Ordering number: ENN7096

Monolithic Linear IC

LA4278

10 W 2-Channel Power Amplifier

Overview

The LA4278 is a 10 W 2-channel power amplifier intended for televisions.
This IC has a series of pin compatible monaural and 2-channel power amplifiers, thus allows the end product to use a common circuit boad.

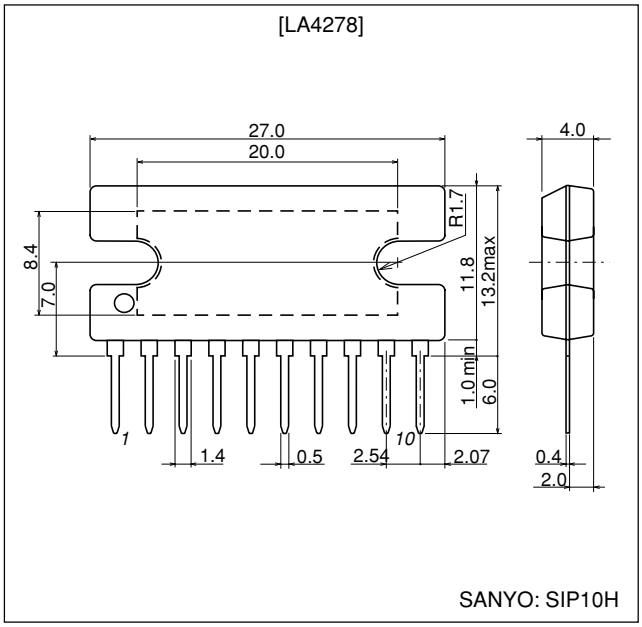
Features

- Television audio output.
- Pin compatible with the LA4266 (3 W)/LA4267 (5 W)/ 4268 (10 W) and the LA4276 (3 W × 2)/4277(5 W × 2).
- Package: SIP-10H (2.54 mm pitch, straight pins).
- Thermal protection circuit and overvoltage protection circuit on chip.
- Output power: 10 W × 2(V_{CC} = 28 V/R_L = 8 Ω).

Package Dimensions

unit: mm

3024A-SIP10H



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}	Rg = 0	35	V
Maximum output current	I_O peak	Per channel	2.5	A
Allowable power dissipation	Pd max	Infinite heat sink	25.0	W
Thermal resistance	θj-c		3.0	°C/W
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		28	V
Load resistance	R_L		8	Ω
Operating supply voltage range	V_{CC} op	Range does not exceed Pd	10 to 34	V

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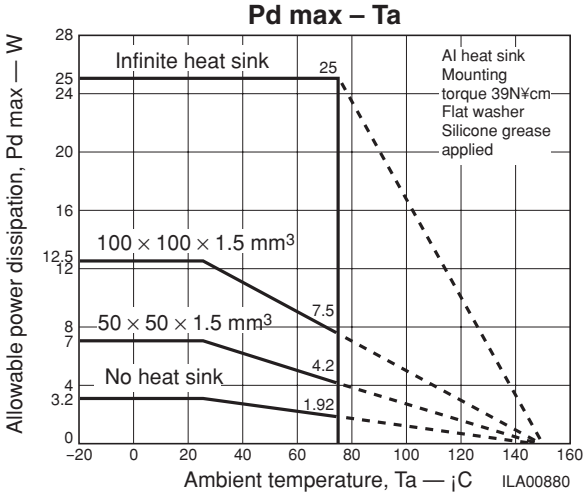
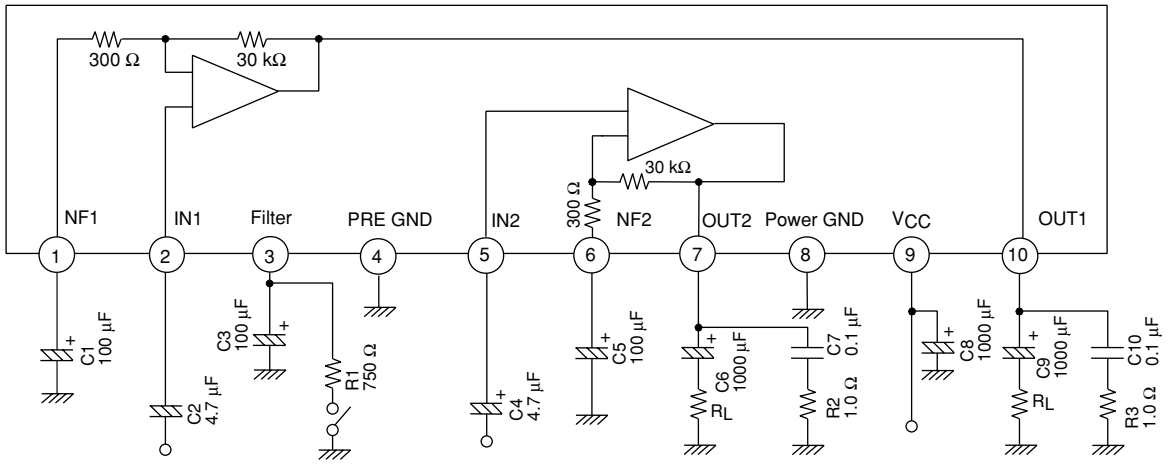
Operating Characteristics at Ta = 25°C, V_{CC} = 28 V, R_L = 8 Ω, f = 1 kHz, Rg = 600 Ω, with specified board, in specified circuit

