



SANYO Semiconductors

DATA SHEET

LA4601N — Monolithic Linear IC Audio Power Amplifier for Radio Cassette Recorders

Overview

The LA4601N is a modified package version of the LA4600 power IC that requires an extremely small number of external components. While its main specifications are for use in $V_{CC} = 15V$ systems, it can be used without a heat sink in $V_{CC} = 9V$ systems. The design of the LA4601N obviates the need for external BS and NF capacitors and an oscillation prevention RC circuit, since these functions are integrated in the device itself.

Functions

- Pin compatibility with the LA4600.
- No heat sink required when used at 9V.
- Output power at $V_{CC} = 15V$, 3Ω load: $7.0W \times 2$.
- Built-in standby switch.
- Built-in thermal protection circuit.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$	$R_g = 0$ (No signal)	24	V
Allowable power dissipation	$P_d \text{ max}$	With an arbitrary large heatsink	25	mW
Thermal resistance	θ_{j-c}		3	$^\circ C/W$
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}		15	V
Recommended load resistance	R_L		3	Ω
Operating supply voltage range	$V_{CC \text{ OP}}$	Within maximum ratings	5.0 to 22	V
Operating load resistance range			2.7 to 8	Ω

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LA4601N

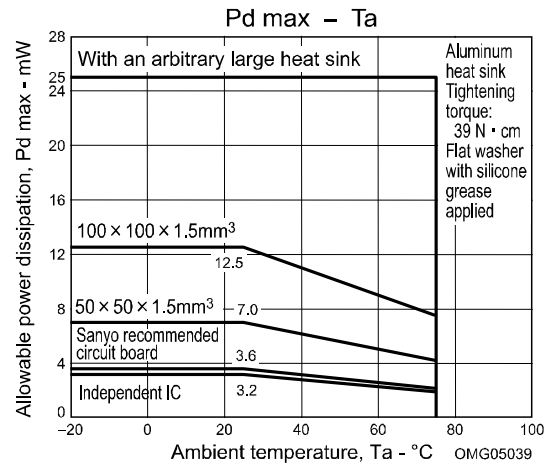
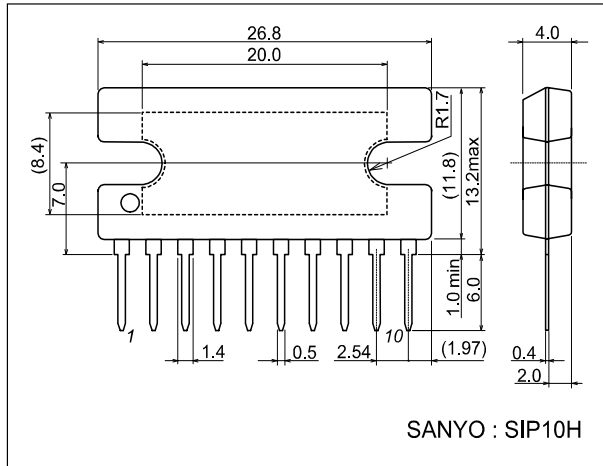
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 15\text{V}$, $R_L = 3\Omega$, $f = 1\text{kHz}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	I_{ST}	Standby pin \rightarrow GND		1.0	10	μA
Quiescent current	I_{CCO}	$R_g = 0$	20	35	80	mA
Voltage gain	V_G	$V_O = 0\text{dBm}$	43.0	45.0	47.0	dB
Total harmonic distortion	THD	$P_O = 1\text{W}$		0.2	0.8	%
Output noise voltage	V_{NO}	$R_g = 0$, DIN AUDIO		0.15	0.5	mV
Output voltage	P_{O1}	THD = 10%	6.0	7.0		W
	P_{O2}	$V_{CC} = 9\text{V}$, $R_L = 4\Omega$, THD = 10%	1.5	2.0		W
Channel separation	Ch sep	$V_O = 0\text{dBm}$, $R_g = 0$, DIN AUDIO	43	50		DB
Ripple rejection ratio	SVRR	$V_R = 0\text{dBm}$, $R_g = 0$, $f_r = 100\text{ Hz}$ DIN AUDIO	43	55		DB
Standby ON voltage	V_{ST}		1.5	5.0		V
Input resistance	R_i		20	30	40	k Ω

