Allow an ample margin of variation for supply voltage, etc. and use the IC in the range where the maximum ratings are not exceeded.

· Pin-to-pin short

If power is applied when the space between pins is shorted, breakdown or deterioration may occur. When mounting the IC on the board or applying power, make sure that the space between pins is not shorted with solder, etc.

· Printed circuit pattern

When designing the printed circuit pattern, make the power supply, output, and ground lines thick and short and arrange the pattern and parts so that no feedback loop is formed between input and output. Place power capacitor C8, oscillation blocking capacitors C4, C5 as close to IC pins as possible to prevent oscillation from occurring. Refer to the sample printed circuit pattern.