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}	Rg = 0		55	80	mA
Voltage gain	VG	V_O = 0 dBm	38	40	42	dB
Total harmonic distortion	THD	P_O = 0.5 W		0.1	0.8	%
Output noise voltage	V_{NO}	Rg = 10 kΩ, BPF = 20 Hz to 20 kHz		0.25	1.0	mV
Output power	P_O	THD = 10 %	8.0	10		W
Ripple rejection	SVRR	Rg = 0, f_r = 100 Hz, Vr = 0.5 Vrms	45	55		dB
Crosstalk	CT	Rg = 10 kΩ, V_O = 0 dBm	40	55		dB



Pin Assignment and Equivalent Circuit Diagram



* For Muting, add a resistor between pin 3 and GND. 750 Ω for the LA4266/67/68, 200 Ω for the LA4276/77.

Description of External Parts

C1, C5: Feedback capacitors
Decreasing the capacitance value lowers the low frequency response. Increasing the capacitance value makes the starting time later.

C2, C4: Input capacitors
Because the DC potential of the input pin is not zero, this capacitor can not be omitted. Decreasing the capacitance value to an extremely low level lowers the low frequency response.

C3: Ripple filter capacitor
Decreasing the capacitance value reduces ripple rejection. This capacitor also affects the starting time; decreasing the capacitance value makes the starting time earlier.

C6, C9: Output capacitors
Decreasing the capacitance value causes insufficient power at low frequencies.

C7, C10: Oscillation blocking capacitors
Decreasing the capacitance value causes oscillation to occur easily. Use a mylar film capacitor that has good high frequency response and temperature characteristics. The use of an electrolytic capacitor or a ceramic capacitor may cause oscillation to occur at low temperatures.

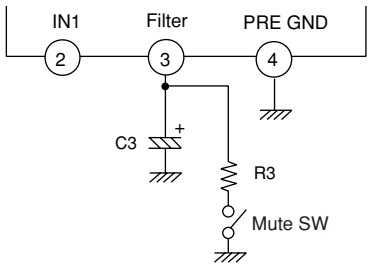
C8: Power capacitor
Decreasing the capacitance value causes ripple to occur easily. Locating this capacitor at a distance from the IC or removing this capacitor may cause oscillation to occur.

R1: Muting resistor
Refer to supplementary discussion "External Muting."

R2, R3: Resistors connected in series with oscillation blocking capacitor
These prevent phase shift in conjunction with the oscillation blocking capacitor so that oscillation does not easily occur. There is an optimal value for the resistor; increasing or decreasing the resistance causes oscillation to occur easily.

