



LA4445

5.5W 2-Channel AF Power Amplifier

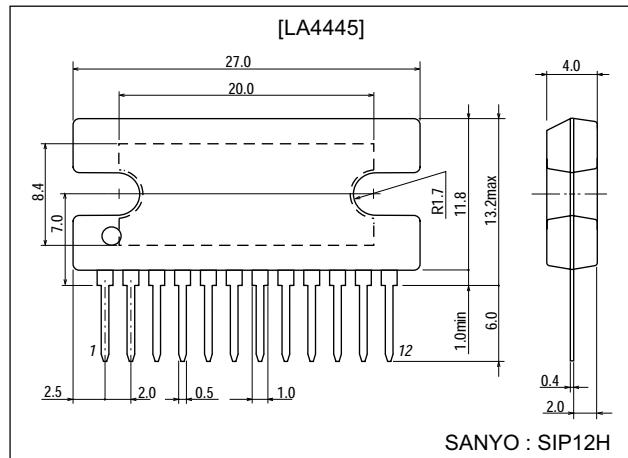
Features

- Dual channels.
- Output : $5.5\text{W} \times 2$ (typ.)
- Minimum number of external parts required.
- Small pop noise at the time of power supply ON/OFF and good starting balance.
- Good ripple rejection : 46dB (typ.)
- Good channel separation.
- Small residual noise ($R_g=0$).
- Built-in protectors.
 - a. Thermal protector
 - b. Overvoltage, surge protector
 - c. Adjacent pins (9-10, 9-8) short protector

Package Dimensions

unit:mm

3049A-SIP12H



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max1	Quiescent (t=30s)	25	V
	V _{CC} max2	Operating	18	V
Surge supply voltage	V _{CC} (surge)	≤0.2s	50	V
Maximum output current	I _O peak	1 channel	3.5	A
Allowable power dissipation	P _d max	See P _d max – Ta characteristic.	15	W
Operating temperature	T _{opr}		-20 to +75	°C
Storage temperature	T _{stg}		-40 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		13.2	V
Recommended load resistance	R_L	2 channels	4	Ω
Operating voltage range	$V_{CC\ op}$		10 to 16	V

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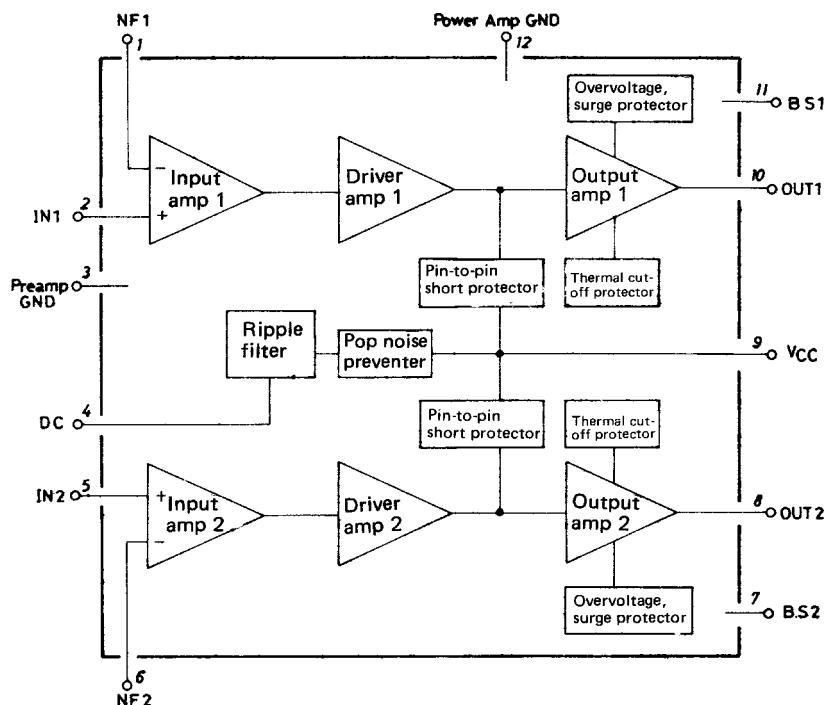
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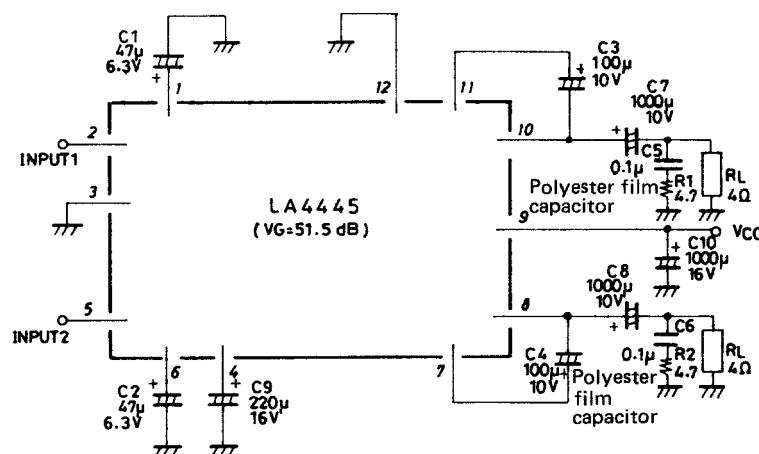
Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 13.2\text{V}$, $R_L = 4\Omega$, $f = 1\text{kHz}$, $R_g = 600\Omega$, with $100 \times 100 \times 1.5\text{mm}^3$
Al heat sink, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CC0}			75	150	mA
Voltage gain	V_G		49.5	51.5	53.5	dB
Output power	P_O	THD=10%, 2 channels	5.0	5.5		W
Total harmonic distortion	THD	$P_O=1\text{W}$		0.15	1.0	%
Input resistance	r_i			30		$\text{k}\Omega$
Output noise voltage	V_{NO}	$R_g=0$		0.6	1.0	mV
		$R_g=10\text{k}\Omega$		1.0	2.0	mV
Ripple rejection	R_r	$R_g=0$, $V_R=200\text{mV}$, $f_R=100\text{Hz}$		46		dB
Channel separation	Ch sep	$R_g=10\text{k}\Omega$, $V_O=0\text{dBm}$	45	55		dB

