



# SANYO Semiconductors

## DATA SHEET

# LA42051

Monolithic Linear IC

## — Audio Output for TV Application

## 5W×1ch Power Amplifier

### Overview

LA42051 is 5W 1-channel AF power amplifier intended for televisions.

### Features

- P<sub>O1</sub> 5W×1ch (V<sub>CC</sub> = 18V, R<sub>L</sub> = 8Ω)
- Built-in standby function
- Pop noise reduction function
- Ripple filter
- Thermal protection circuit

LA42000 series is power IC which made Pin compatible altogether in 5 to 15W. They consist of four kinds of power ICs (mono, stereo, mono with volume function, stereo with volume function. They realized PCB layout communalization of an audio power block of TV).

| Model name | P <sub>O</sub> | Channel  |        | Volume |
|------------|----------------|----------|--------|--------|
|            |                | Monaural | Stereo |        |
| LA42051    | 5W             | ○        |        |        |
| LA42052    | 5W             |          | ○      |        |
| LA42351    | 5W             | ○        |        | ○      |
| LA42352    | 5W             |          | ○      | ○      |
| LA42071    | 7W             | ○        |        |        |
| LA42072    | 7W             |          | ○      |        |
| LA42152    | 15W            |          | ○      |        |

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## Specifications

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

| Parameter                    | Symbol        | Conditions         | Ratings     | Unit               |
|------------------------------|---------------|--------------------|-------------|--------------------|
| Maximum supply voltage       | $V_{CC}$ max  | No signal          | 24          | V                  |
| Allowable power dissipation  | $P_d$ max     | Infinite heat sink | 15          | W                  |
| Maximum junction temperature | $T_j$ max     |                    | 150         | $^\circ\text{C}$   |
| Thermal resistance           | $\theta_{jc}$ |                    | 3           | $^\circ\text{C/W}$ |
| Operating temperature        | $T_{opr}$     |                    | -25 to +75  | $^\circ\text{C}$   |
| Storage temperature          | $T_{stg}$     |                    | -40 to +150 | $^\circ\text{C}$   |

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

| Parameter                                | Symbol      | Conditions | Ratings   | Unit     |
|------------------------------------------|-------------|------------|-----------|----------|
| Recommended supply voltage               | $V_{CC}$    |            | 18        | V        |
| Recommended load resistance              | $R_L$       |            | 8         | $\Omega$ |
| Allowable operating supply voltage range | $V_{CC}$ op |            | 5.5 to 22 | V        |

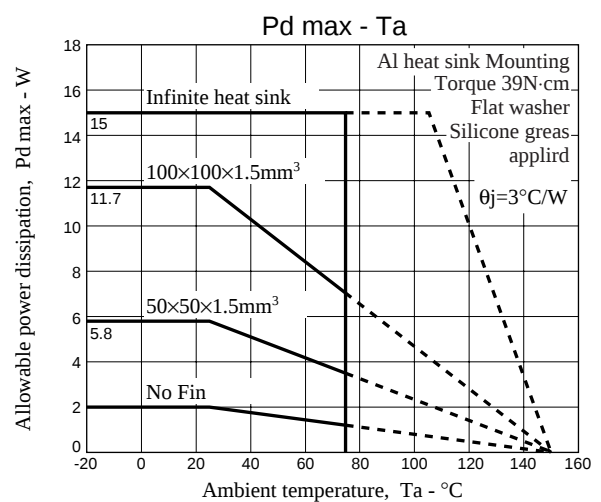
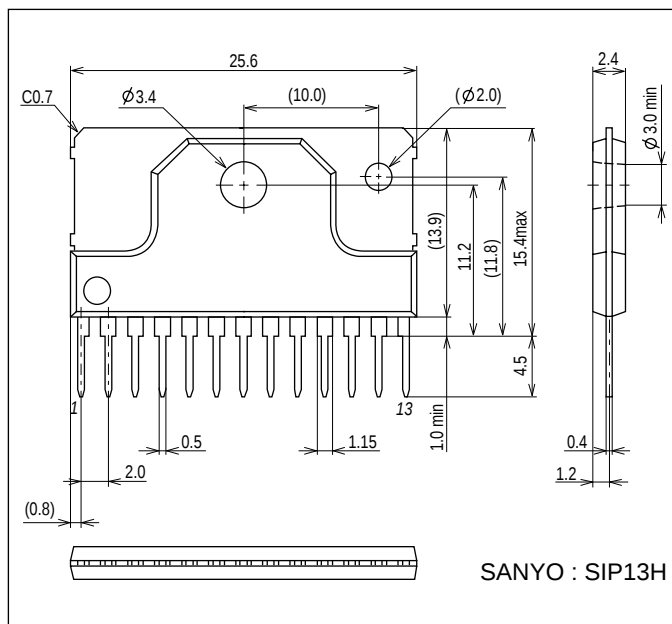
### Operating Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 18\text{V}$ , $R_L = 8\Omega$ , $f = 1\text{kHz}$ , $R_g = 600\Omega$

