Ordering number : ENN8177

SANYO Semiconductors

DATA SHEET

Monolithic Linear IC

LA4631 — 5 W Two-Channel AF Power Amplifier for Audio Applications

Overview

The LA4631 (5 W × 2 channels) is a single-ended power IC that has a pin arrangement similar to the LA4632 BTL power IC (10 W × 2 channels). The LA4631's pin compatibility makes it possible to share a common printed circuit board among a series of end products differentiated by power rank. (Note that the LA4632 is provided in an SIP-12H package, and that it is necessary to provide a hole for the LA4631 pin 13 if the same printed circuit board is to be shared. Note also that certain external components differ.)

Functions and Applications

- Two-channel power amplifier for audio applications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Rated value	Unit
Maximum supply voltage	V_{CC} max	With no input signal	24	V
Maximum output current	I_O peak	Per channel	2	A
Allowable power dissipation	Pd max	With an infinitely large heat sink	15	W
Maximum junction temperature	Tj max		150	°C
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Rated value	Unit
Recommended supply voltage	V_{CC}		14	V
Recommended load resistance range	R_L op		4	Ω
Allowable operating supply voltage range	V_{CC} op		5.5 to 22	V

*: V_{CC}, R_L, and the output level must be set for the size of the heat sink used so that the Pd max range is not exceeded.

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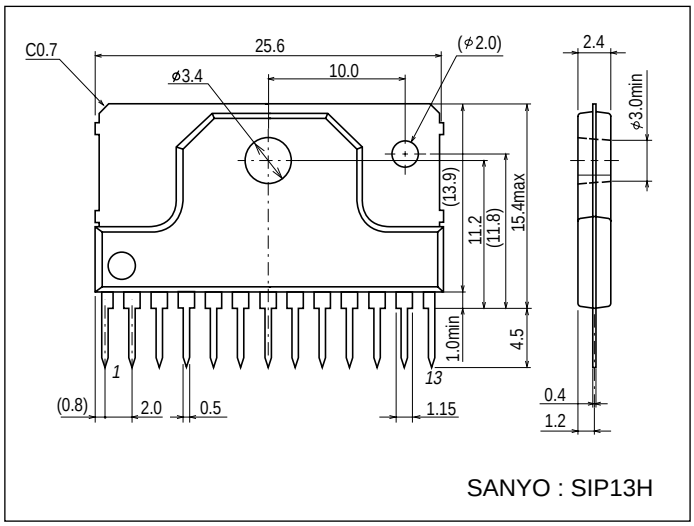
Operating Characteristics at Ta = 25°C, V_{CC} = 14 V, R_L = 4 Ω, f = 1kHz, Rg = 600 Ω

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	Ist	VSTB = 0 V		1	10	μA
Quiescent current drain	I_{CCO}	Rg = 0, VSTB = 5 V	18	35	80	mA
Standby pin applied voltage	Vst	The pin 5 voltage such that the amplifier is on	1.5		5	V
Output power	P_O	THD = 10 %	4	5		W
Total harmonic distortion	THD	V_O = 1 W		0.15	0.4	%
Voltage gain	VG	V_O = 0 dBm	33	35	37	dB
Output noise voltage (rms)	V_{NO}	Rg = 0, BPF = 20 Hz to 20 kHz		0.05	0.25	mVrms
Supply voltage rejection ratio	SVRR	Rg = 0, f_R = 100 Hz, V_{CC}R = 0 dBm	50	60		dB
Channel separation	CH. Sep	Rg = 10 kΩ, V_O = 0 dBm	45	55		dB
Input resistance	Ri		20	30	40	kΩ