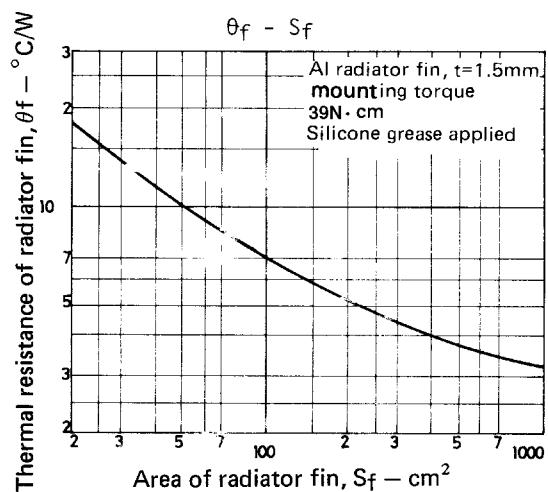
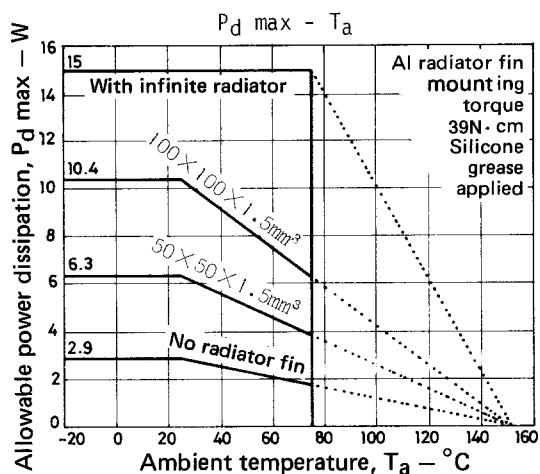
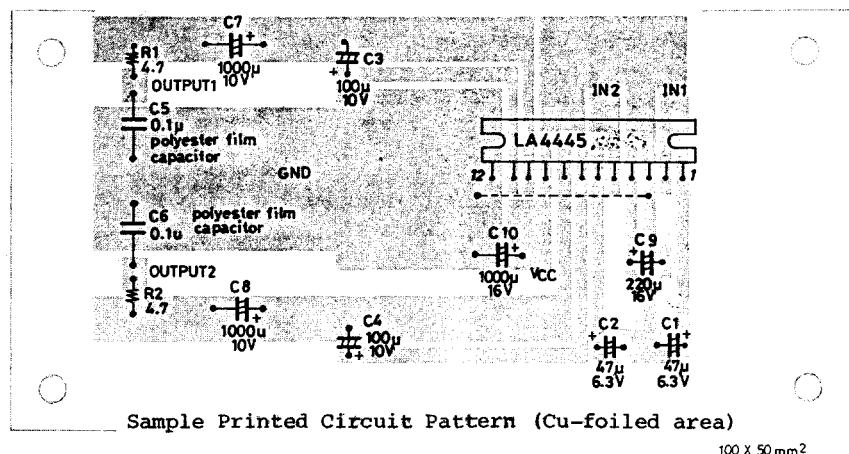
Equivalent Circuit Block Diagram



