Ordering number:ENN3607A

Monolithic Linear IC

LA4620

Two-channel Audio Power Amplifier

Overview

The LA4620 is a two-channel high-power audio amplifier for automotive stereo and general-purpose audio amplification equipment.

The LA4620 has a 6 to 22V operating supply voltage range. Each channel uses a bridge configuration to obtain high output power from low supply voltages. Typical output power is 17W per channel.

The LA4620 incorporates a thermal protection circuit, an output short-circuit protection circuit and a pop suppression circuit. It has low-power, logic-level standby control and mute control inputs.

The LA4620 is available in 23-pin SIPs and operates from a 15V supply.

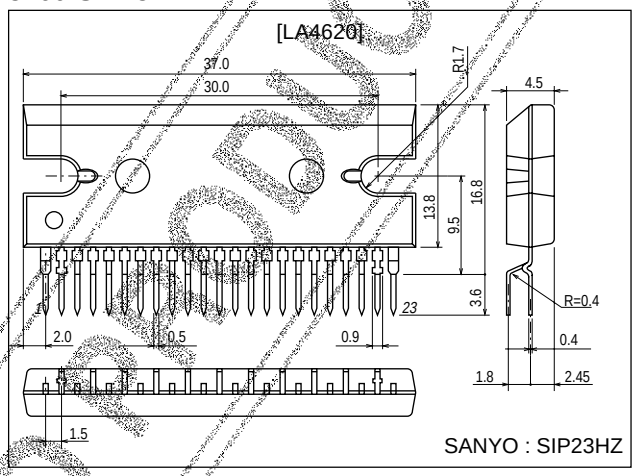
Features

- 17W output power per channel.
- 6 to 22V supply voltage range.
- Pop suppression.
- Logic-controlled standby mode.
- Thermal protection.
- Short-circuit protection.
- 60dB channel separation.
- 58dB supply voltage ripple rejection.
- 0.2% harmonic distortion.
- 23-pin SIP.

Package Dimensions

unit:mm

3160-SIP23HZ



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Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		24	V
Allowable power dissipation	Pd max		37.5	W
Operating temperature	Topr		–20 to +75	˚C
Storage temperature	Tstg		–40 to +150	˚C

Recommended Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		12, 15	V
Supply voltage range	V_{CC}		6 to 22	V
Load resistance	R_L		4	Ω

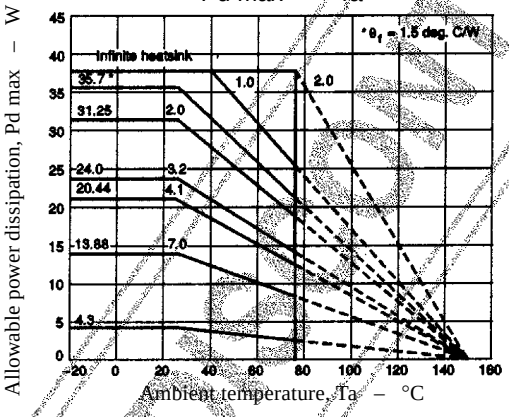
Note

When operating at 22V with a load of 4Ω, ensure that the output power, P_O, does not exceed 1W per channel.

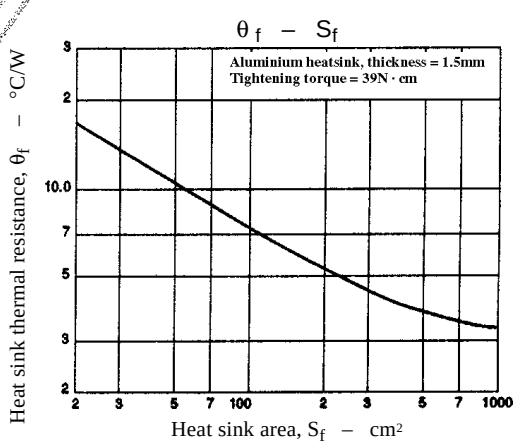
Electrical Characteristics at Ta = 25˚C, V_{CC}=15V, f=1kHz, R_L=4kΩ, Rg=600Ω unless otherwise noted

