Ordering number : EN6014

Monolithic Linear IC

LA4613

Audio Power Amplifier for Radio Cassette Recorders

Overview

This is a different-package version of the power amplifier LA4600 with ultralow peripheral component count. Basic power supply spec is V_{CC} = 15V. BS capacitor, NF capacitor, and oscillation prevention CR components are incorporated into the IC circuitry.

Functions

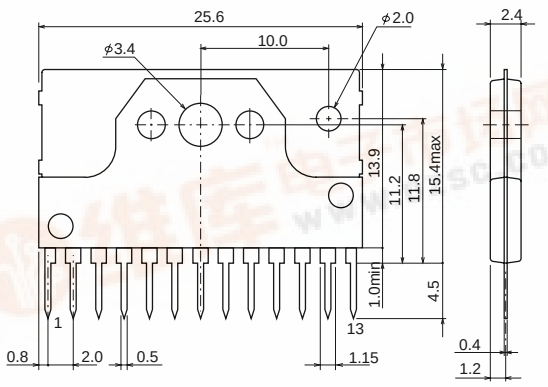
- Output power : V_{CC}=15V/3Ω....7.0W X 2
- Built-in stanby switch
- Built-in overheat protection (TSD)

Package Dimensions

unit: mm

3107-SIP13H

[LA4613]



SANYO : SIP13H

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	Vcc max	Rg=0 (No signal)	24	V
Allowable power dissipation	Pd max	With an arbitrary large heatsink	15.0	W
Thermal resistance	θ j-c		3.0	℃/W
Operating temperature	Topr		– 20 to +75	℃
Storage temperature	Tstg		– 40 to +150	℃

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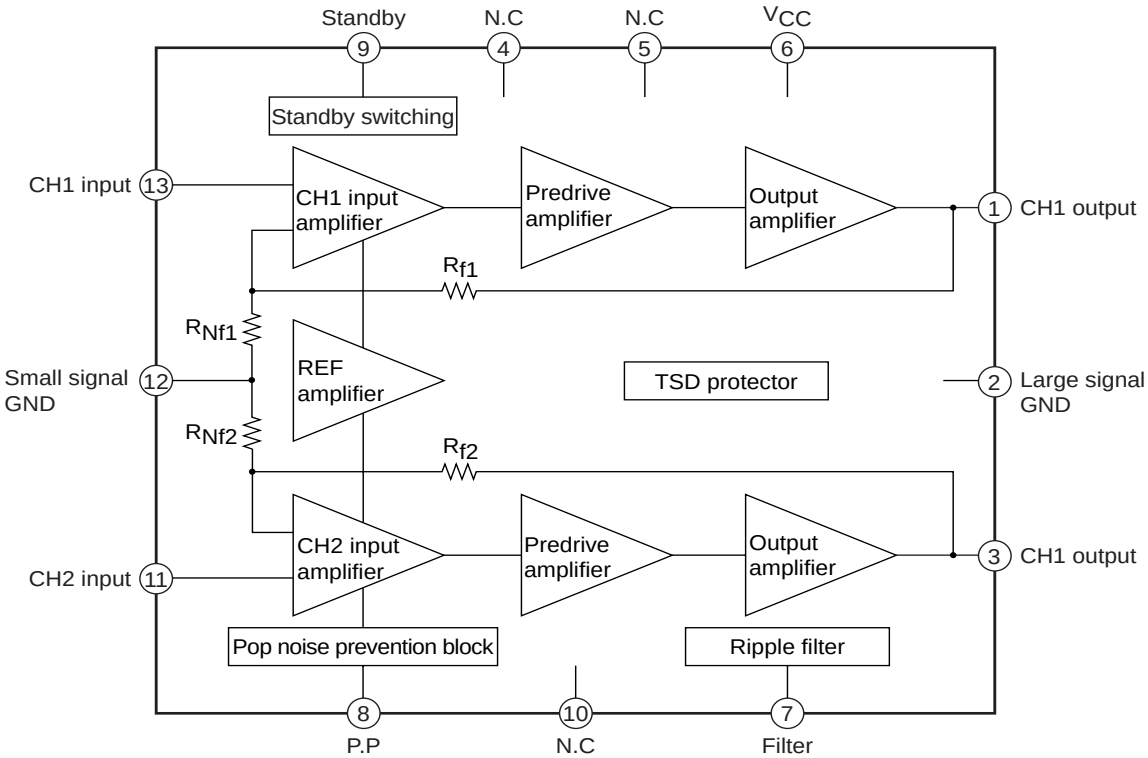
Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		15	V
Recommended load resistance	R_L		3	Ω
Operating supply voltage range	V_{CC} op	Within maximum ratings	5.0 to 22	V
Operating load resistance range			2.7 to 8	Ω