Sample Application Circuit

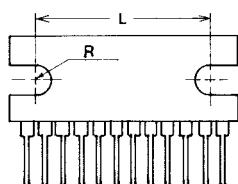


Sample Printed Circuit Pattern



Proper Cares in Mounting Radiator Fin

1. The mounting torque is in the range of 39 to 59N · cm.
2. The distance between screw holes of the radiator fin must coincide with the distance between screw holes of the IC. With case outline dimensions L and R referred to, the screws must be tightened with the distance between them as close to each other as possible.



3. The screw to be used must have a head equivalent to the one of truss machine screw or binder machine screw defined by JIS. Washers must be also used to protect the IC case.
4. No foreign matter such as cutting particles shall exist between heat sink and radiator fin. When applying grease on the junction surface, it must be applied uniformly on the whole surface.
5. IC lead pins are soldered to the printed circuit board after the radiator fin is mounted on the IC.

Description of External Parts

C1 (C2) : Feedback capacitor
Low cutoff frequency f_L depends on this feedback capacitor. Increasing the capacitor value makes the starting time later.

C3 (C4) : Bootstrap capacitor
If the capacitor value is decreased, the output at low frequencies goes lower.
(Recommended value : $47\mu\text{F}$ min.)

C5 (C6) : Oscillation blocking capacitor
Polyester film capacitor, being excellent in temperature characteristic, frequency characteristic, is recommended. The capacitor value can be reduced to $0.047\mu\text{F}$ depending on the stability of the board.

C7 (C8) : Output capacitor
The low cutoff frequency depends on this output capacitor. In bridge connection applications the output capacitor must be normally connected.

C9 : Decoupling capacitor
Used for the ripple filter. Since the rejection effect is saturated at a certain capacitor value, it is meaningless to increase the capacitor value more than needed. This capacitor, being also used for the time constant of the pop noise preventer, affects the starting time. Too small a capacitor value makes the pop noise level higher.

C10 : Power source capacitor.

R1 (R2) : Oscillation blocking filter resistor.

IC Application

1. V.G. can be reduced by connecting R_{NF} to the N.F. pin (pins 1, 6)

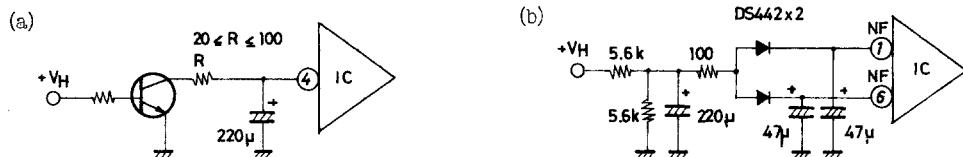
V.G. is calculated by the following formula.

