



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

# LA4631VC

Monolithic Linear IC

For Home Audio Use

## 2-Channel SE AF Power Amplifier

### Overview

The LA4631VC built-in a 2 channel single-ended output power amplifier that a power supply voltage range is wide and has additionally the standby function to reduce the current drain. It is a power amplifier IC suitable for driving speaker of various audio system equipments, which is especially useful for products that use batteries.

### Functions

- Output power = 4.5W (typical) ( $V_{CC} = 12V, R_L = 3\Omega, THD+N = 10\%$ )
- Built in standby function (Pin5)
- Built in thermal suht down circuit

### Specifications

Maximum Ratings at  $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\ max}$	With no input signal	24	V
Maximum output current	$I_{O\ peak}$	Per channel	2.5	A
Allowable power dissipation	$P_d\ max$	With an infinitely large heat sink	25	W
Operating temperature	$T_{opr}$		-20 to +75	$^\circ C$
Storage temperature	$T_{stg}$		-40 to +150	$^\circ C$

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		12	V
Recommended load resistance range	$R_L\ op$		3 to 8	$\Omega$
Allowable operating supply voltage range	$V_{CC\ op}$		5.5 to 22	V

\*:  $V_{CC}$ ,  $R_L$ , and output level such that  $P_d\ max$ , is not exceeded for the size of heat sink used.

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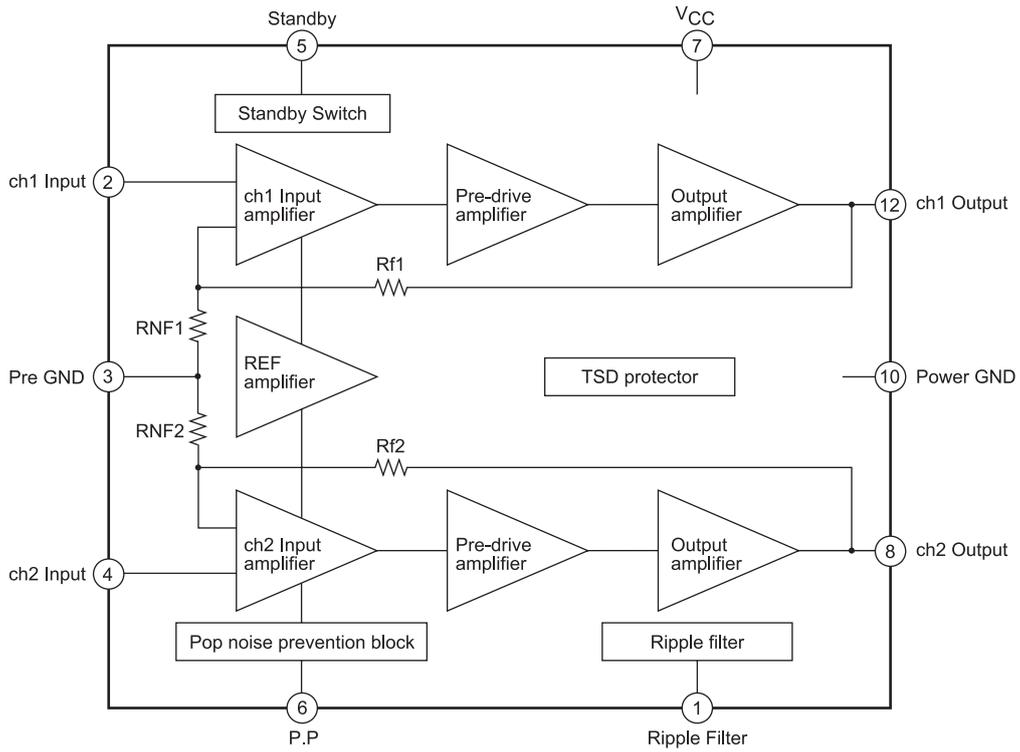
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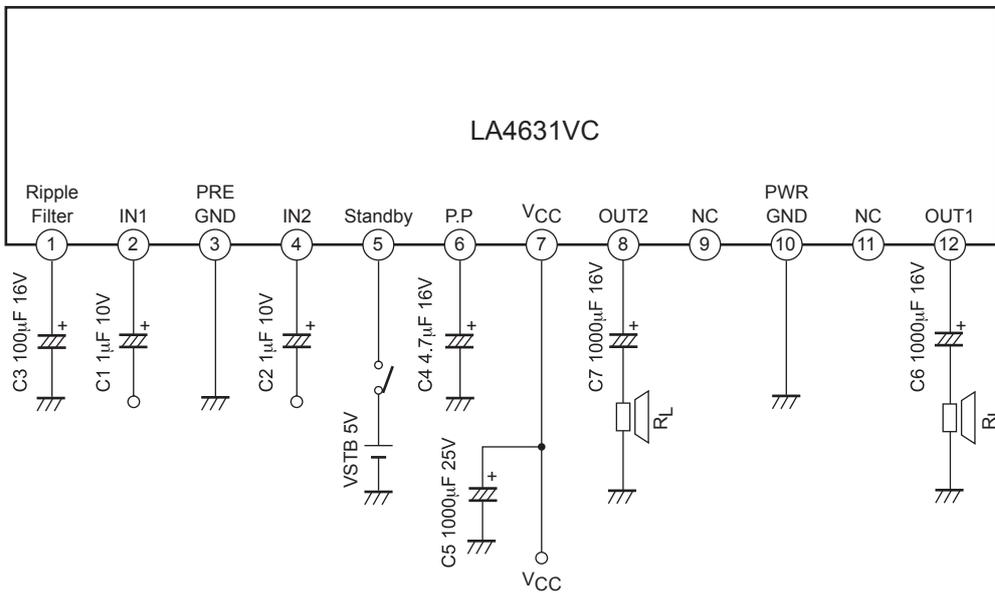