| Parameter                       | Symbol      | Conditions                                                       | Ratings |      |      | Unit          |
|---------------------------------|-------------|------------------------------------------------------------------|---------|------|------|---------------|
|                                 |             |                                                                  | min     | typ  | max  |               |
| Standby current                 | $I_{STB}$   | Amplifier off                                                    |         | 1    | 10   | $\mu\text{A}$ |
| Quiescent current               | $I_{CCO}$   | $R_g = 0\Omega$                                                  | 15      | 25   | 50   | mA            |
| Output power                    | $P_O$       | THD = 10%                                                        | 4       | 5    |      | W             |
| Total harmonic distortion       | THD         | $P_O = 1\text{W}$                                                |         | 0.15 | 0.4  | %             |
| Voltage gain                    | VG          | $V_O = 0\text{dBm}$                                              | 33      | 35   | 37   | dB            |
| Output noise voltage            | $V_{NO}$    | $R_g = 0\Omega$ , BPF = 20Hz to 20kHz                            |         | 0.05 | 0.25 | mVrms         |
| Ripple rejection                | SVRR        | $R_g = 0\Omega$ , $f_R = 100\text{Hz}$ , $V_{CCR} = 0\text{dBm}$ | 50      | 60   |      | dB            |
| Standby control voltage (Pin 5) | $V_{STB-H}$ | Amplifier on                                                     | 1       |      | 5    | V             |
|                                 | $V_{STB-L}$ | Amplifier off                                                    | 0       |      | 0.5  | V             |
| Input resistance                | $R_i$       |                                                                  | 21      | 30   | 39   | $k\Omega$     |