$$VG = 20\log R_f / (R_{\text{NF}} + R_{\text{NF}}')$$

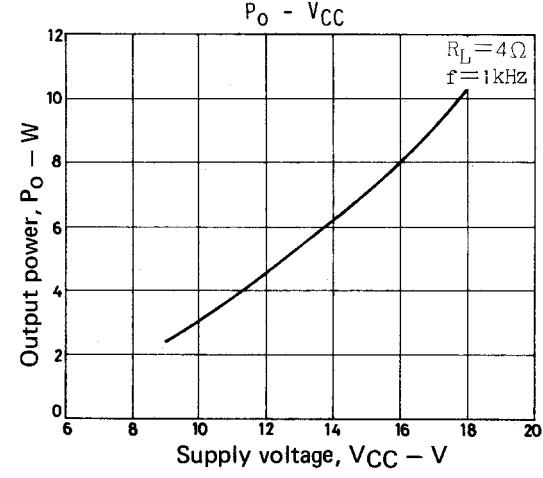
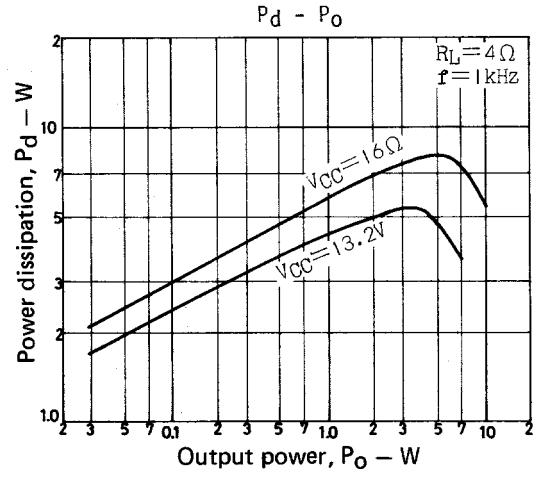
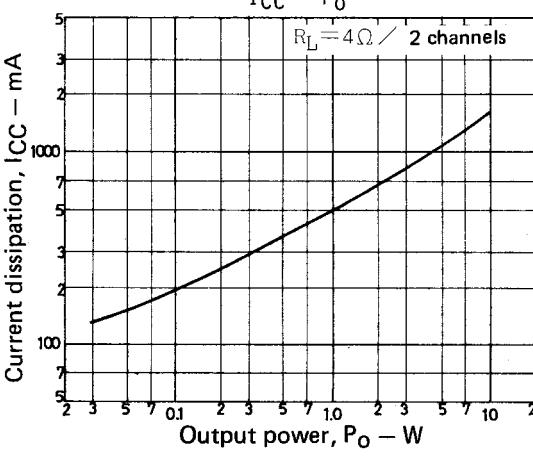
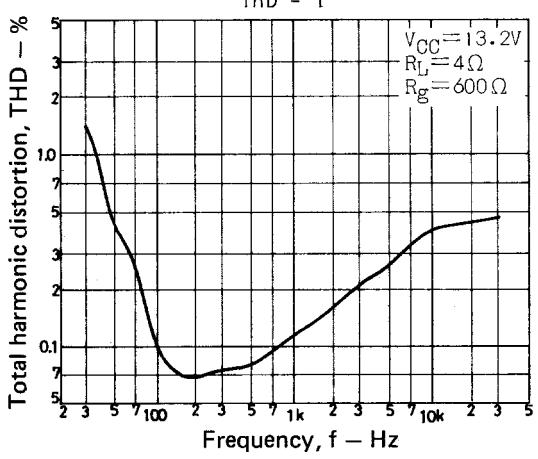
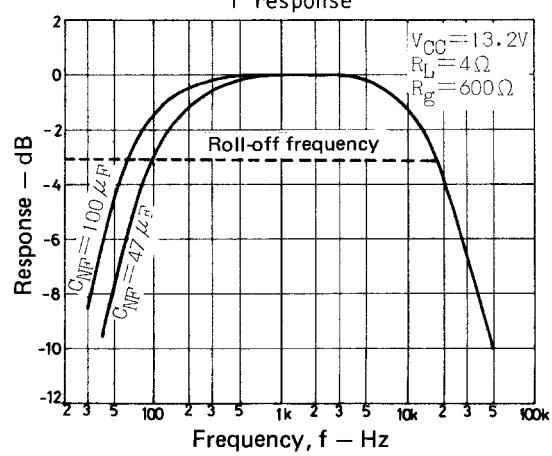
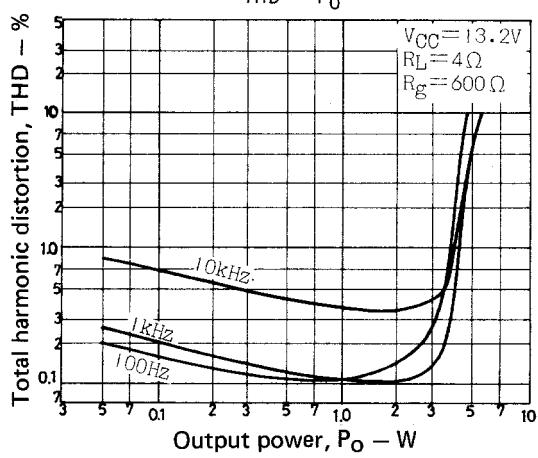
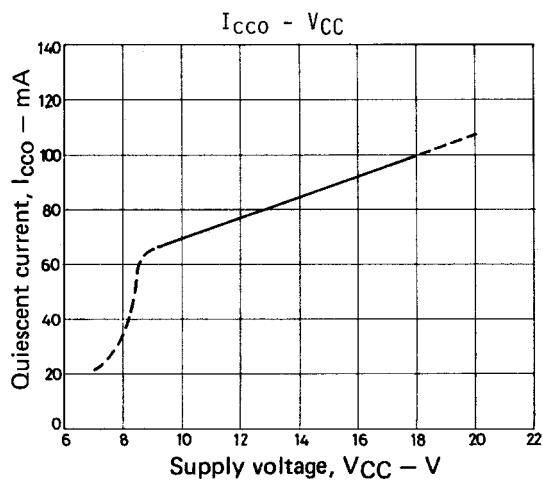
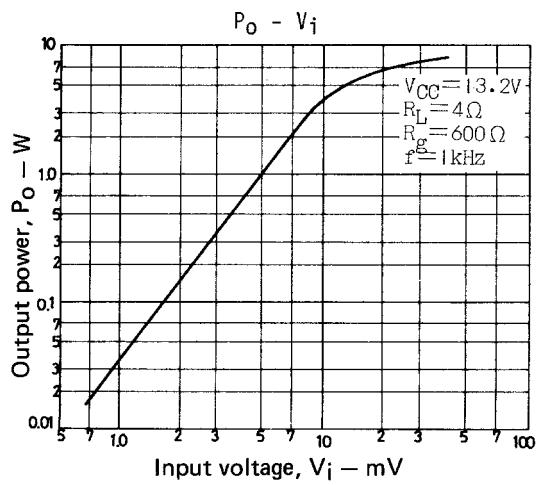
where $R_f = 20\text{k}\Omega$, $R_{\text{NF}} = 50\Omega$