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}		50	75	120	mA
Standby current	I_{ST}			1	10	μA
Output power	P_O1	V_{CC}=12V, THD=10%	10	13		W
	P_O2	V_{CC}=15V, THD=10%	14	17		W
Total harmonic distortion	THD	P_O=1W		0.2	1.0	%
Input resistance	R_{IN}		17	24	31	kΩ
Voltage gain	VG		42	44	46	dB
Output noise voltage	$V_{NO}1$	Rg=0Ω, bandpass frequency range=20Hz to 20kHz		0.2	0.5	mV
	$V_{NO}2$	Rg=10kΩ, bandpass frequency range=20Hz to 20kHz		0.5	1.0	mV
Channel separation	CH SEP	Rg=10kΩ, V_O=0dBm	45	60		dB
Supply voltage ripple rejection	SVRR	Rg=0Ω, f_R=100Hz, $V_{CC}R$=0dBm	45	58		dB
Offset voltage	V_{OS}	Rg=0Ω	–180		+180	mV

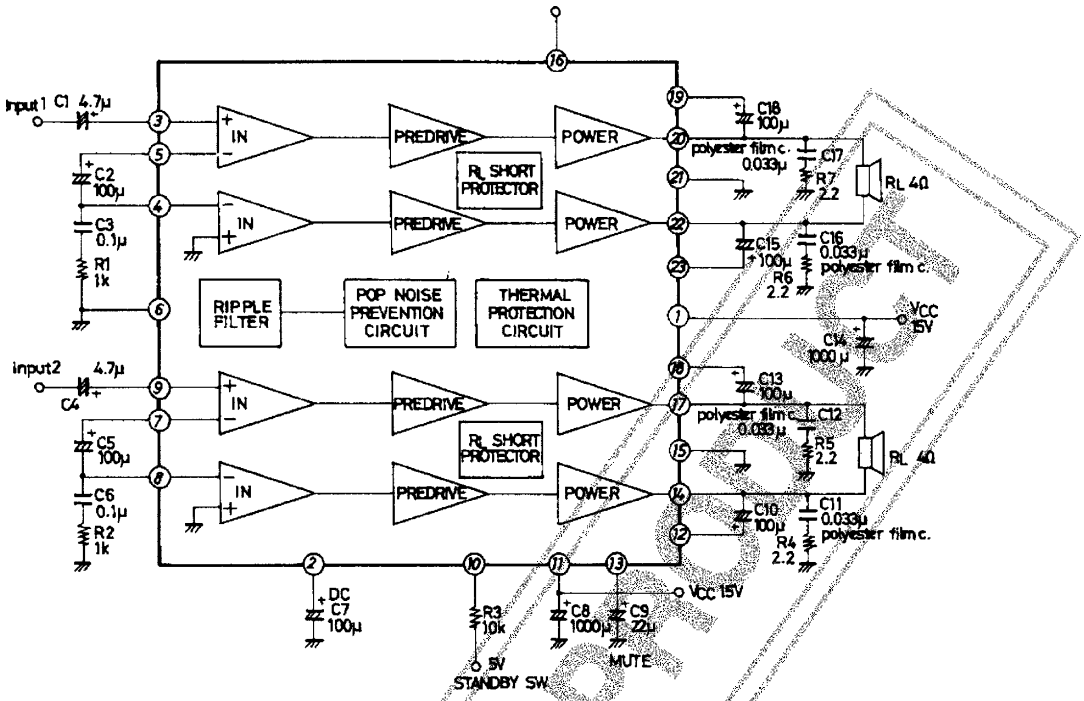
Pd max – Ta



θf – Sf



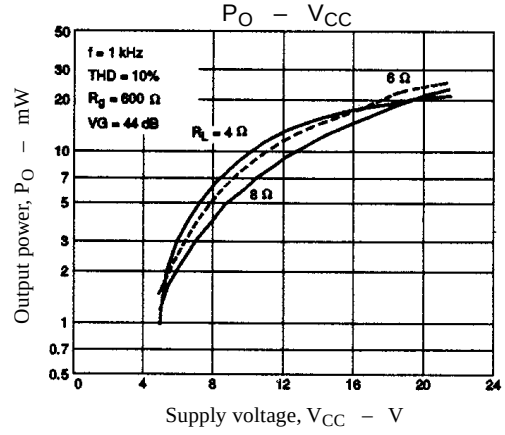
Test Circuit



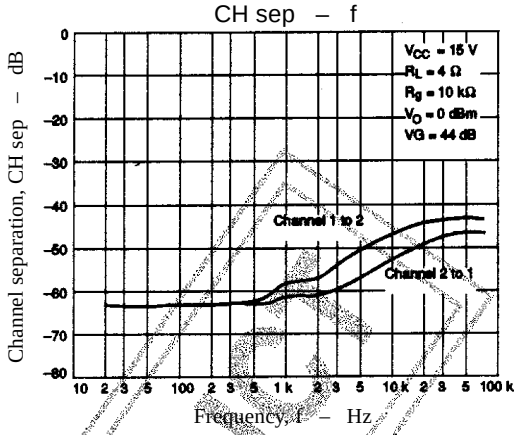
Pin Description

Number	Name	Description
1	V_{CC}	Supply voltage
2	RIP	Ripple filter
3	INPUT1	Channel 1 input
4	NF2	Channel 1 negative feedback input
5	NF1	Channel 1 negative feedback input
6	GND	Ground
7	NF3	Channel 2 negative feedback input
8	NF4	Channel 2 negative feedback input
9	INPUT2	Channel 2 input
10	STANDBY	Standby switch
11	V_{CC}	Supply voltage
12	BS4	Channel 2 bootstrap capacitor
13	MUTE	Muting control
14	OUT4	Channel 2 output
15	GND	Ground
16	NC	No connection
17	OUT3	Channel 2 output
18	BS3	Channel 2 bootstrap capacitor
19	BS1	Channel 1 bootstrap capacitor
20	OUT1	Channel 1 output
21	GND	Ground
22	OUT2	Channel 1 output
23	BS2	Channel 1 bootstrap capacitor

