



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LA42031 — Monolithic Linear IC Audio Output for TV application 5W Monaural Power Amplifier

Overview

LA42031 is 5W monaural AF power amplifier intended for televisions.

Functions

- 3W Monaural ($V_{CC} = 9V$, $R_L = 8\Omega$, THD = 10%).
- 5W Monaural ($V_{CC} = 11V$, $R_L = 8\Omega$, THD = 10%).
- Built-in standby function.
- Built-in mute function.
- Built-in various protection circuit (short to V_{CC} /short to ground/load shorting/overheating).

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$	No signal	16	V
Allowable power dissipation	$P_d\text{ max}$	Infinitely large heat sink	15	W
Maximum junction temperature	$T_j\text{ max}$		150	$^\circ\text{C}$
Thermal resistance	θ_{jc}		3	$^\circ\text{C}/\text{W}$
Operating temperature	T_{opr}		-25 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +150	$^\circ\text{C}$

Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		9	V
Recommended load resistance	R_L		8	Ω
Allowable operating supply voltage range	$V_{CC\text{ op}}$		5.5 to 15	V

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LA42031

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 9\text{V}$, $R_L = 8\Omega$, $f = 1\text{kHz}$, $R_g = 600\Omega$

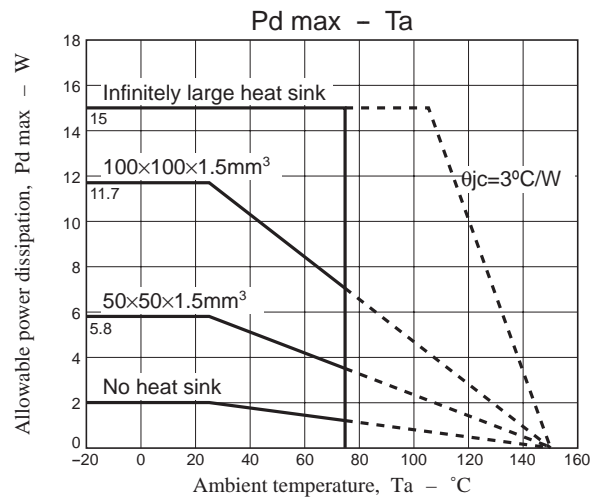
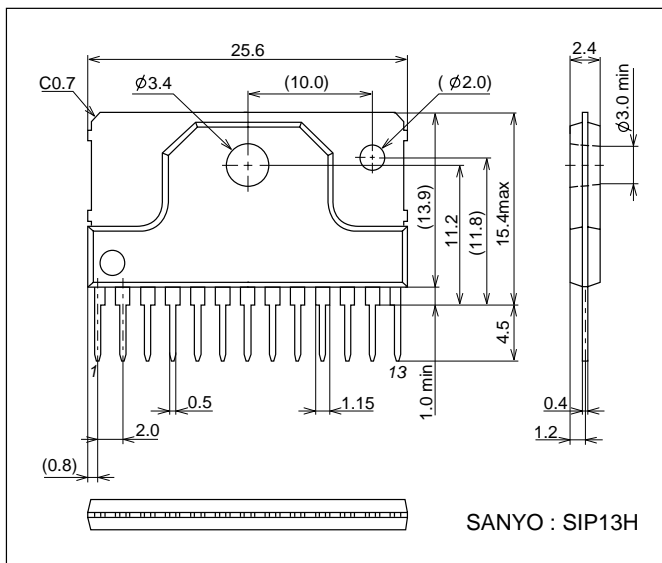
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	I_{st}	Amplifier OFF		0	10	μA
Quiescent current	I_{CCO}	$R_g = 0$, $R_L = \text{OPEN}$	25	45	90	mA
Output power	P_{O1}	THD = 10%	2	3		W
	P_{O2}	$V_{CC} = 11\text{V}$, THD = 10%		5		W
Total harmonic distortion	THD	$P_O = 1\text{W}$		0.06	0.2	%
Voltage gain	VG	$V_O = 0\text{dBm}$	33	35	37	dB
Output noise voltage	V_{NO}	$R_g = 0$, BPF = 20Hz to 20kHz		0.2	0.4	mVrms
Ripple rejection ratio	SVRR	$R_g = 0$, $f_R = 100\text{Hz}$, $V_{CCR} = 0\text{dBm}$	40	50		dB
Mute attenuation value	ATT	$V_O = 1\text{Vrms}$, BPF = 20Hz to 20kHz	80	90		dB
Mute control voltage (pin 6)	V_{mute}	Mute ON *1	1.7		3.0	V
		Mute OFF	0		0.5	V
Standby control voltage (pin 5)	V_{st}	Amplifier ON *1	2.5		15	V
		Amplifier OFF	0		0.5	V
Input resistance	R_i		21	30	39	$\text{k}\Omega$