# LA4631VC

## Block Diagram



## Application Circuit Example

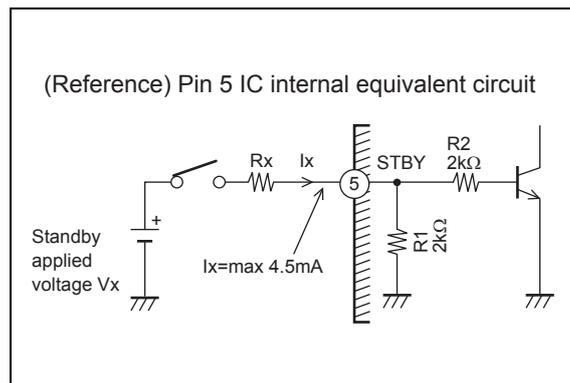


Top view

## External Components and Usage Notes

- C1, C2 : These are input coupling capacitors; we recommend a value of 1 $\mu$ F or lower. The LA4631VC input pin potential is about 1.4V, and the polarity must be considered due to the DC potential of the circuits connected to the LA4631VC 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 $\mu$ F 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 $\mu$ F. Amplifier impulse noise when turned off (when the standby pin goes low) may be made worse if a value under 100 $\mu$ F is used. The pin 1 voltage is about 1/2V<sub>CC</sub>. A DC mute function can be applied if pin 1 is connected to ground through a 300 to 500 $\Omega$  resistor. Note that the muting activation voltage will be too low if a resistor value of 750 $\Omega$  or higher is used.
- C4 : This is an impulse noise prevention capacitor. The recommended value is 4.7 $\mu$ F. If a value of 2.2 $\mu$ F 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 $\mu$ F 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. ( $f_c = 1/2\pi C_{out} \times R_L$ )  
 $f_c$  = low band cutoff frequency,  $C_{out} = C6, C7$

## (Reference) Pin 5 Equivalent Circuit Inside IC



- The amplifier can be turned on and off by controlling the level (high/low) of Pin 5.
- Applying a signal equal or greater than 1.5V and 800 $\mu$ A to Pin 5 turns on the amplifier. (If 5V is applied directly to Pin 5 the inflow current of Pin 5 is approximately 4.5mA.)
- If a voltage, V<sub>x</sub>, exceeding 5V is to be applied, current limiting resistor (R<sub>x</sub>) should be inserted to limit the inflow current to 4.5mA. (See following equation.)