Package Dimensions

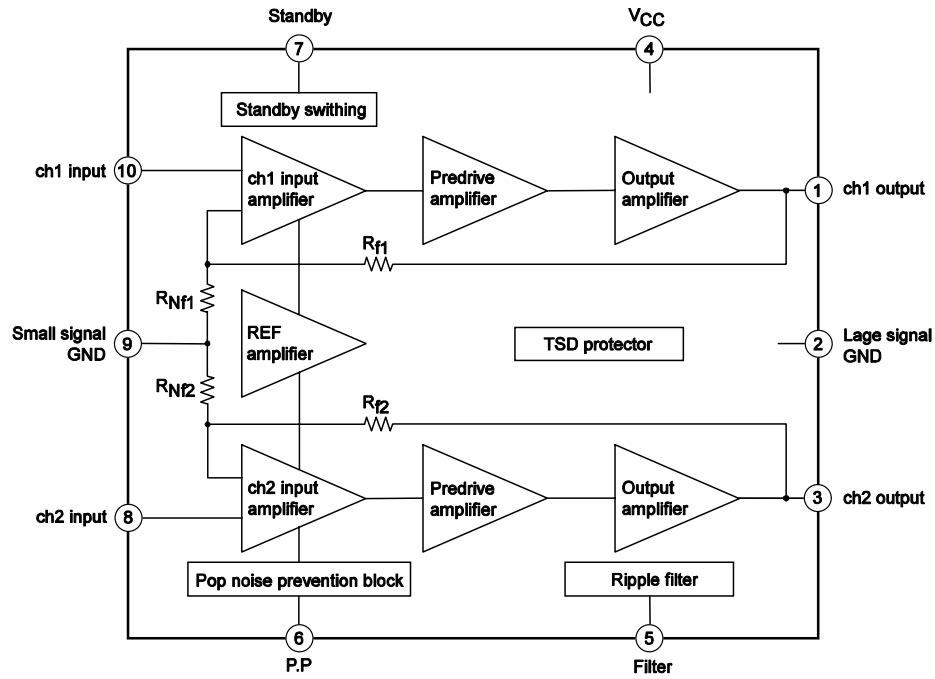
unit : mm

3024B



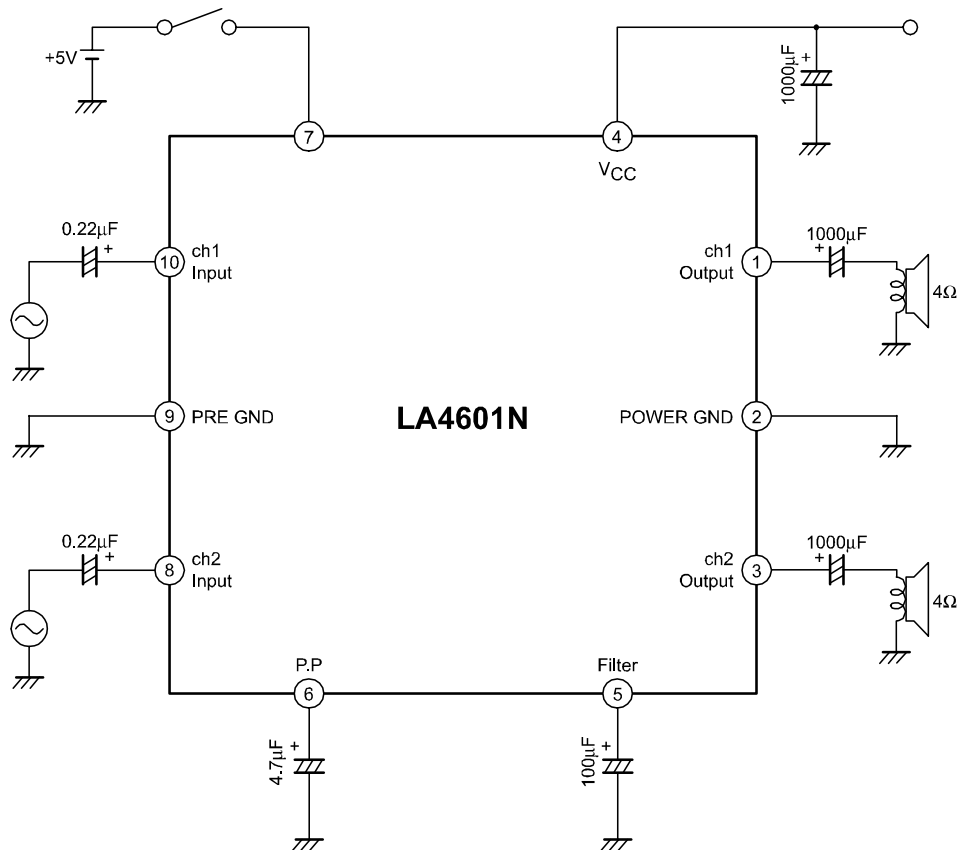
LA4601N

Block Diagram



OMB05085

Sample Application



OMB05086

Pin Descriptions

1. Standby switching function (7)

Power is switched ON and OFF by controlling the High and Low states at pin 7, respectively (standby). To switch power ON, apply 1.5V or more, or 800µA to pin 7.