*1 : Note that the STANDBY pin (pin 5) and MUTE pin (pin 6) incorporate the anti-static diode and that decrease of the V_{CC} 7 pin potential below that of pin 5/6 causes the current to flow through the diode.

Package Dimensions

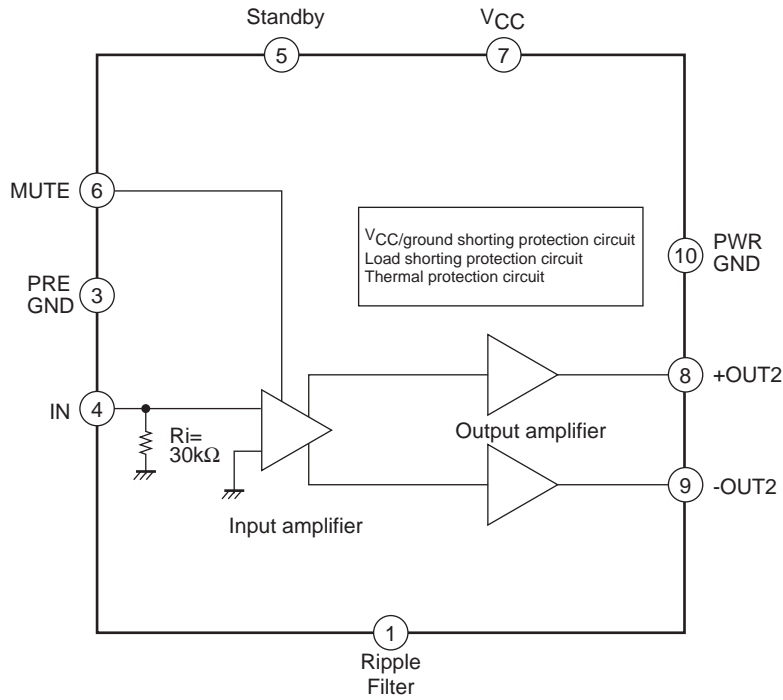
unit : mm (typ)