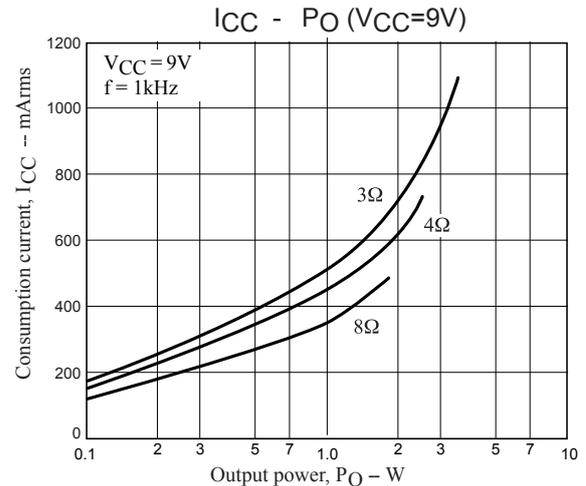
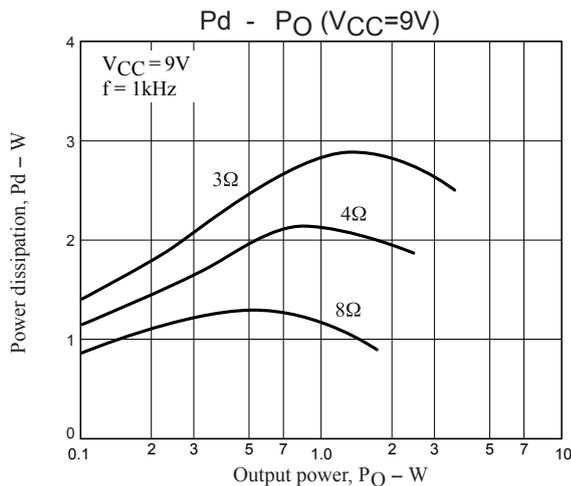
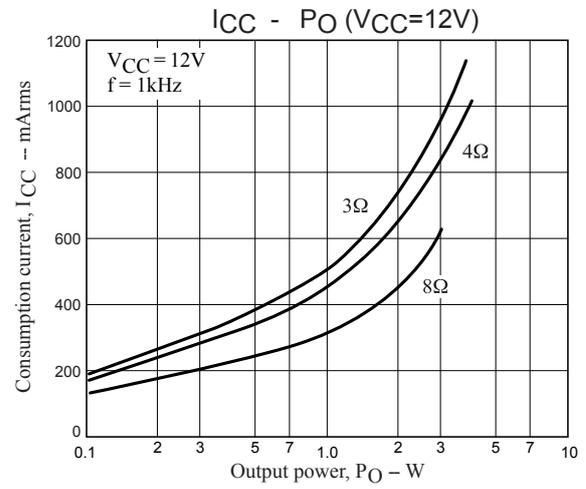
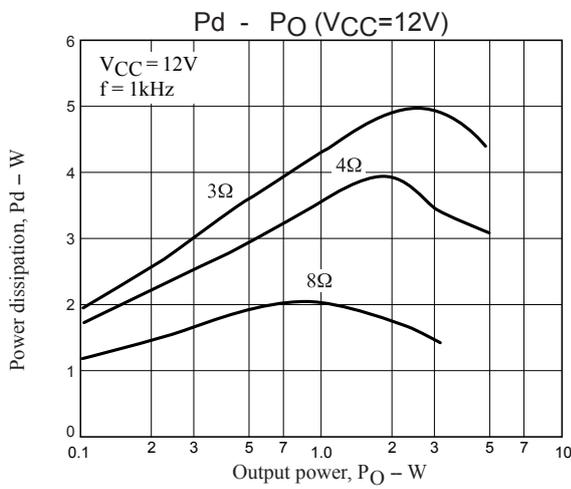