$$\text{Current supplied to pin 7} \approx \frac{\text{Applied voltage}}{2\text{k}\Omega} + \frac{\text{Applied voltage} - V_{BE} \text{ (approx. } 0.7\text{V)}}{2\text{k}\Omega}$$

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

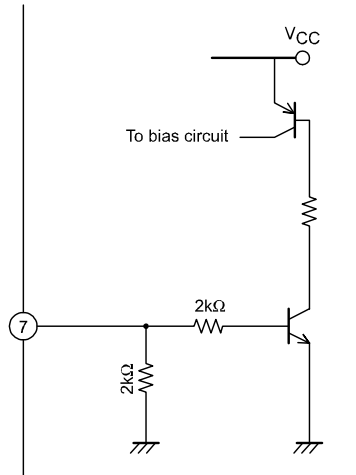
2. Input pins (8,10)

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

Input impedance is approx. 30kΩ.

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

Input capacitor	1.0µF	2.0 µF	3.3 µF	4.7 µF	10 µF
Starting time (ts)	0.2s	0.3s	0.5s	0.65s	1.5s



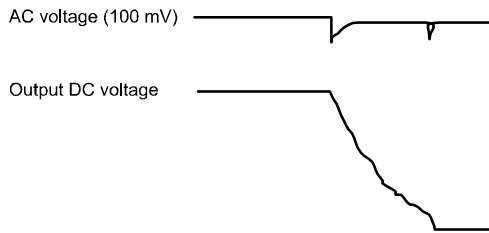
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3. Filter (decoupling) pin (5)

Pin voltage is approx. 1/2 V_{CC}.

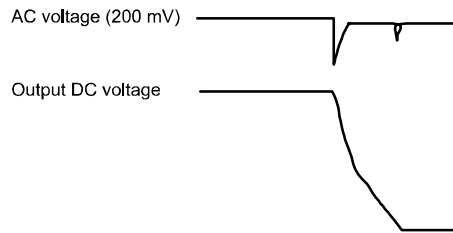
The recommended value for the filter capacitor is 100µF.

When capacitance is lower, pop noise when setting the standby pin to Low (power OFF) will increase.



Filter capacitor = 100µF

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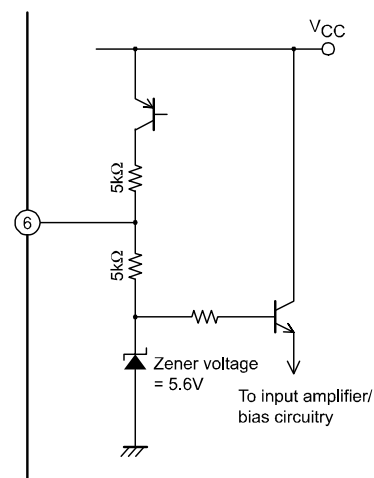
Filter capacitor = 47µF

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4. P.P (pop noise) pin (6)

$$\text{Voltage at pin 6} \approx \frac{V_{CC} - V_{CE} \text{ (approx. } 0.3\text{V)} - 5.6\text{V}}{2\text{k}\Omega} + 5.6\text{V}$$

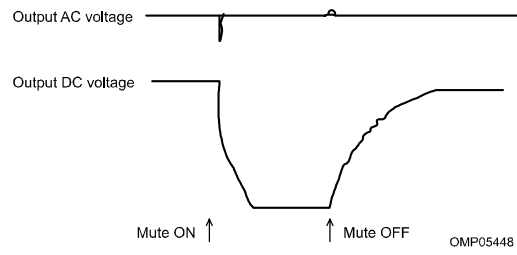
- The recommended value for the P.P capacitor is 4.7µF. When capacitance is lower than 2.2µF, pop noise when setting the standby pin to Low (power OFF) will increase. When capacitance is higher than 10µF, the sound will not be cut off when setting the standby pin to Low (power OFF).