3107B

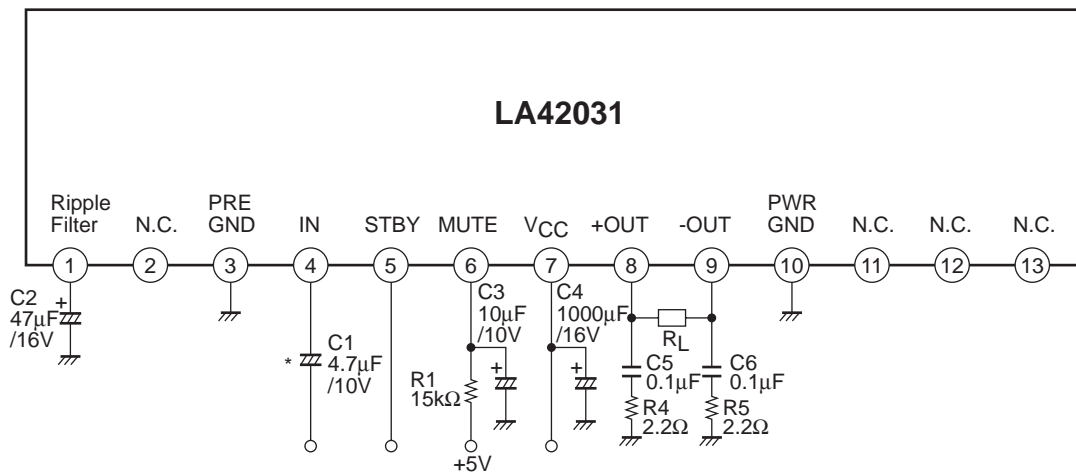


LA42031

Block Diagram



Test Circuit



* LA42031 employs the zero-bias type input circuit, with the input pin potential being nearly zero (about 0.01V). Accordingly, the polarity must be determined according to the DC potential of a circuit connected to the previous stage of LA42031.

External Components

- C1 : The input coupling capacitors, for which 4.7μF or less is recommended. LA42031 employs the zero-bias type input circuit, with the input pin potential being nearly zero (about 0.01V). Accordingly, the polarity must be determined according to the DC potential of a circuit connected to the previous stage of LA42031.
- C2 : Capacitor for starting time of the ripple filter and amplifier, for which 47μF is recommended.
- C3, R1 : Capacitor and resistor for mute. C3 is necessary even when the mute function is not used.
- C4 : Power capacitor.
- C5, C6 : Capacitor and resistor for oscillation prevention. For C5, C6, the polyester film capacitor with superior temperature characteristics (Mylar capacitor) is recommended. Use R2, R3 of 2.2Ω along with the capacitor.

1. Mute function (pin 6)

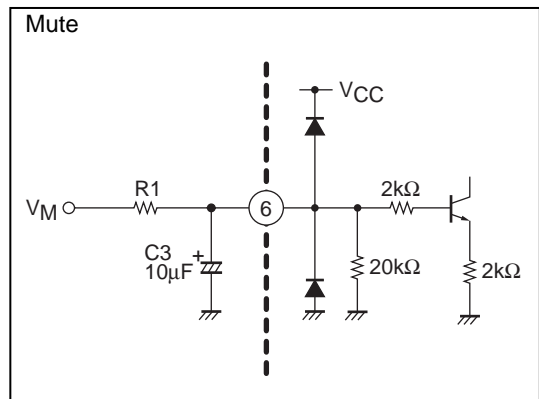
With the pin 6 voltage of 1.7V (minimum) or more, the mute function is turned ON.

Set the V_M application voltage so that the pin 6 voltage becomes. 1.7V or more.

The mute time constant is determined by R1 and C3. Determine the constant after careful review because it is related to the pop sound at mute ON/OFF.

C3 is necessary even when the mute function is not used because it is related to the pop sound when the amplifier is turned ON.

Note that the MUTE pin (pin 6) incorporates the anti-static diode and that decrease of the V_{CC} pin 7 potential below that of pin 6 causes the current to flow through the diode.



2. Standby function (pin 5)

The amplifier is turned ON when the voltage of 2.5V (minimum) or more is applied to pin 5.

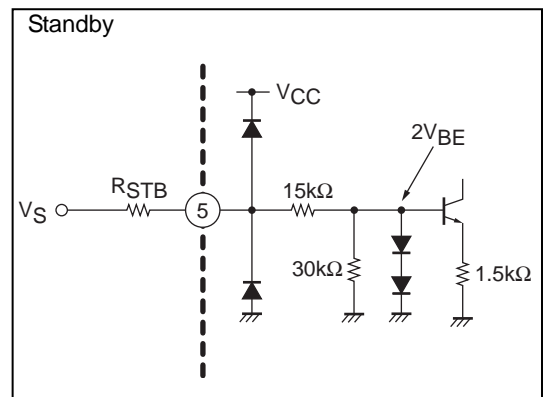
Pin 5 control voltage

Pin 5 voltage	Amplifier	Standby
0 to 0.5	OFF	ON
2.5 to 15	ON	OFF

To suppress the inrush current to pin 5 when the V_{STB} application voltage is high, insert the control resistor (R_{STB}).