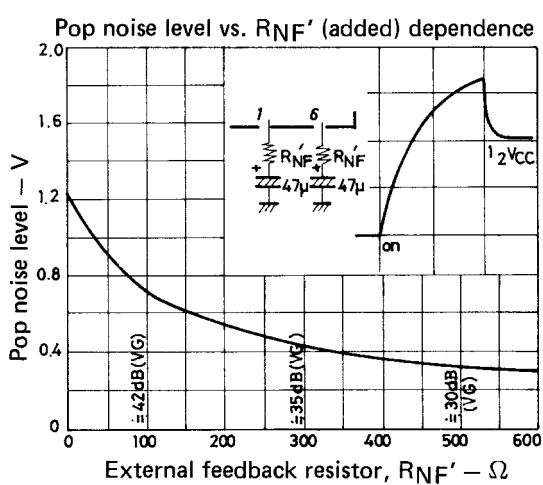
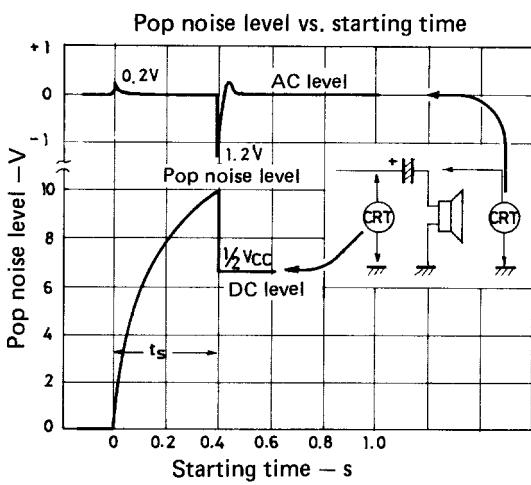
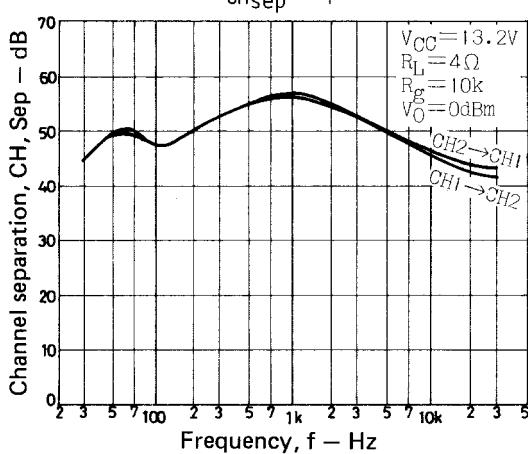
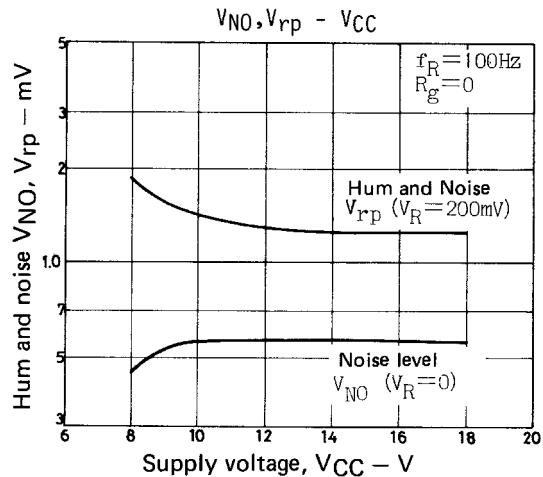
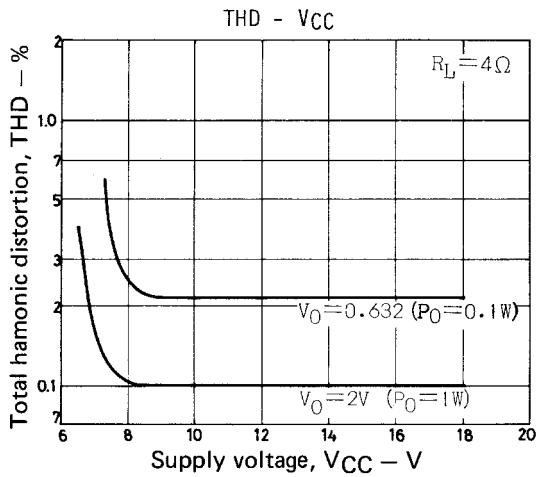
The usable lower limit of VG is 36dB or thereabouts. When setting VG, oscillation and high cutoff frequency f_H must be considered.