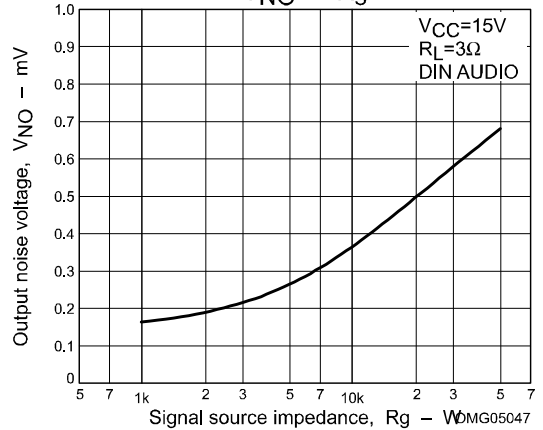
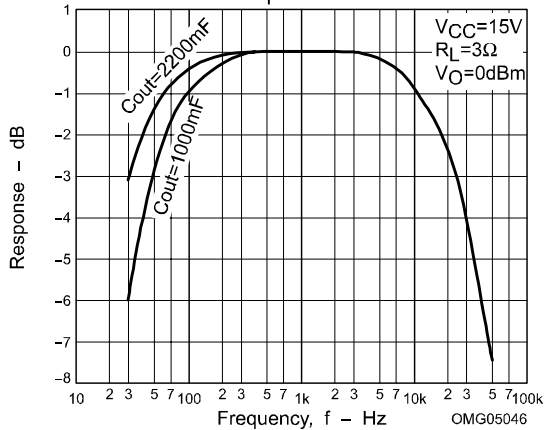
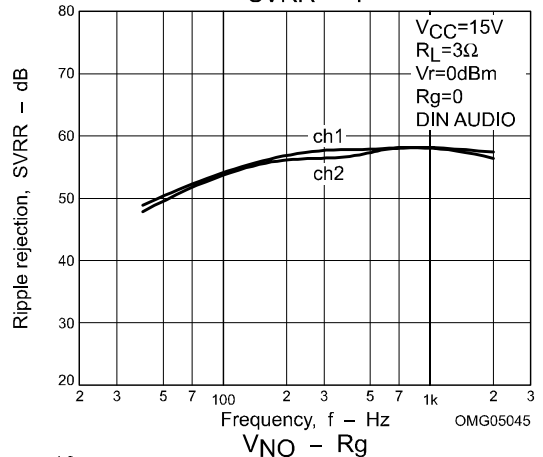
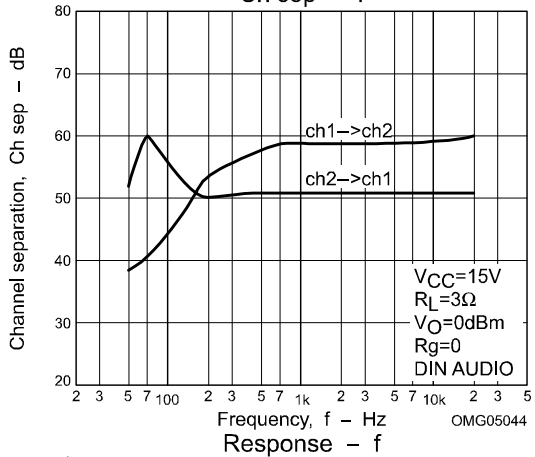
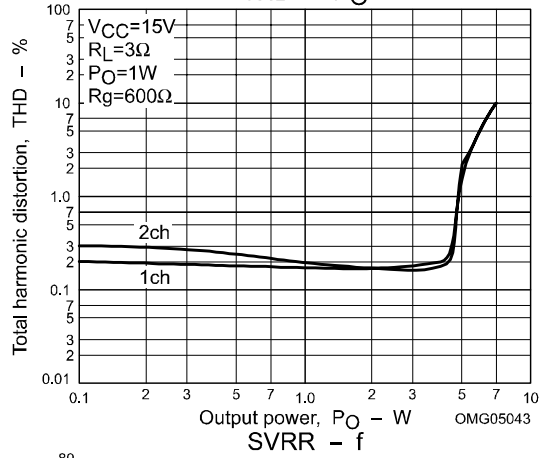
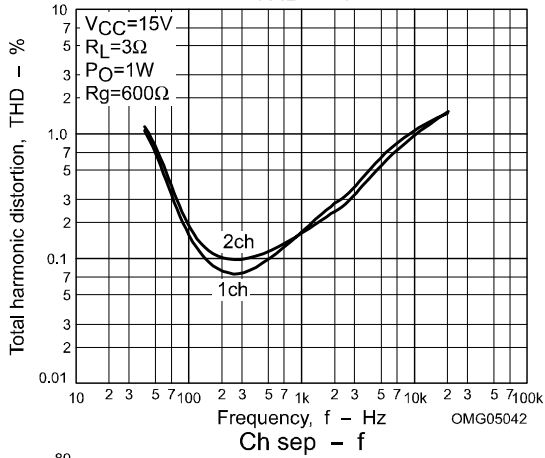
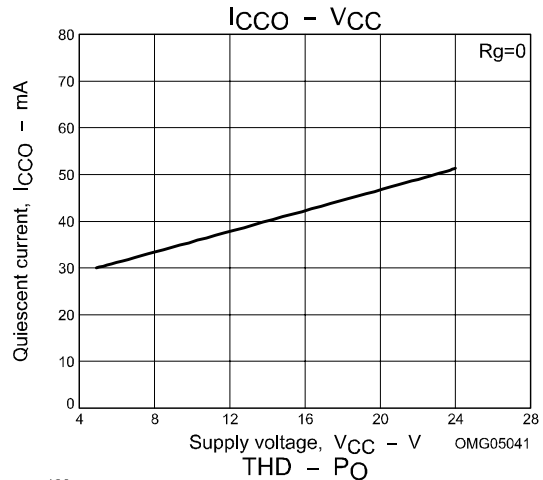
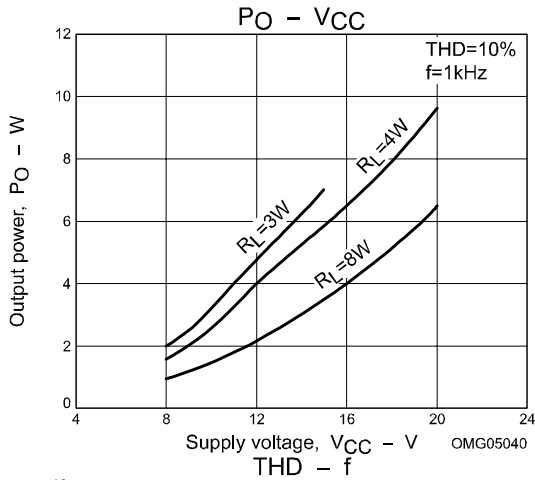