Example : To suppress the pin 5 inrush current to 500μA or less

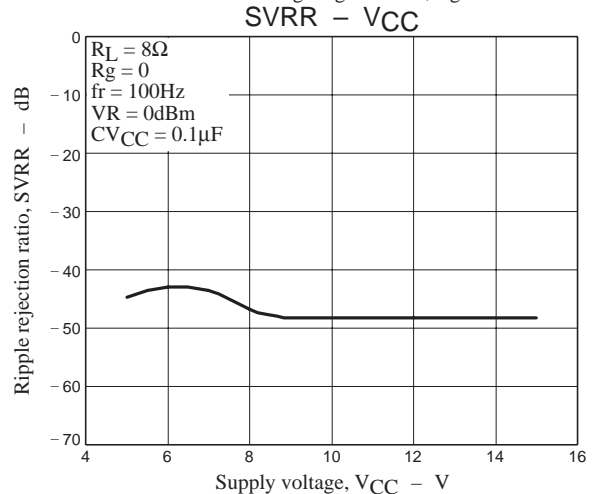
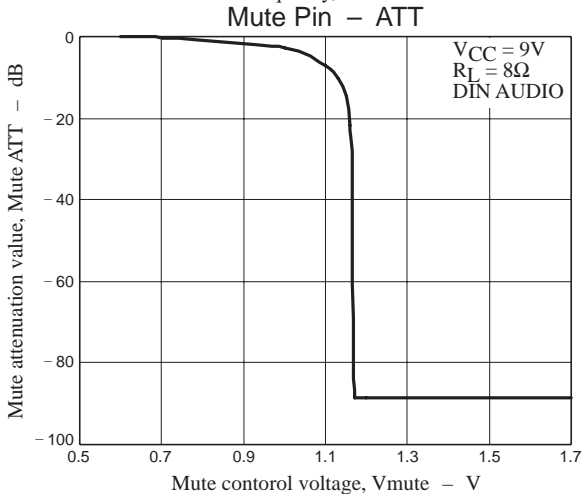
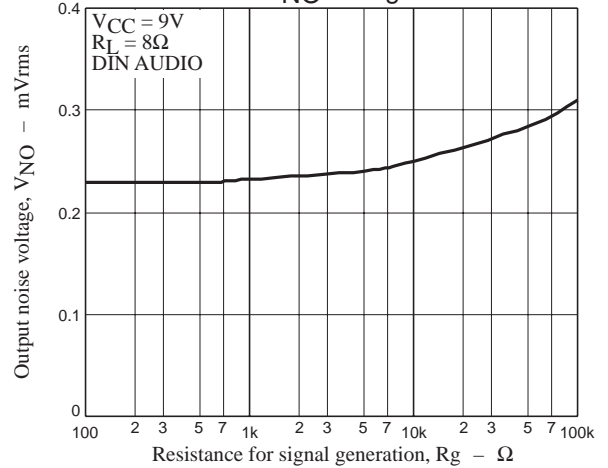
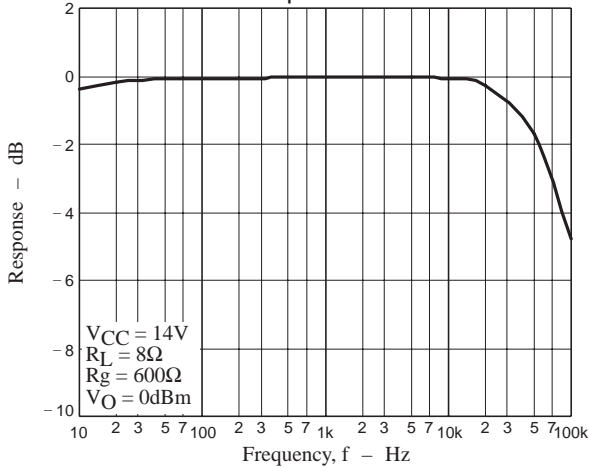
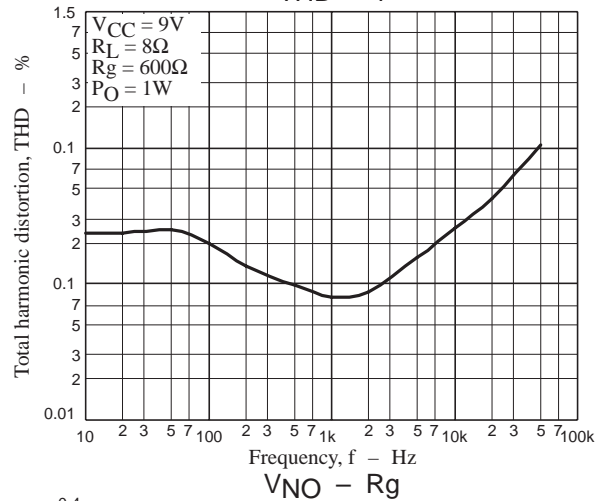