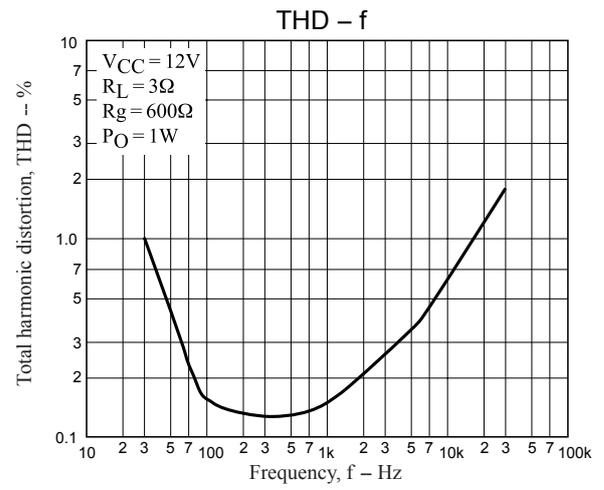
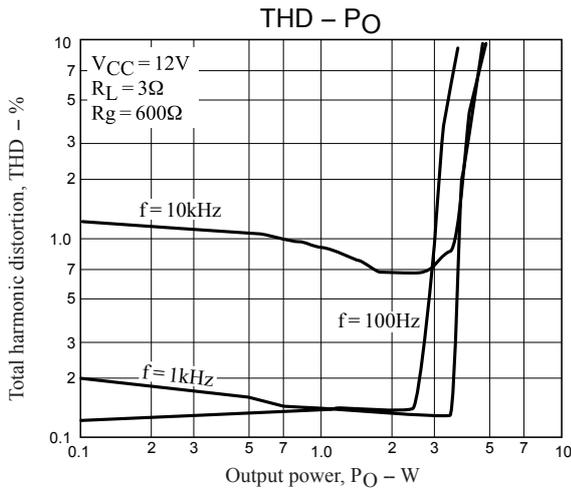
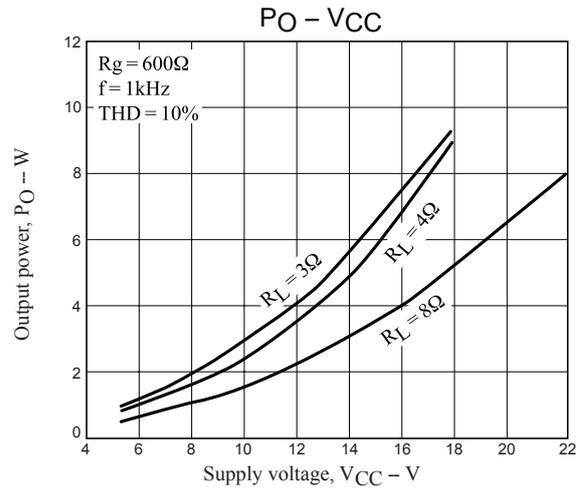
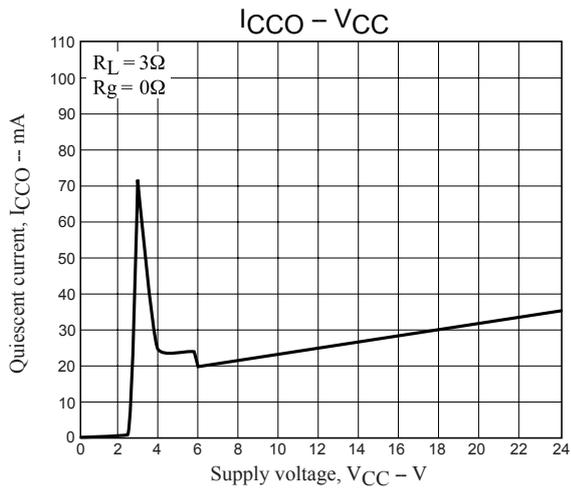
$$R_x = (V_x - 5V) / 4.5mA$$