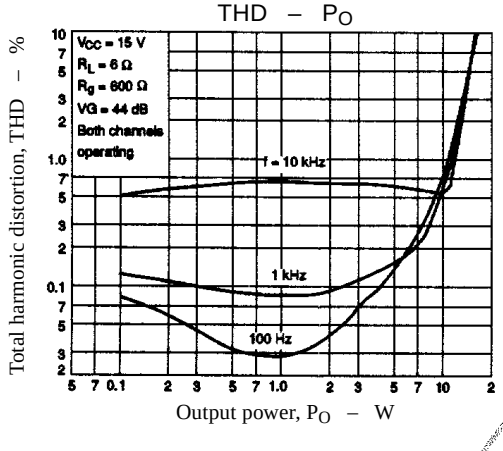
P_O – V_{CC}



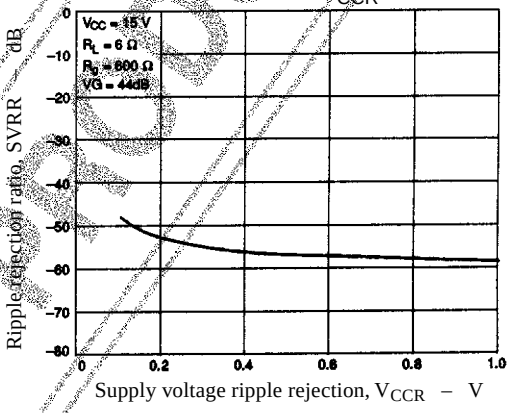
CH sep – f



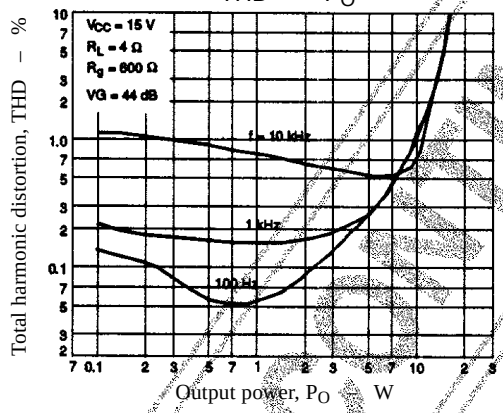
THD – P_O



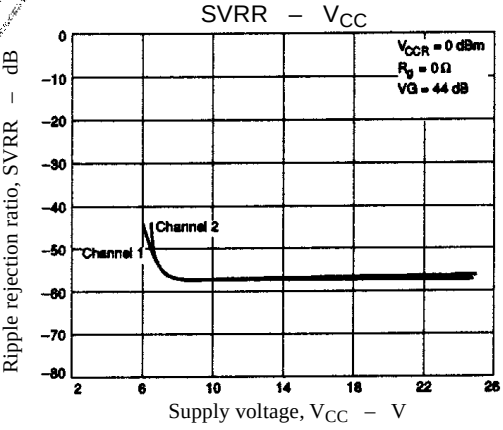
SVRR – V_{CCR}



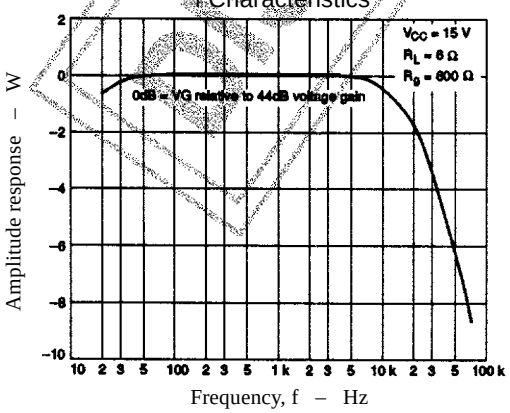
THD – P_O



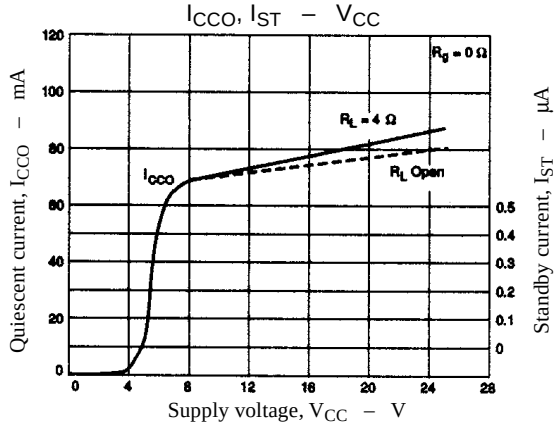
SVRR – V_{CC}