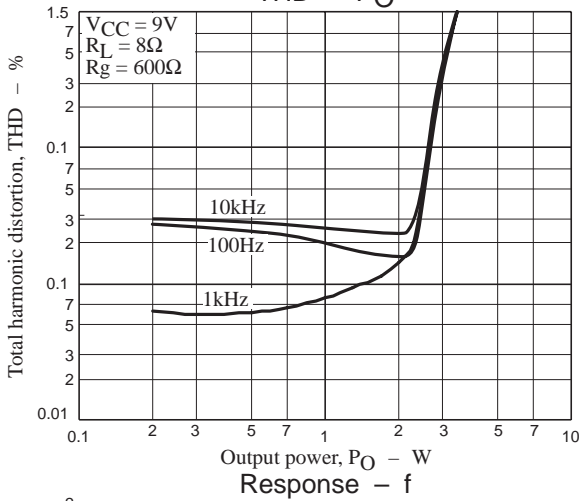
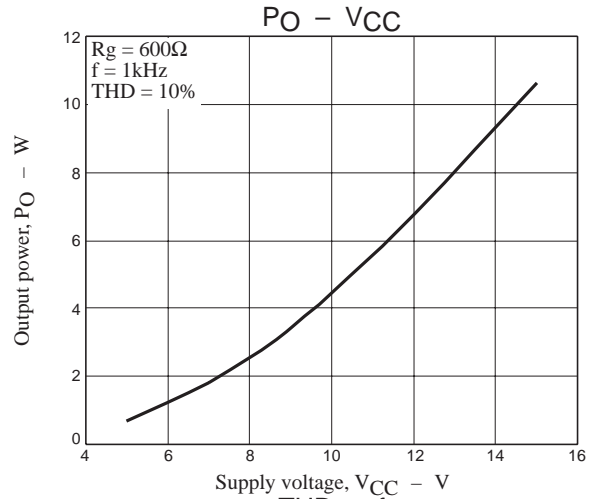
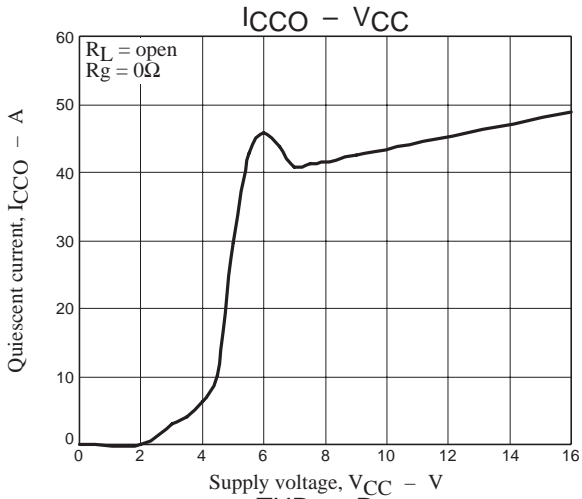
$$R_{STB} = \frac{\text{Applied voltage } (V_{STB}) - 2V_{BE} \text{ (About 1.4V)}}{500\mu\text{A}} - 15\text{k}\Omega$$