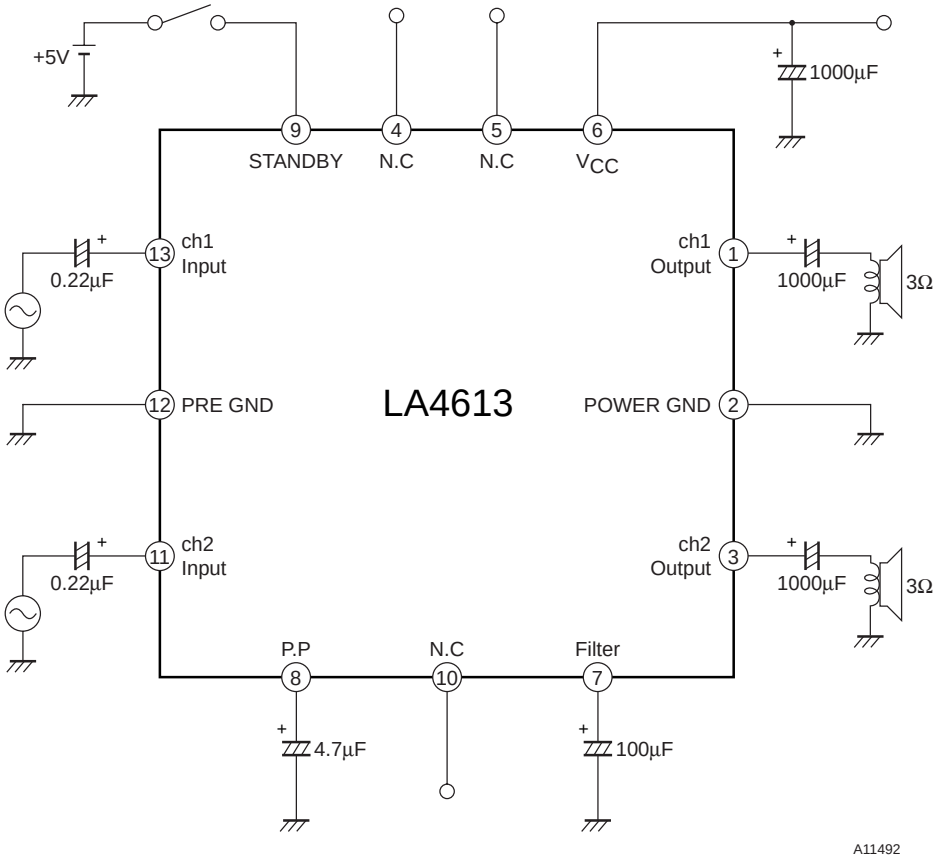
Electrical Characteristics at Ta = 25°C, V_{CC} = 15V, R_L = 3Ω, f = 1 kHz

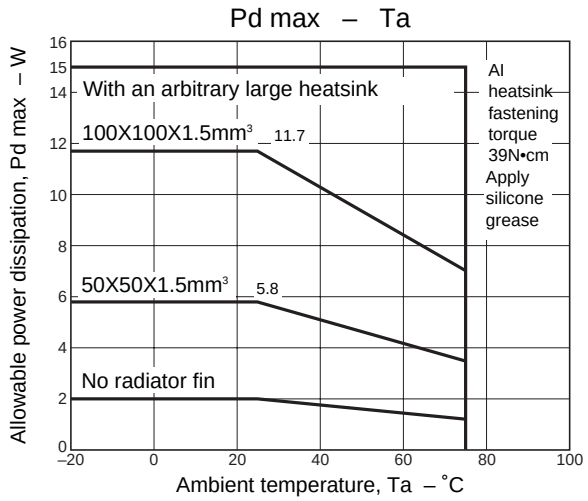
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	Ist	Standby pin –> GND	—	1.0	10	μA
Quiescent current	Icco	Rg=0	20	35	70	mA
Voltage gain	VG	Vo=0 dBm	43.0	45.0	47.0	dB
Total harmonic distortion	THD	Po=1w	—	0.2	0.8	%
Output noise voltage	Vno	Rg=0, DIN AUDIO	—	0.15	0.5	mV
Output voltage	Po1	THD=10%	6.0	7.0	—	W
	Po2	Vcc=9V, RL=4Ω, THD=10%	1.5	2.0	—	W
Channel separation	Chsep	Vo=0 dBm, Rg=0, DIN AUDIO	50	60	—	dB
Ripple rejection ratio	SVRR	Vr=0 dBm, Rg=0, fr=100 Hz DIN AUDIO	45	55	—	dB
Stanby ON voltage	Vst		1.5	5.0	—	V
Input resistance	Ri		20	30	40	kΩ