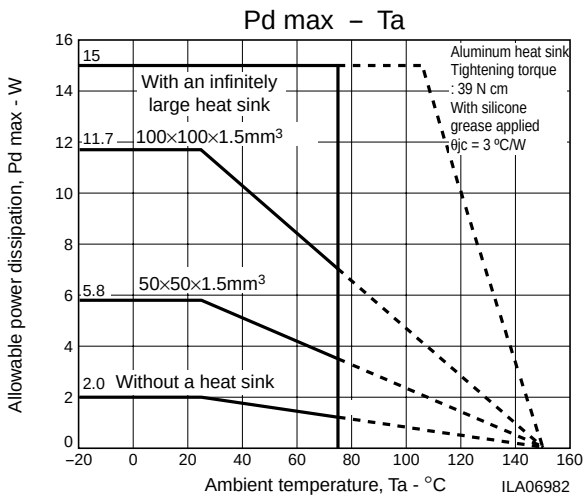
Package Dimensions

unit : mm

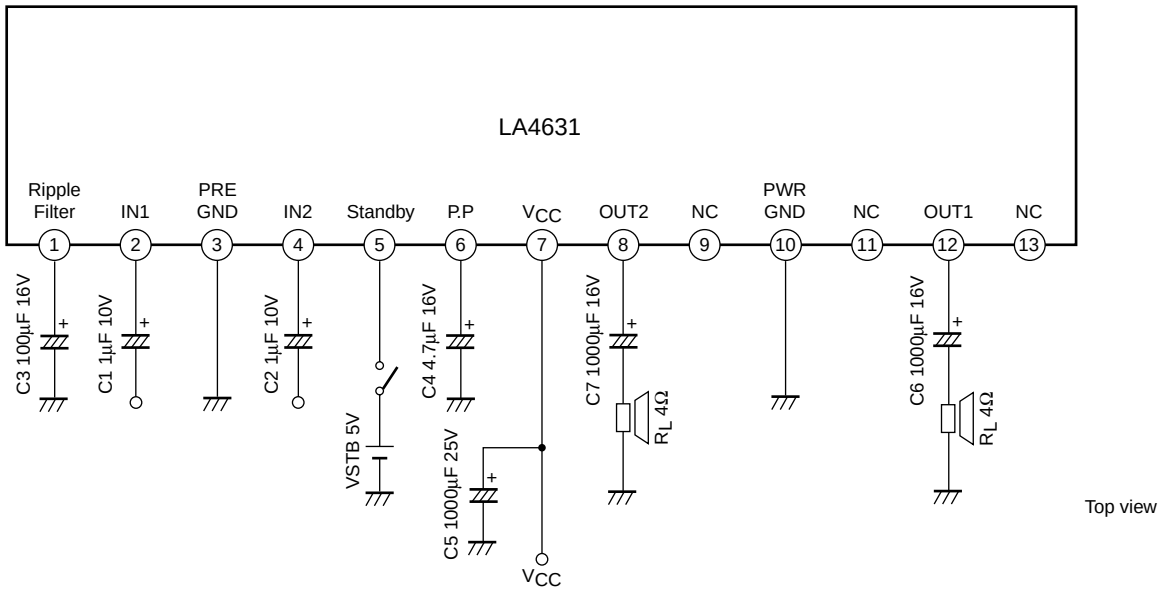
3236



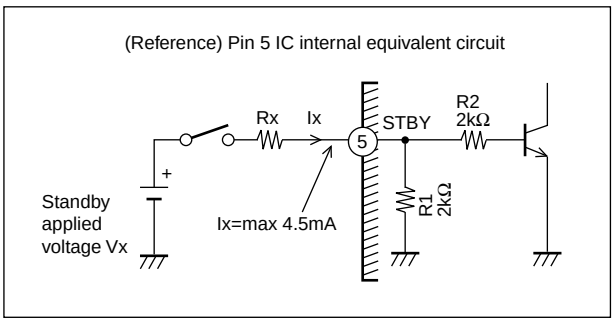
SANYO : SIP13H



Application Circuit Example



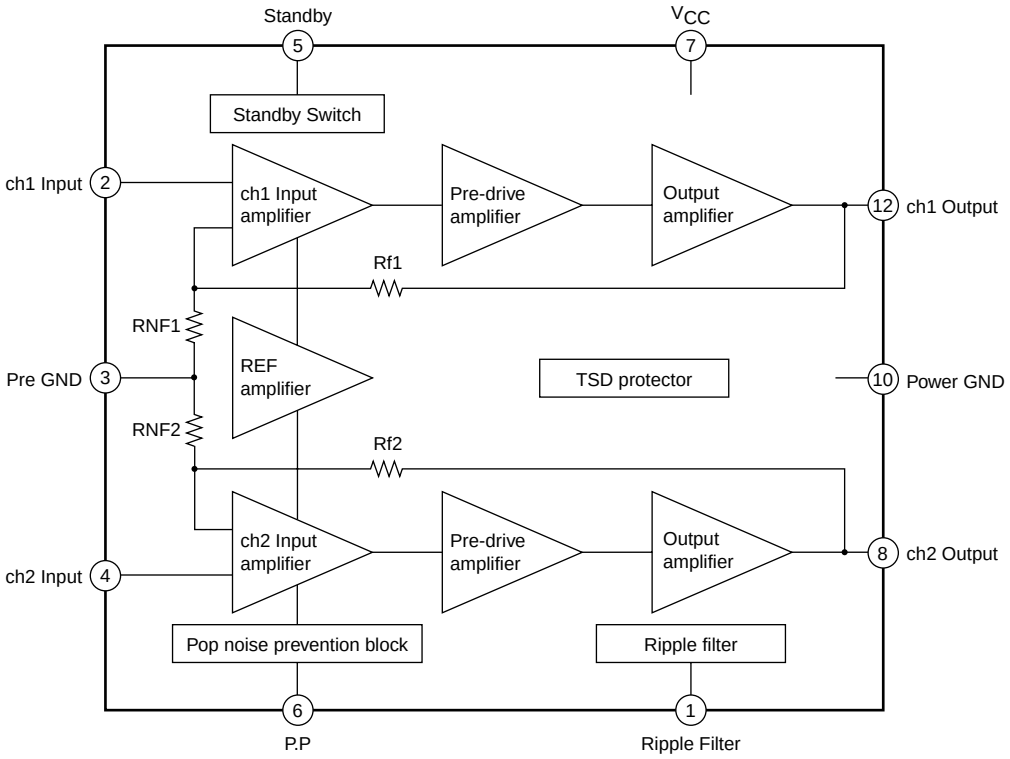
- Caution
  Although the LA4631 is basically pin compatible with the LA4632, there are certain differences in the external components and the way the devices are used.



- The amplifier can be turned on or off by controlling the high/low state of pin 5.
- The amplifier is turned on by applying a voltage of 1.5 V or higher or an influx current of 800 µA or higher. (If a 5 V level is applied directly to pin 5, the pin 5 influx current will be about 4.5 mA.)
- If a voltage, Vx, that exceeds 5 V will be applied, insert a current limiter resistor (Rx) so that the influx current does not exceed 4.5 mA. (See the formula below.)
  Rx = (Vx – 5 V) / 4.5 mA
- When pin 5 is controlled by a microcontroller, to set up a pin 5 influx current (Ix) optimal for the drive capacity of the microcontroller, calculate Rx from the following formula as a first approximation and measure the influx current to verify that level.
  Rx = (Vx / Ix) – R1 (2 kΩ)