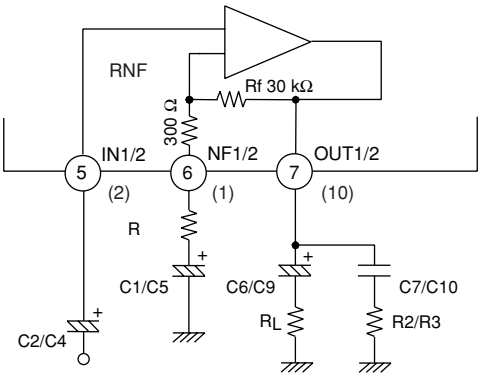
External Muting

- Pull down the electric potential of the ripple filter pin (pin 3).
  Muting becomes possible by inserting the discharge resistor R3 between pin 3 and GND. If the resistance value of R3 is too low, a popping noise is generated; if the resistance value is too high, the muting effect is reduced. (A value of 750 Ω is recommended for R3.)



Voltage Gain

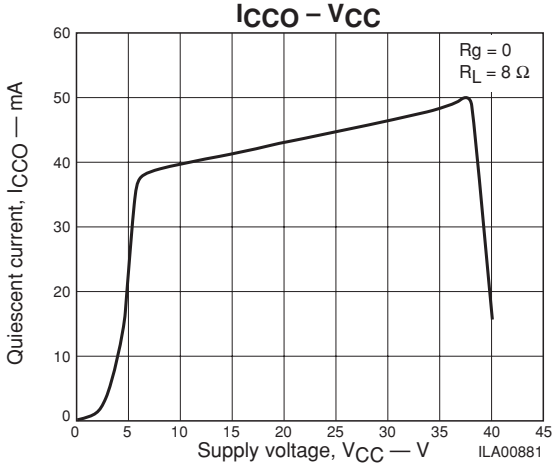
The voltage gain is fixed at 40dB by the ratio of the 30 kΩ and 300 Ω internal resistors. Therefore, it is not possible to use this IC with a voltage gain greater than 40 dB. Although it is possible to use this IC with a voltage gain of less than 40 dB by adding a feedback resistor (RNF) and external resistors (R) as shown in the diagram, doing so causes oscillation to occur easily. Therefore, do not use this IC with a voltage gain of 30dB or less.



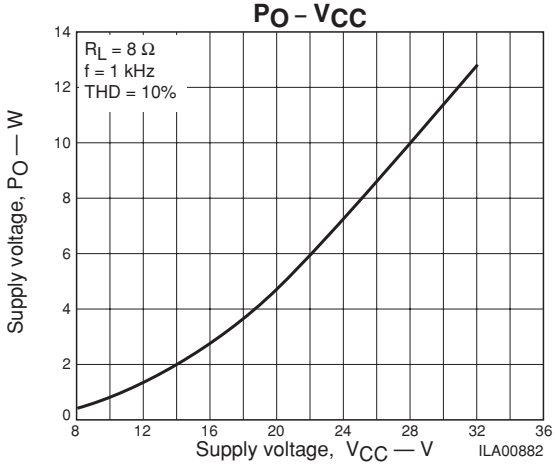
Notes on Using the IC

- Maximum ratings
  When this IC is used near its maximum ratings, it is possible that a slight fluctuation in the operating conditions could cause the maximum ratings to be exceeded, damaging the IC. Therefore, allow for an adequate safety margin in regards to supply voltage, etc., so that the IC is never used under conditions that exceed its maximum ratings.
- Short circuit between pins
  Applying power to the IC while a short circuit exists between two pins can cause damage or deterioration in the IC. Therefore, after mounting the IC on a board, make sure that there are no solder bridges, etc., causing a short circuit between any of the pins before applying power to the IC.
- Using the IC in a radio
  When using this IC in a radio, make sure that there is enough distance between the IC and the bar antenna.
- Printed circuit pattern
  When designing the printed circuit pattern, keep power, output, and ground lines thick and short, and determine the placement of the pattern and the components in such a way as to prevent the generation of an I/O feedback loop.
  In addition, power supply capacitor C8 and oscillation blocking capacitor C7 and C10 should be placed as close as possible to the IC pins in order to prevent oscillation.