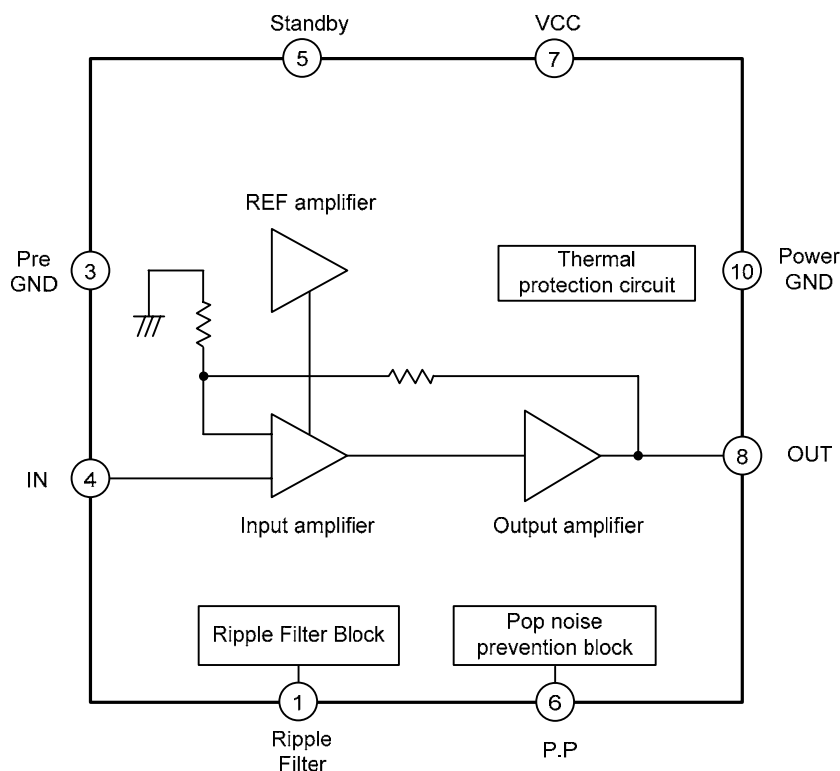
## Package Dimensions

unit : mm (typ)

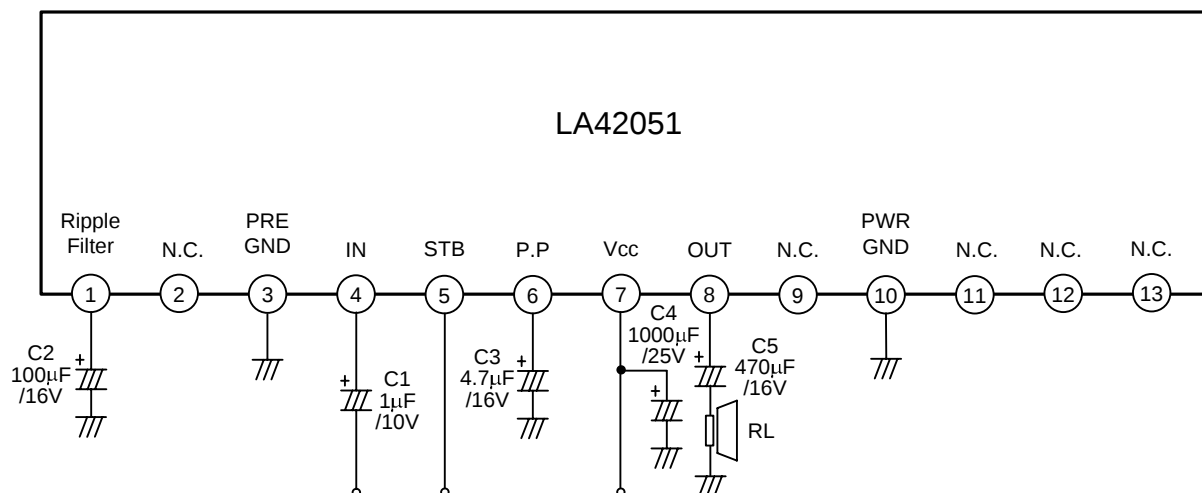
3107B



## Block Diagram



## Test Circuit



## Description of External parts

- C1 : Input coupling capacitor, for which 1.0μF is recommended. The potential of input pin is  $2V_{BE}$  (about 1.4V). Therefore, the polarity must be determined according to the DC potential of the circuit connected to the previous step of LA42051.
- C2 : Capacitor for ripple filter, for which 100μF is recommended.
- C3 : Capacitor for attenuation of pop noise, for which 4.7μF is recommended.
- C4 : Power supply capacitor.
- C5 : Output capacitor, for which 470μF is recommended. Determine the constant while taking into account a fact that, with the capacitance set to 470μF or less, the roll-off frequency decreases in the low range.

### 1. Standby function (pin 5)

The amplifier can be turned ON/OFF through HIGH/LOW control of pin 5.

The amplifier is turned ON when the voltage of 1.0V (min) or more is applied to pin 5.