*: When a voltage is applied to the standby pin (pin 5), refer to the above and insert a resistor (Rx) to limit the influx current if required.

Block Diagram



External Components and Usage Notes

C1, C2: These are input coupling capacitors; we recommend a value of 1 µF or lower. The LA4631 input pin potential is about 1.4 V, and the polarity must be considered due to the DC potential of the circuits connected to the LA4631 front end. The amplifier's startup time (the time from the point power is first applied until the point an output is generated) will change proportionally with the values of these input capacitors. (When 1 µF capacitors are used, the startup time will be about 0.2 seconds.)

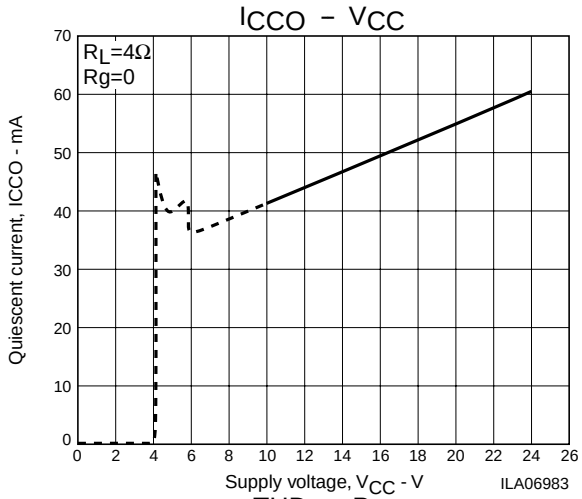
C3: This capacitor is used as a ripple filter. We recommend a value of 100 µF. Amplifier impulse noise when turned off (when the standby pin goes low) may be made worse if a value under 100 µF is used. The pin 1 voltage is about 1/2 V_{CC}. A DC mute function can be applied if pin 1 is connected to ground through a 300 to 500 Ω resistor. Note that the muting activation voltage will be too low if a resistor value of 750 Ω or higher is used.