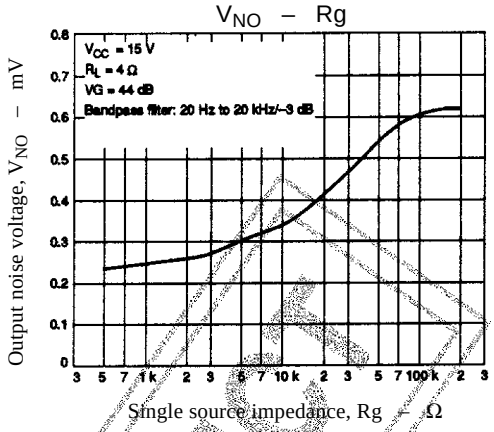
f Characteristics



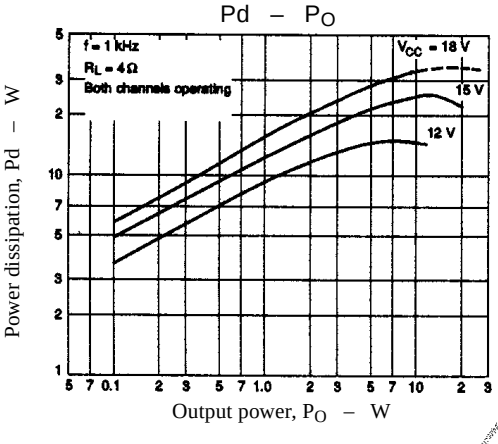
I_{CCO}, I_{ST} – V_{CC}



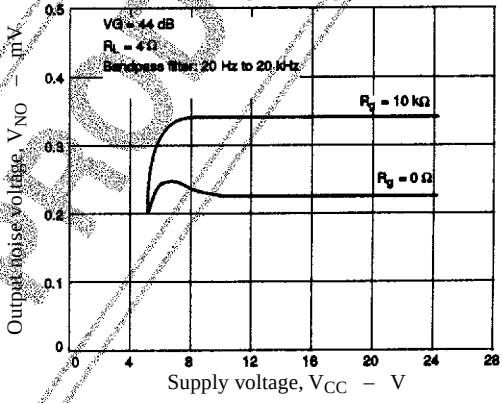
V_{NO} – Rg



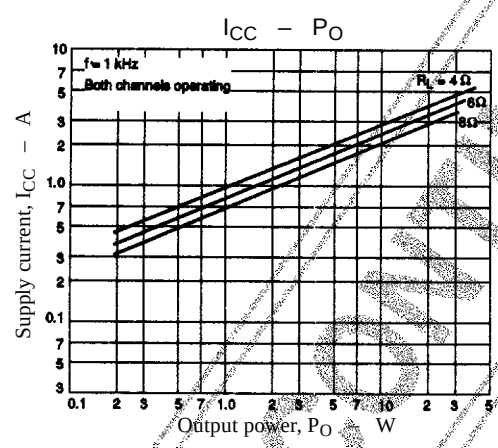
Pd – P_O



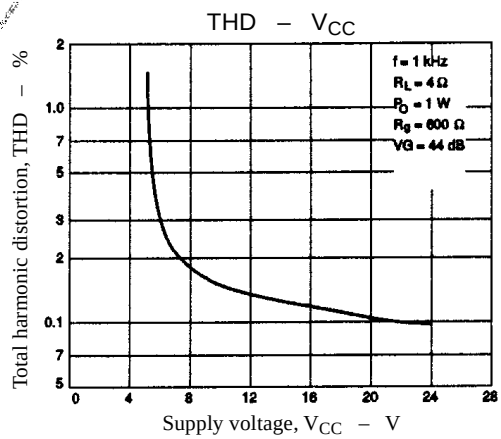
V_{NO} – V_{CC}



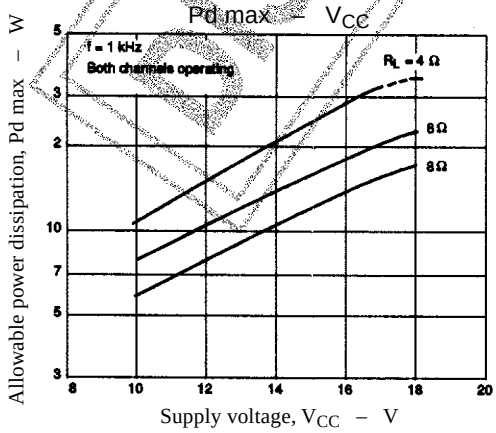
I_{CC} – P_O