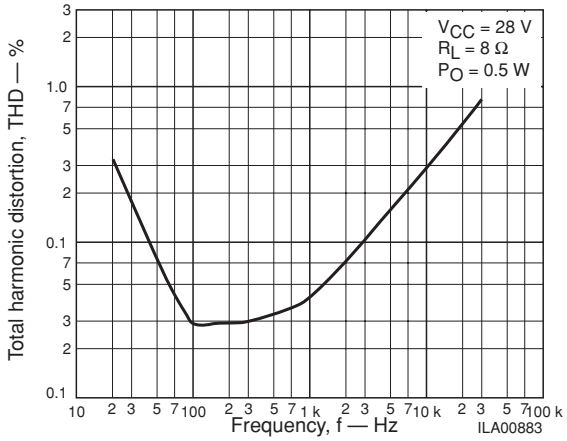
I_{CCO} – V_{CC}



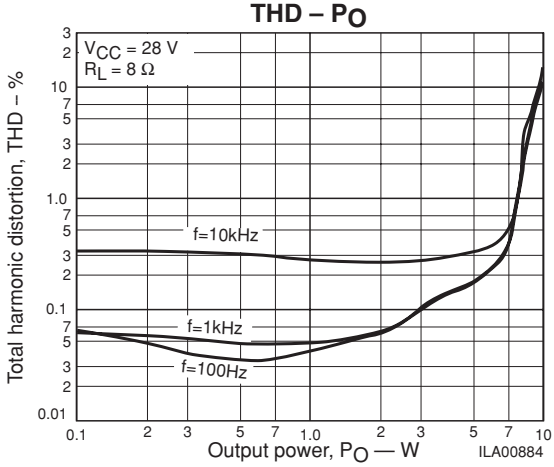
P_O – V_{CC}



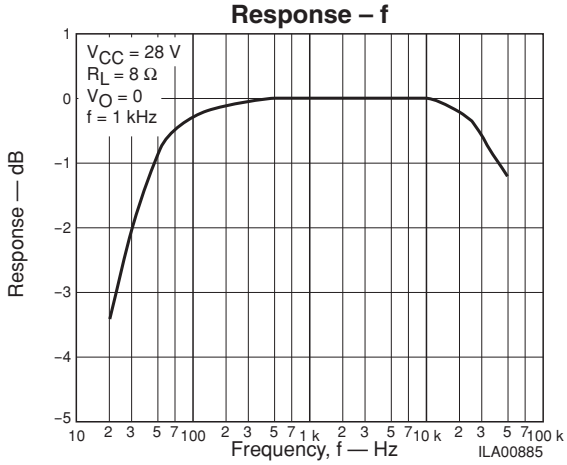
THD – f



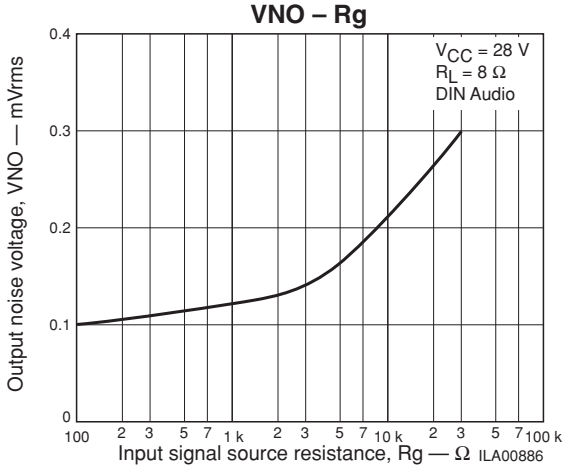
THD – P_O



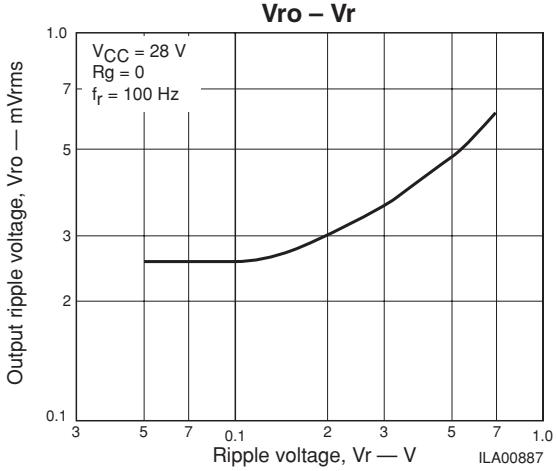
Response – f



VNO – Rg



Vro – Vr



CT – f