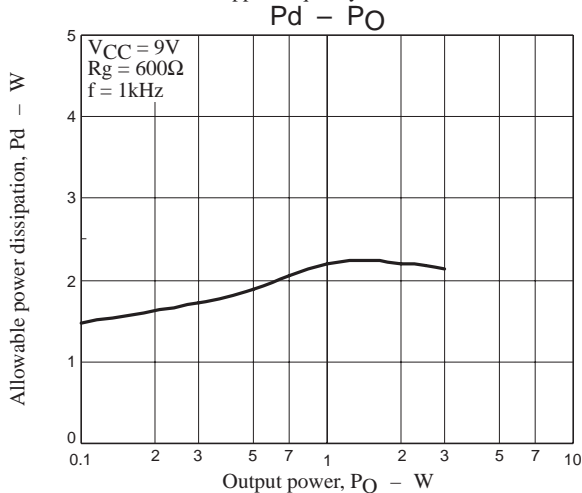
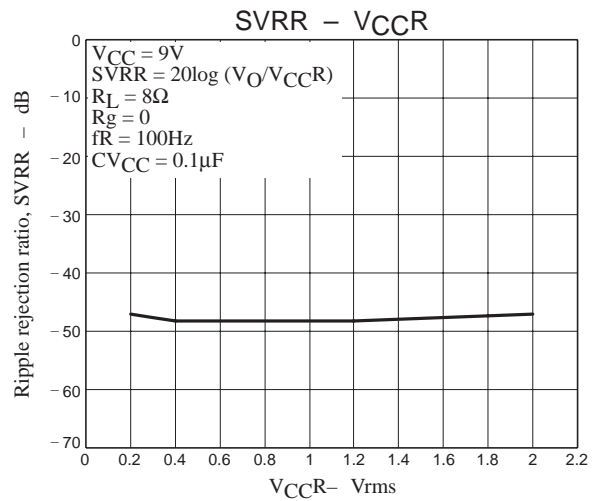
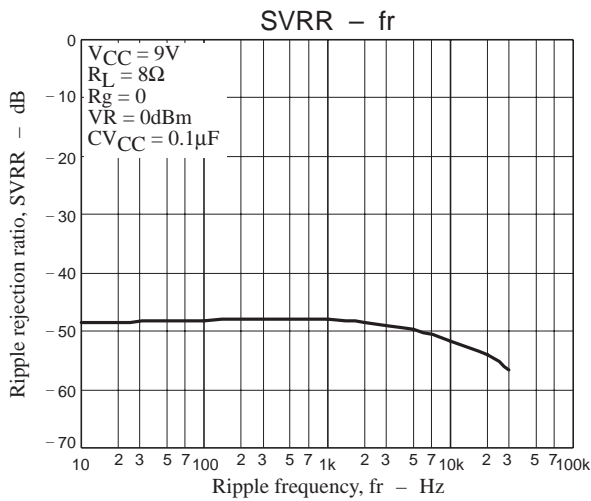


Note that the standby pin (pin 5) incorporates the anti-electrostatic diode, allowing the current to flow through the diode when the potential of V_{CC} pin 7 decreases below that of pin 5.

Cautions for us

1. Short-circuit (power-output short-circuit), ground fault (GND-output short-circuit), and load short-circuit protective circuits are incorporated. They are activated in case of abnormal connection.
These circuits remain active while such abnormal connection continues and is reset automatically when the abnormality is removed.
In certain conditions, the protective circuits may be locked and continue to be active even when the abnormality is removed. In this case, either enter the standby mode or turn OFF the power supply.
2. The thermal protection circuit is incorporated and is activated when the junction temperature (T_j) rises to about 160°C or more. The output is controlled to return gradually to the attenuated state.
3. When the product is used near the maximum rating, even the slightest change in the condition may cause exceeding of the maximum rating, resulting possibly in breakdown. Take the sufficient margin for the supply voltage, etc. and always use the product within a range never exceeding the maximum rating.





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