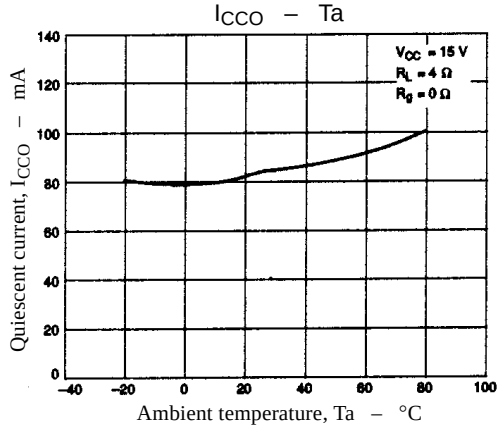
THD – V_{CC}

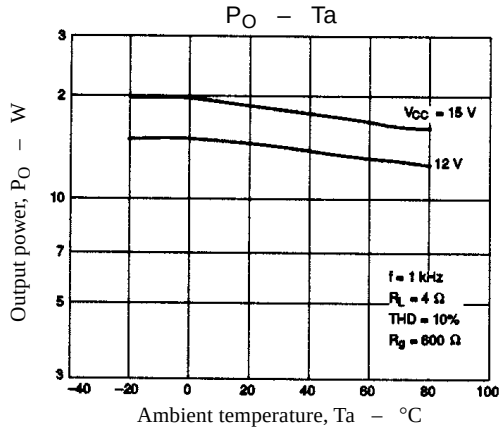


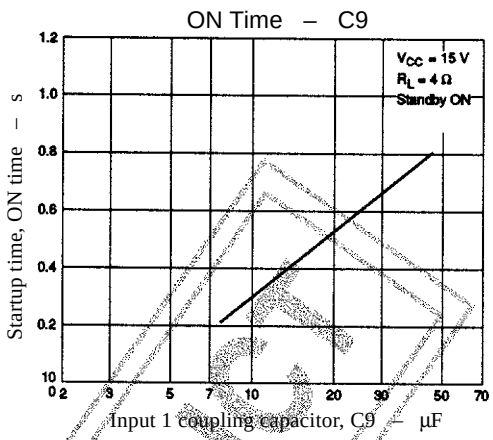
Pd max – V_{CC}

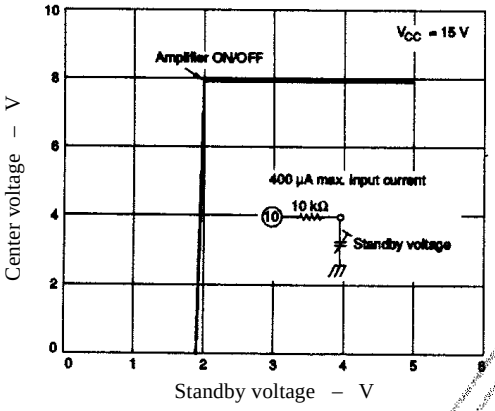


I_{CCO} – Ta









Functional Decription

Standby Mode Control

Applying 1.5V or more to R3 at STANDBY SW enables the amplifier. The maximum input current is 400µA.