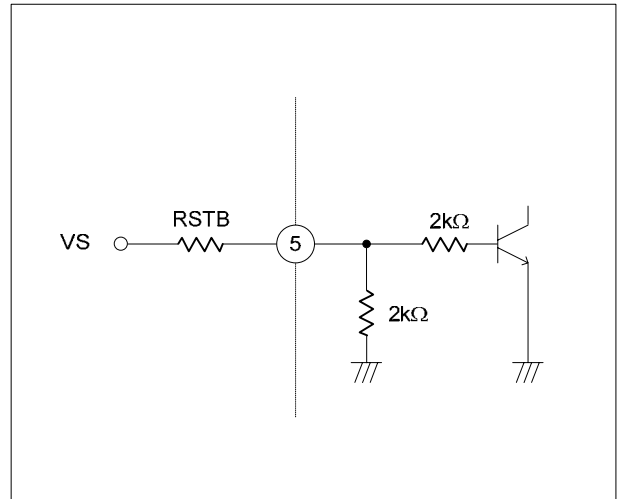
#### Pin 5 control voltage

| Voltage of pin 5 | Amplifier | Standby |
|------------------|-----------|---------|
| 0 to 0.5         | OFF       | ON      |
| 1.0 to 5.0       | ON        | OFF     |

Insert a limiting resistor (RSTB) when the inrush current to pin 5 is to be limited if the application voltage to VS is high.

Example: when VS=5V, RSTB=5.1kΩ is inserted

The inrush current to pin 5 is about 750μA and the potential of pin 5 is about 1.2V.



### 2. Ripple filter and MUTE function (Pin 1)

The potential of pin 1 is about 1/2 VCC. Muting to control the output signal becomes effective by shifting down pin 1 with 300 to 500Ω. Note that the MUTE suppression rate decreases when the resistance exceeds 750Ω.

### 3. Input pin (Pin 4)

The potential of input pin is 2VBE (about 1.4V). Therefore, the polarity must be determined according to the DC potential of the circuit connected to the previous step of LA42051. The standard input resistance is 30kΩ.

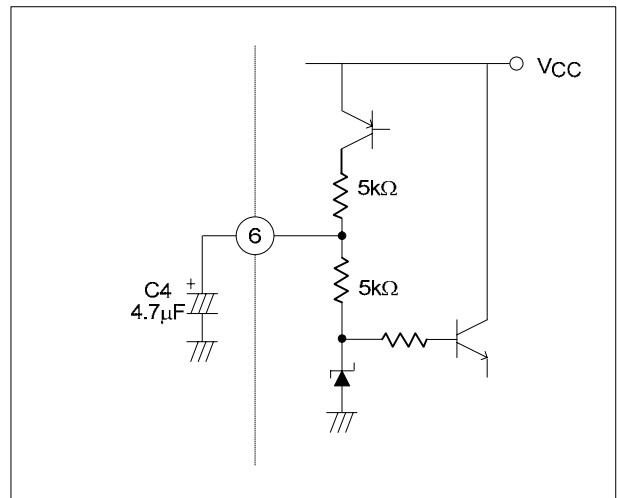
For the input capacitor, 1.0μF is recommended. The starting time with power ON in this case is about 0.2s.

The starting time becomes about 1.5s when the capacitance is 10μF.