- If Pin 5 is to be controlled by the microprocessor, the Pin 5 inflow current (I<sub>x</sub>) should be optimized for the capacity of the microprocessor by calculating R<sub>x</sub> using the following equation, as a general guideline, and then confirming the inflow current through actual measurement.

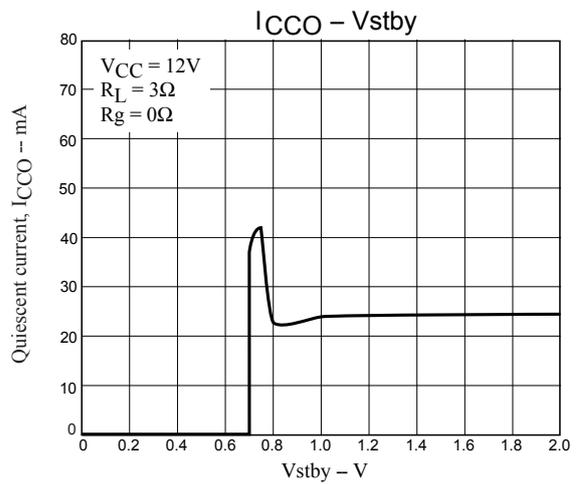
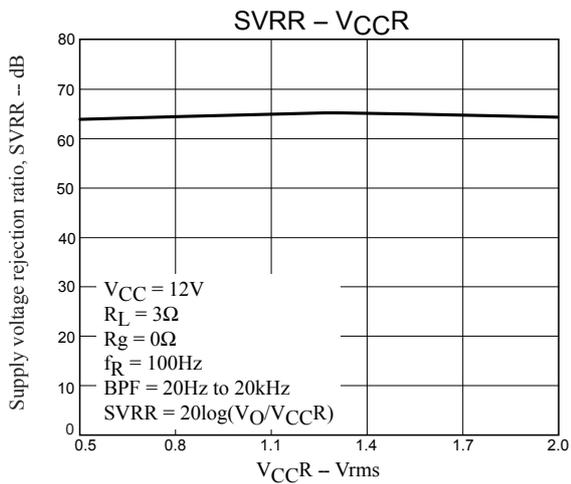