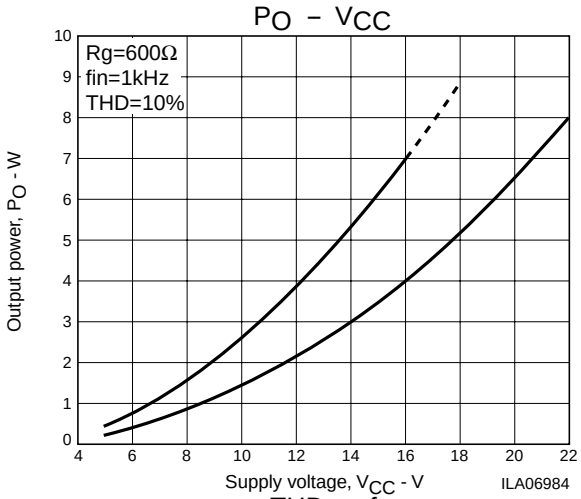
C4: This is an impulse noise prevention capacitor. The recommended value is 4.7 µF. If a value of 2.2 µF or lower is used for C4, impulse noise when the amplifier is turned off (when the standby pin goes low) may be made worse. Also, if a value of 10 µF or higher is used, an "incomplete muting" phenomenon may occur when the amplifier is turned off (when the standby pin goes low).

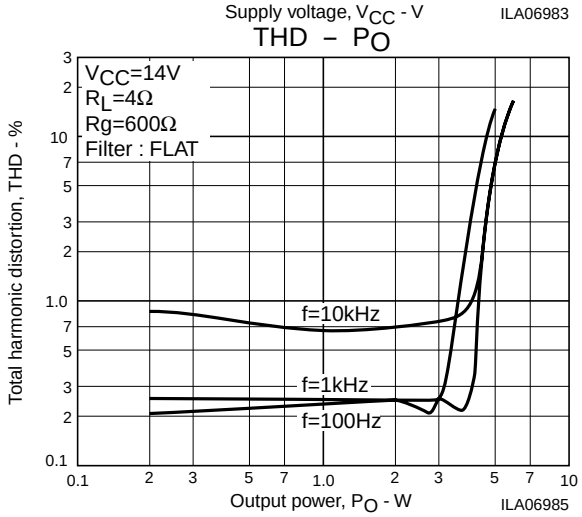
C5: Power supply capacitor. This capacitor should be located as close as possible to the IC (to minimize increases in the power supply line impedance) to achieve stable amplifier operation.

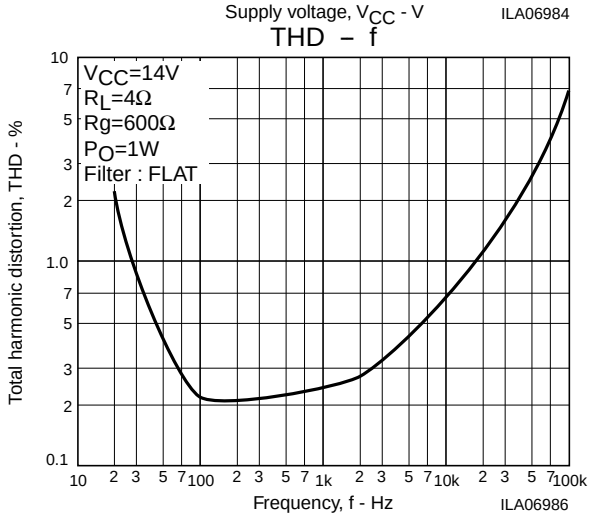
C6, C7: Output capacitors. These capacitors influence the amplifiers low band frequency characteristics. (fc = 1/2 πCout × R_L)

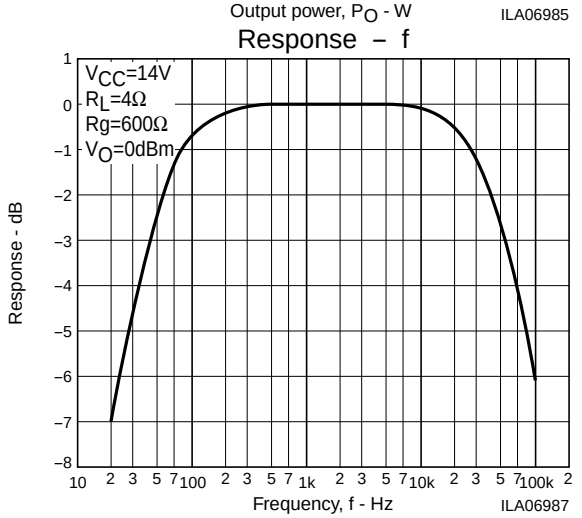
fc = low band cutoff frequency, Cout = C6, C7