### 4. P.P (Pin 6)

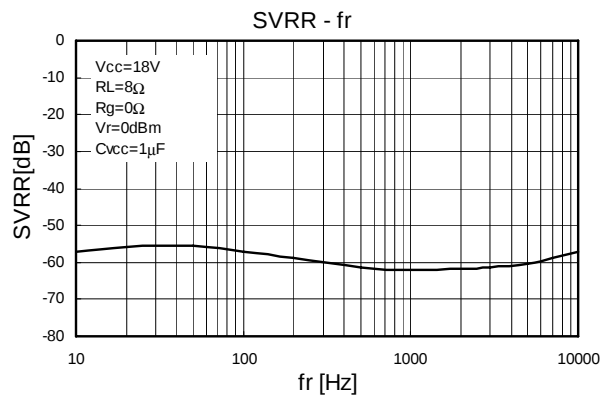
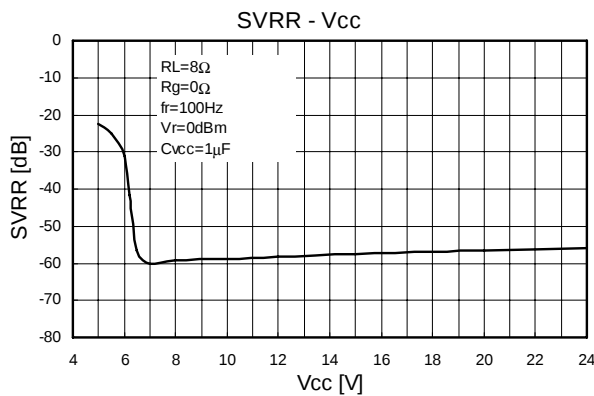
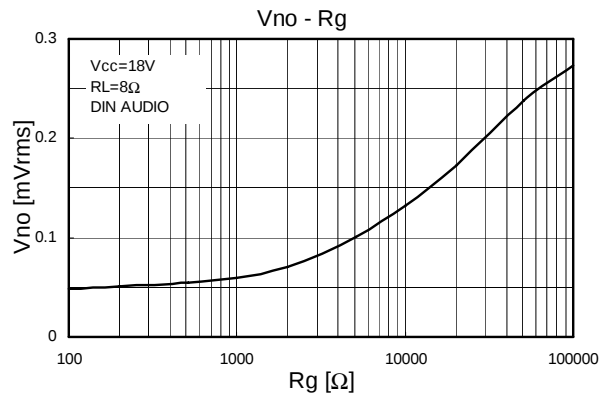
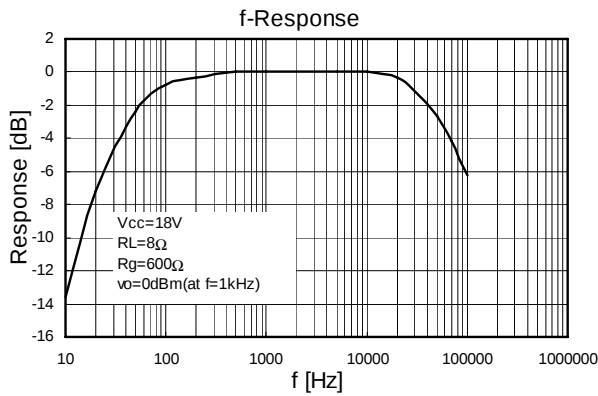
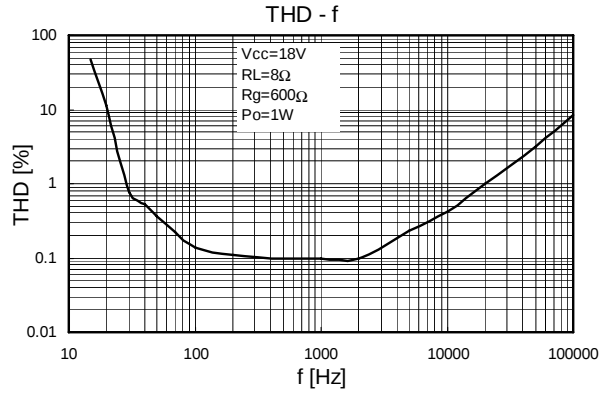
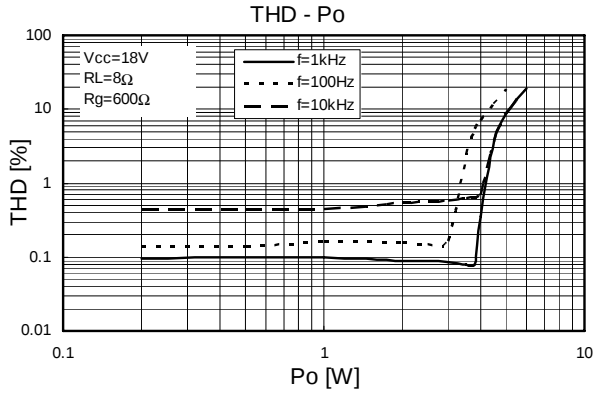
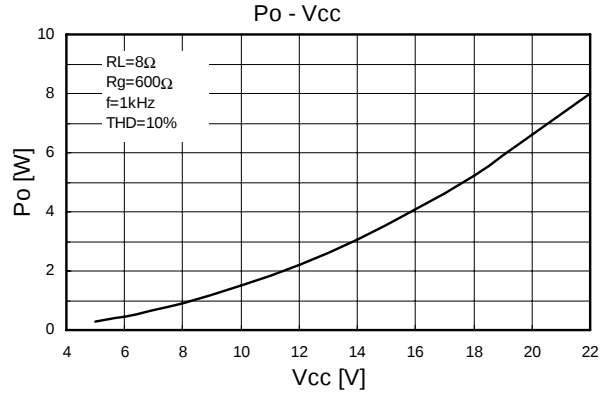
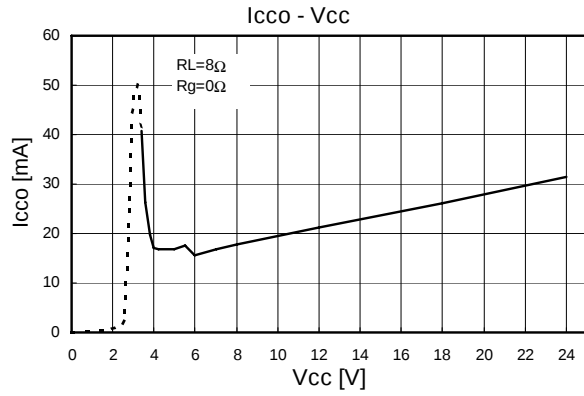
This is the pin to attenuate the pop noise during power ON/OFF. Note that, with the capacitance set at 10μF or more, the sound may remain because the signal is not cut off.