Block Diagram



Sample Application



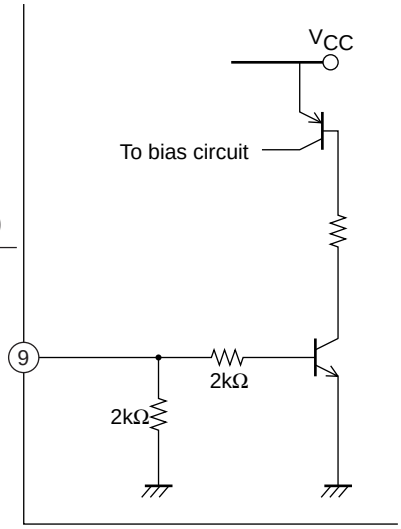


Pin Descriptions

1. Standby switching function (9)

Power is switched ON and OFF by controlling the High and Low states at pin 9, respectively (standby). To switch power ON, apply 1.5V or more, or 800 μA to pin 9.

$$\text{Current supplied to pin 9} \fallingdotseq \frac{\text{Applied voltage}}{2\ \text{k}\Omega} + \frac{\text{Applied voltage} - V_{BE}\ (\text{approx. } 0.7\text{V})}{2\ \text{k}\Omega}$$



- When directly connecting the microcontroller with this pin, add a resistor in series to optimize the current for the microcontroller.

2. Input pins (11,13)

Voltage at the input pins is approx. 2 V_{BE} (1.4V).
Input impedance is approx. 30 kΩ.

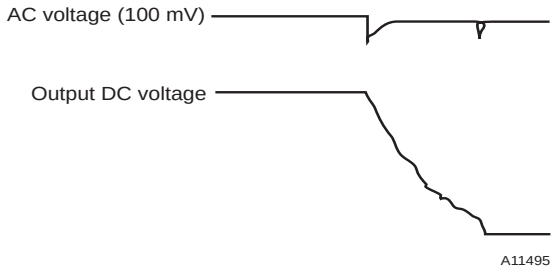
- The recommended value for the input capacitor is 0.22 μF, but this can be varied in order to adjust the starting time (t_S). (The starting time is the time required from applying voltage to the standby pin until sound output is obtained.)

Input capacitator	1.0 μF	2.2 μF	3.3 μF	4.7 μF	10 μF
Starting time t_s	0.2s	0.3s	0.5s	0.65s	1.5s

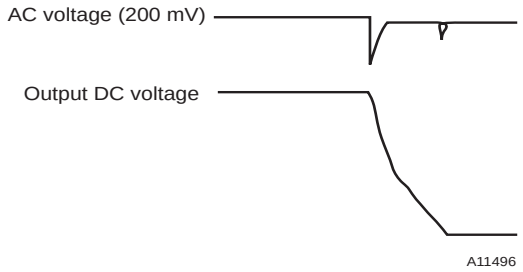
3. Filter (decoupling) pin (7)

Pin voltage is approx. 1/2 V_{CC}.
The recommended value for the filter capacitor is 100 μF.
When capacitance is lower, pop noise when setting the standby pin to Low (power OFF) will increase.

Filter capacitor= 100 μF



Filter capacitor= 47 μF

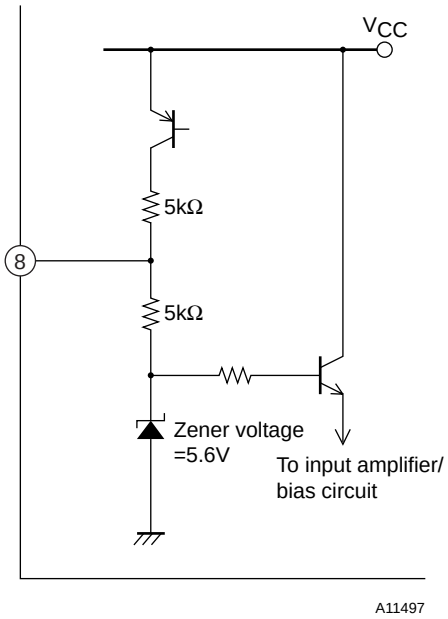


4. P.P (pop noise) pin (8)

$$\text{Voltage at pin 8} \fallingdotseq \frac{V_{CC} - V_{CE}\ (\text{approx. } 0.3V) - 5.6V}{2} + 5.6V$$

- The recommended value for the P.P capacitor is 4.7 µF. When capacitance is lower than 2.2 µF, pop noise when setting the standby pin to Low (power OFF) will increase.