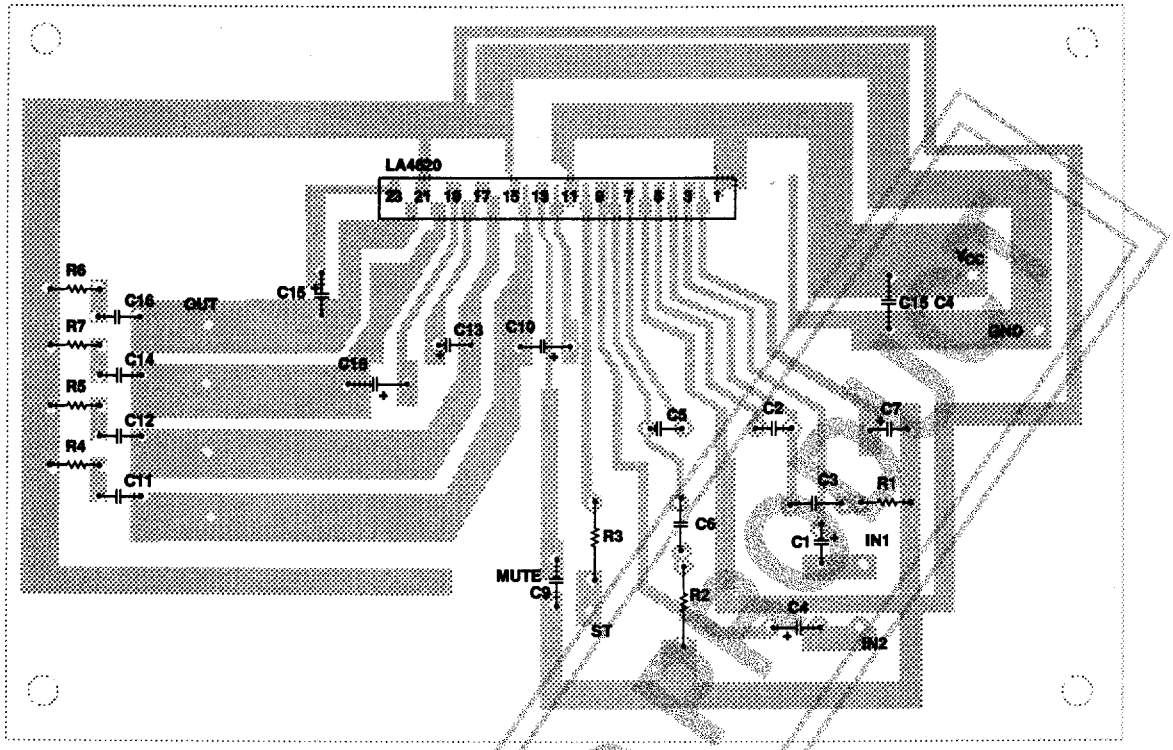
Mute Control

Pulling MUTE to ground mutes the amplifier. The startup time and recovery time when MUTE is pulled HIGH can be adjusted by changing C9.

Short-circuit Protection

The LA4620 incorporates a protection circuit for short circuits between output pins. However, this is inadequate for short circuits to ground or the supply. See the design notes.

Sample Printed Circuit Pattern



Note

Board size : 125 × 85mm
Surface finish : Copper foil

Design Notes

Input Capacitors

C1 and C4 are input coupling capacitors. They should both be 4.7μF or less.

Feedback Capacitors

C2 and C5 from the negative feedback network. They sould both be between 47 and 100μF.

Supply Decoupling Capacitor

C7 should be 100μF.

Supply Ripple Filter Capacitors

C8 and C14 smooth the supply voltage. Both should be at least 1,000μF, and one of at least 2,000 μF can be used.

Startup Time Capacitor

C9 determines the amplifier startup time.

Bootstrapping Capacitors