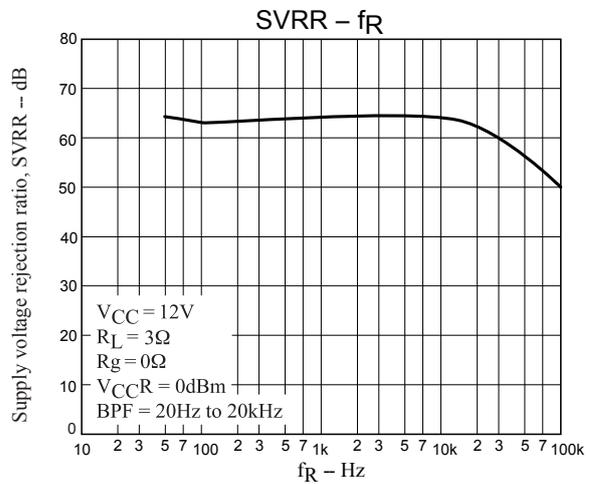
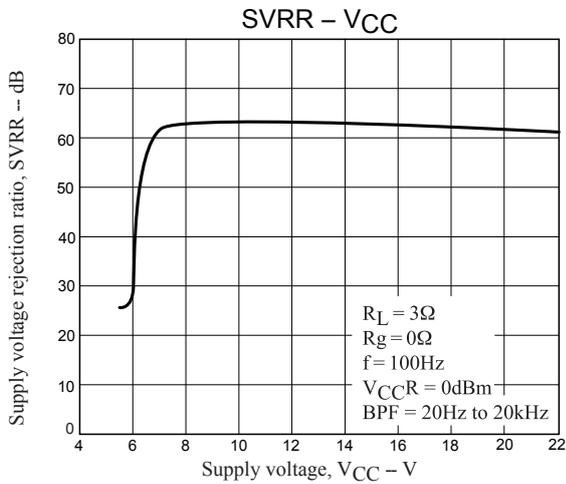
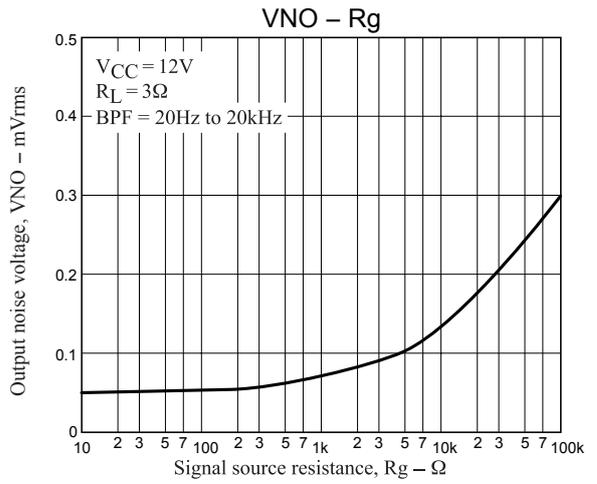
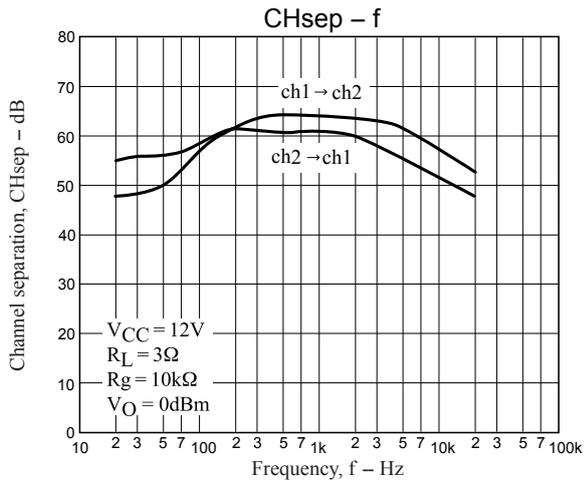
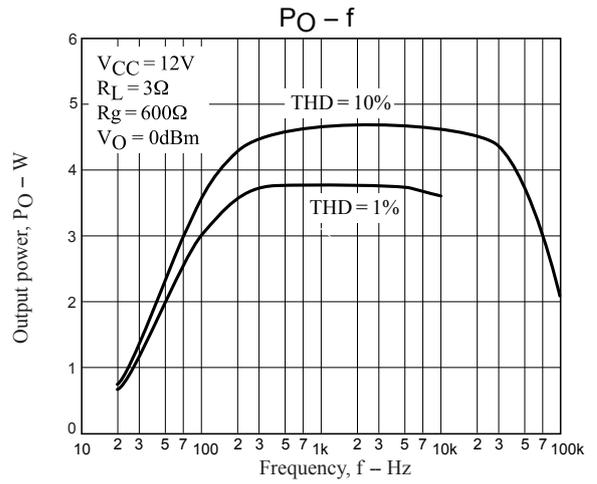
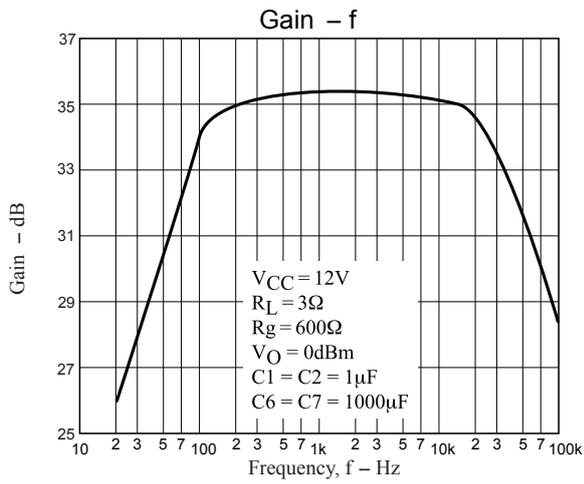
$$R_x = (V_x / I_x) - R_1 (2k\Omega)$$

Note: When apply voltage to standby (Pin 5), please add resistor (R<sub>x</sub>).

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