  When capacitance is higher than 10 µF, the sound will not be cut off when setting the standby pin to Low (power OFF).



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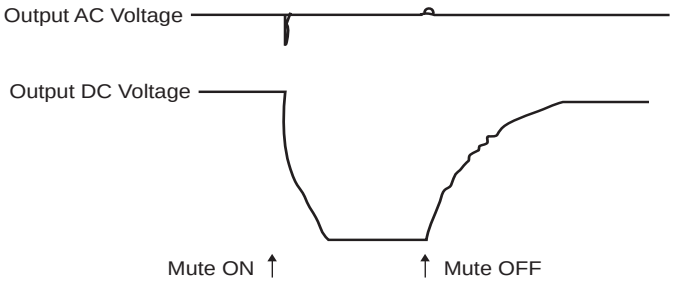
5. Muting

The output signal can be controlled by connecting pin 7 (Filter) to ground via a resistance of 300 to 500 Ω. If resistance is higher than 750 Ω, the suppression ratio will decrease.



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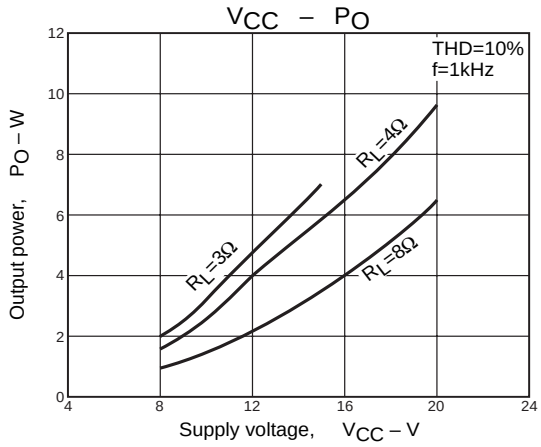
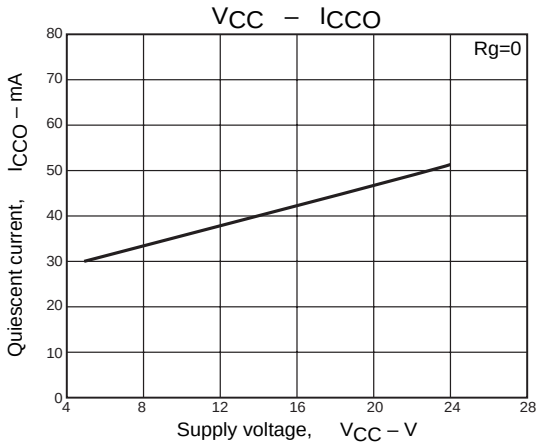
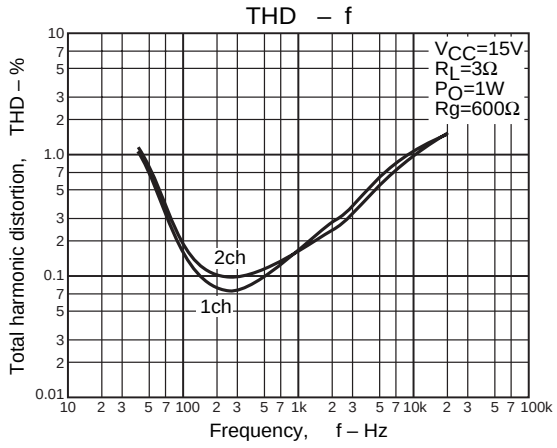
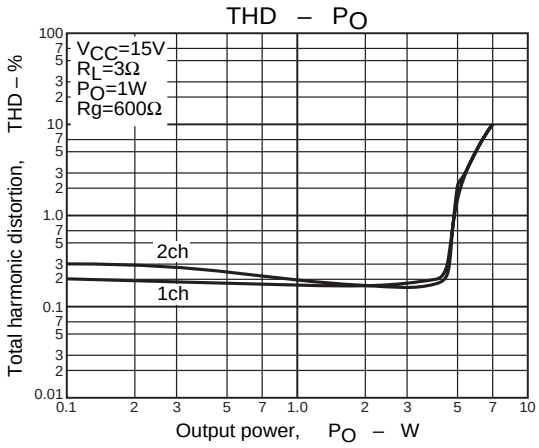
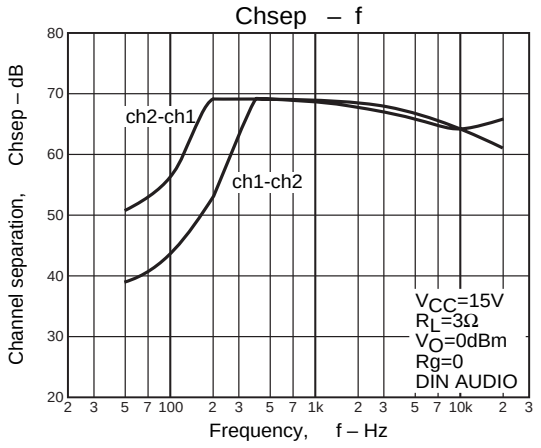
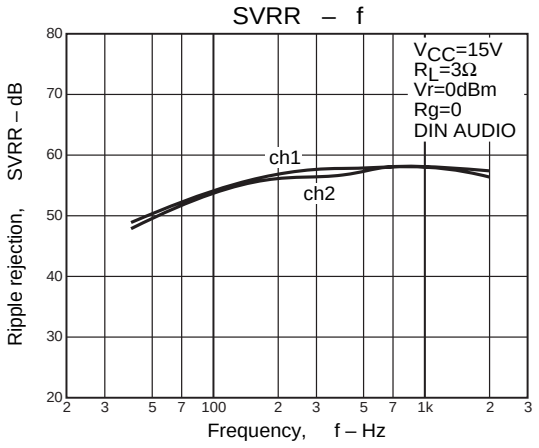