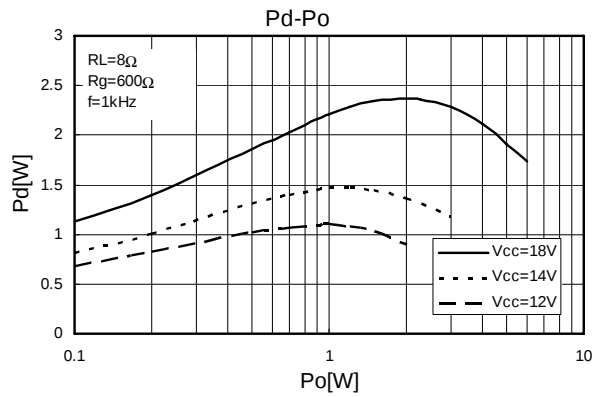
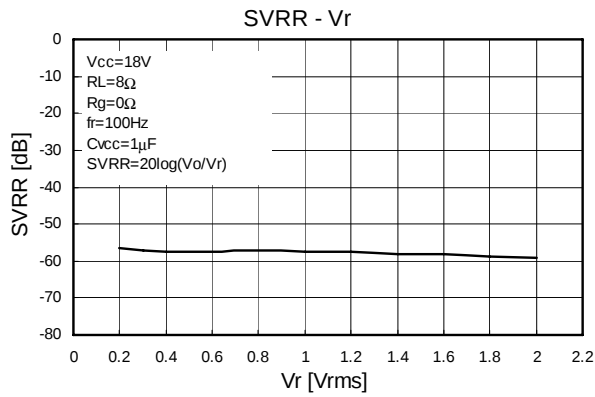
$$\text{Pin 6 potential} = \frac{V_{CC} - V_{CE} (\text{about } 0.3V) - 5.6V}{2} + 5.6V$$



## Cautions for use

- As power fault (power supply - output short-circuit) and ground fault (GND - output short-circuit) protective circuits are not incorporated, due care must be taken during use.
- The thermal protective circuit is incorporated, which is activated when the junction temperature (Tj) rises to about 160°C or more, controlling the output gradually to the attenuated condition.
- During use near the maximum rating, the product may suffer damage if the slightest fluctuation of condition exceeds the maximum rating. Be sure to use the product within a range which never exceeds the maximum rating while allowing sufficient margin for the supply voltage, etc.





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