2. External audio muting method

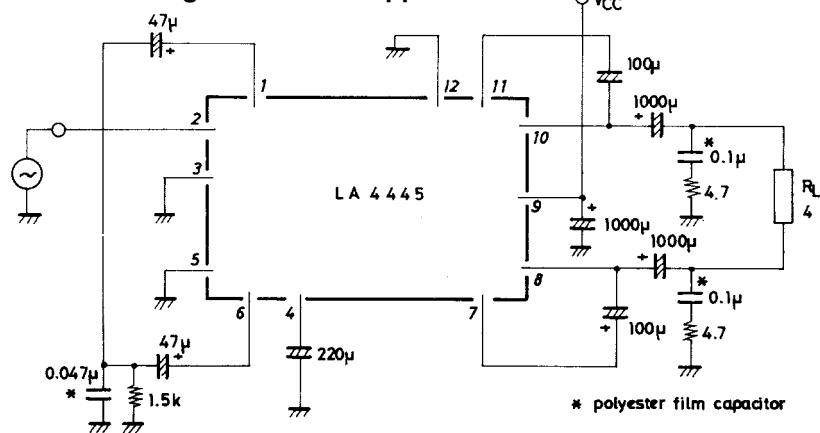
**Proper Cares in Using IC**

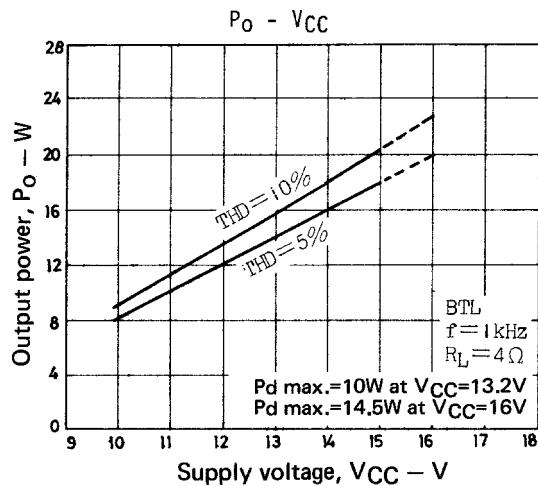
- If the IC is used in the vicinity of the maximum rating, even a slight variation in conditions may cause the maximum rating to be exceeded, thereby leading to breakdown. Allow an ample margin of variation for supply voltage, etc. and use the IC in the range where the maximum ratings is not exceeded.
- Printed circuit board
When making the board, refer to the sample printed circuit pattern. No feedback loop must be formed between input and output. Both Pins GND and Power GND must be shorted at the root of IC pin so that the common impedance can be reduced.
- Others
The radiator fin on the package must be normally connected to GND.
Some plug jacks to be used for connecting to the external speaker are such that both poles are shorted once when connecting. In this case, the load is shorted, which may break down the IC.





Sample Application Circuit : Bridge connection application





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