VCC – PO
THD=10%
f=1kHz
RL=4Ω
RL=3Ω
RL=8Ω
Output power, PO – W
Supply voltage, VCC – V

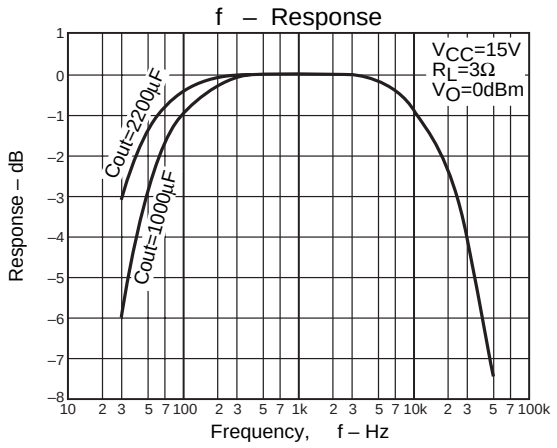

VCC – ICCO
Rg=0
Quiescent current, ICCO – mA
Supply voltage, VCC – V

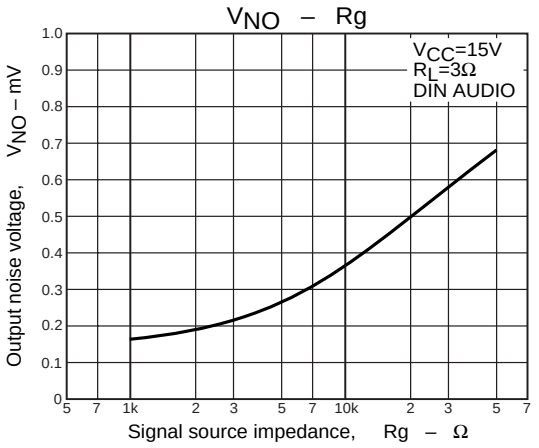

THD – f
VCC=15V
RL=3Ω
PO=1W
Rg=600Ω
2ch
1ch
Total harmonic distortion, THD – %
Frequency, f – Hz


THD – PO
VCC=15V
RL=3Ω
PO=1W
Rg=600Ω
2ch
1ch
Total harmonic distortion, THD – %
Output power, PO – W


Chsep – f
ch2-ch1
ch1-ch2
VCC=15V
RL=3Ω
VO=0dBm
Rg=0
DIN AUDIO
Channel separation, Chsep – dB
Frequency, f – Hz


SVRR – f
VCC=15V
RL=3Ω
Vr=0dBm
Rg=0
DIN AUDIO
ch1
ch2
Ripple rejection, SVRR – dB
Frequency, f – Hz


f – Response
VCC=15V
RL=3Ω
VO=0dBm
Cout=2200μF
Cout=1000μF
Response – dB
Frequency, f – Hz


VNO – Rg
VCC=15V
RL=3Ω
DIN AUDIO
Output noise voltage, VNO – mV
Signal source impedance, Rg – Ω