C10, C13, C15 and C18 improve the device linearity for a wide range of input signals. These capacitors should be between 47μF and 100μF to improve the low-frequency response.

Oscillation Suppression

The R1 and C3, and R2 and C6 networks suppress oscillation. Use ceramic or mylar capacitors of 0.1μF or more. Avoid using very large capacitances as these can cause high-frequency distortion.
C11, C12, C16, and C17 from RC networks with R4, R5, R6 and R7, respectively. Use mylar capacitors of 33nF or more to prevent instability caused by circuit board layout.

Standby Control Current Limiting Resistor

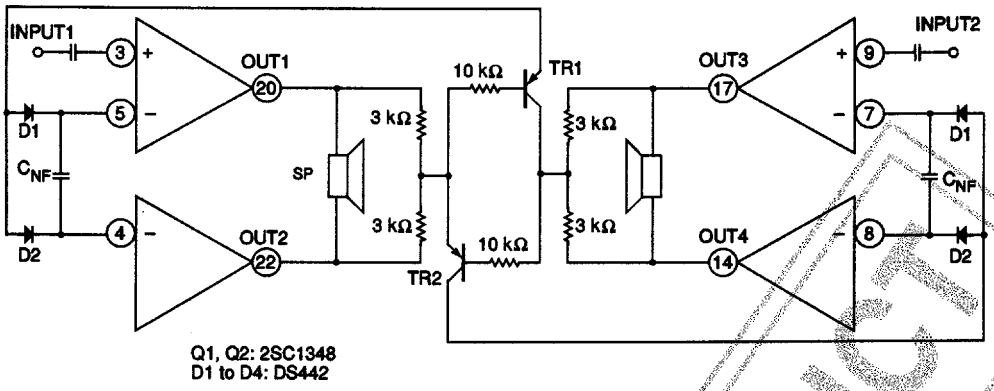
R3 limits the current applied to STANDBY SW. It should be 10Ω or more.

Heatsinking

The LA4620 should always be operated with a heatsink. If the heatsink does not provide adequate thermal dissipation, the thermal protection circuit will attenuate the signal level when the device overheats to prevent long-term thermal stress.

Short-circuit Protection

If outputs can be shorted either to ground or the supply, use an external circuit to protect the device as shown in the following figure.



Q1, Q2: 2SC1348
D1 to D4: DS442