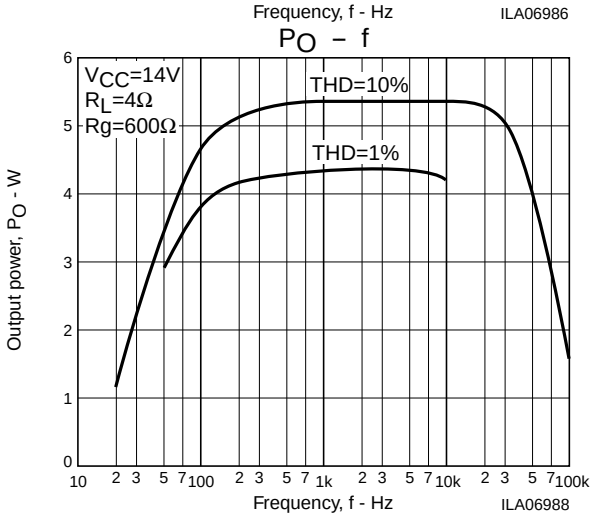

ICCO – VCC
RL=4Ω
Rg=0
Quiescent current, ICCO - mA
Supply voltage, VCC - V
ILA06983

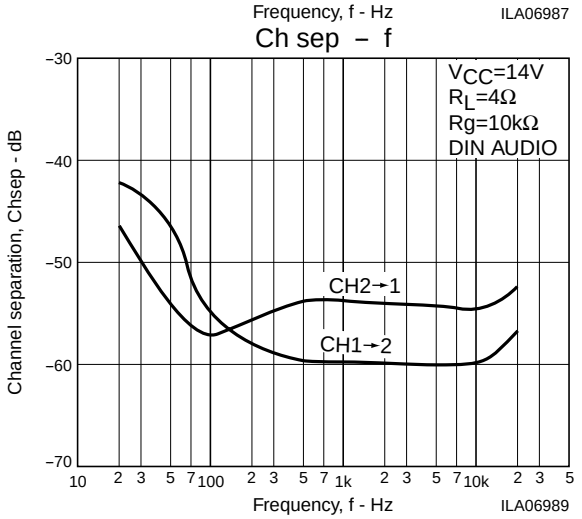

PO – VCC
Rg=600Ω
fin=1kHz
THD=10%
Output power, PO - W
Supply voltage, VCC - V
ILA06984

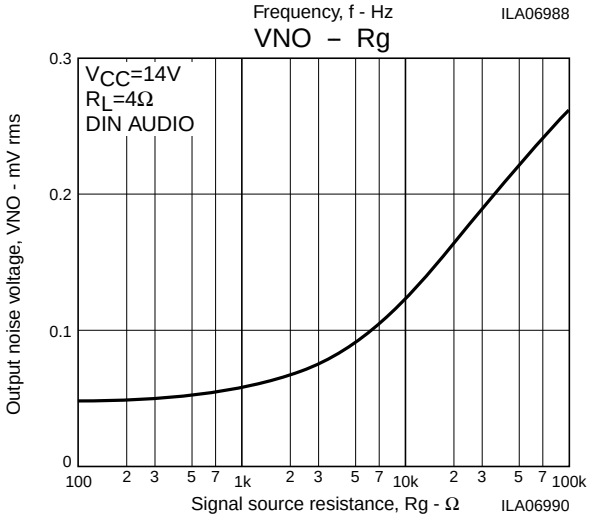

THD – PO
VCC=14V
RL=4Ω
Rg=600Ω
Filter : FLAT
f=10kHz
f=1kHz
f=100Hz
Total harmonic distortion, THD - %
Output power, PO - W
ILA06985


THD – f
VCC=14V
RL=4Ω
Rg=600Ω
PO=1W
Filter : FLAT
Total harmonic distortion, THD - %
Frequency, f - Hz
ILA06986


Response – f
VCC=14V
RL=4Ω
Rg=600Ω
VO=0dBm
Response - dB
Frequency, f - Hz
ILA06987


PO – f
VCC=14V
RL=4Ω
Rg=600Ω
THD=10%
THD=1%
Output power, PO - W
Frequency, f - Hz
ILA06988


Ch sep – f
VCC=14V
RL=4Ω
Rg=10kΩ
DIN AUDIO
CH2→1
CH1→2
Channel separation, Chsep - dB
Frequency, f - Hz
ILA06989


VNO – Rg
VCC=14V
RL=4Ω
DIN AUDIO
Output noise voltage, VNO - mV rms
Signal source resistance, Rg - Ω
ILA06990