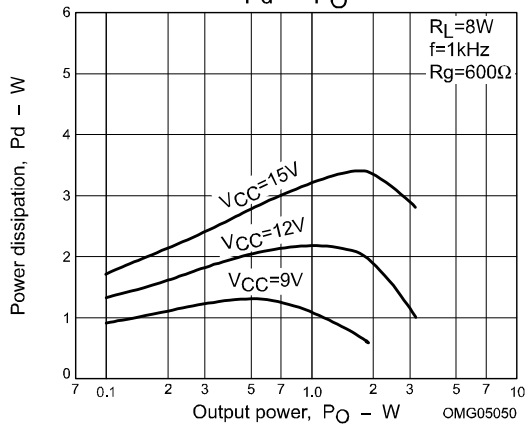
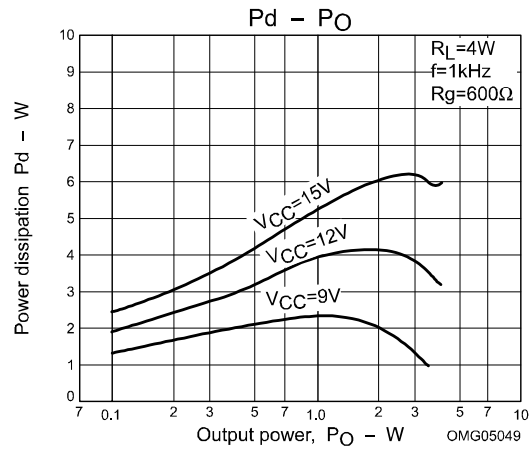
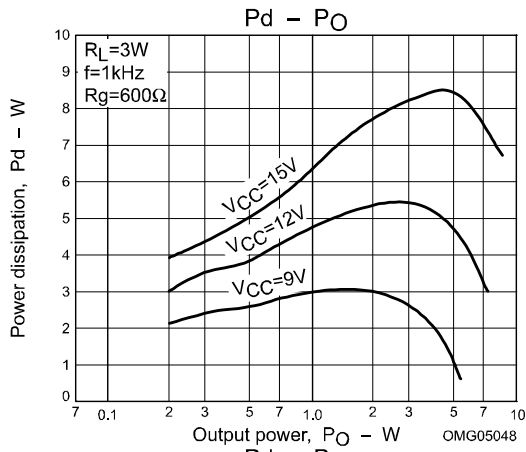
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5. Muting

The output signal can be controlled by connecting pin 5 (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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