



SANYO Semiconductors

# DATA SHEET

## LA42352 — Monolithic Linear IC 5W 2-Channel AF Power Amplifier With DC Volume Control

### Overview

LA42352 is 5W 2-channel AF power amplifier with DC volume control intended for televisions.

LA42000 series is power IC which made Pin compatible possible altogether in 3 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.

|         | PO  | Channel |        | Volume |
|---------|-----|---------|--------|--------|
|         |     | Mono    | Stereo |        |
| LA42051 | 5W  | ○       |        |        |
| LA42052 | 5W  |         | ○      |        |
| LA42351 | 5W  | ○       |        | ○      |
| LA42352 | 5W  |         | ○      | ○      |
| LA42071 | 7W  | ○       |        |        |
| LA42072 | 7W  |         | ○      |        |
| LA42152 | 15W |         | ○      |        |

### Feature

- PO 5W×2ch ( $V_{CC} = 18V$ ,  $R_L = 8\Omega$ , THD = 10%)
- Built-in DC Volume Control.
- Built-in Standby function.
- Built-in overheat protection.

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# LA42352

## Specifications

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

| Parameter                    | Symbol              | Conditions         | Ratings     | Unit               |
|------------------------------|---------------------|--------------------|-------------|--------------------|
| Maximum supply voltage       | $V_{CC\text{ max}}$ | No signal          | 24          | V                  |
| Allowable power dissipation  | $P_{d\text{ max}}$  | Infinite heat sink | 15          | W                  |
| Maximum junction temperature | $T_{j\text{ max}}$  |                    | 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 Conditions at  $T_a = 25\text{ }^\circ\text{C}$

| Parameter                         | Symbol             | Conditions | Ratings  | Unit     |
|-----------------------------------|--------------------|------------|----------|----------|
| Recommended supply voltage        | $V_{CC}$           |            | 18       | V        |
| Recommended load resistance       | $R_L$              |            | 8        | $\Omega$ |
| Allowable operating voltage range | $V_{CC\text{ op}}$ |            | 10 to 22 | V        |

Operating Characteristics at  $T_a = 25\text{ }^\circ\text{C}$ ,  $V_{CC} = 18\text{V}$ ,  $R_L = 8\Omega$ , Volume = 5V,  $f = 1\text{kHz}$ ,  $R_g = 600\Omega$

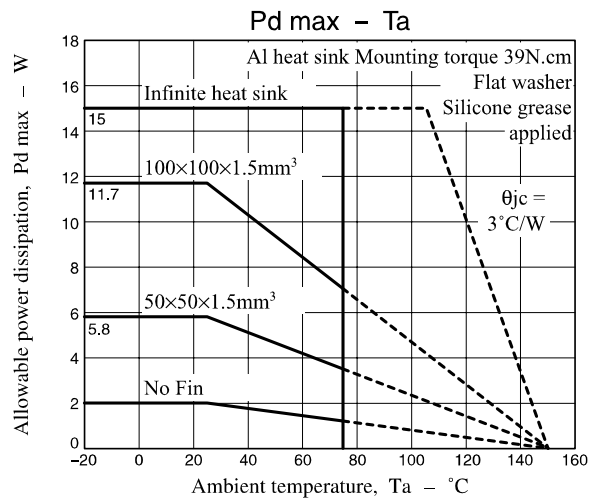
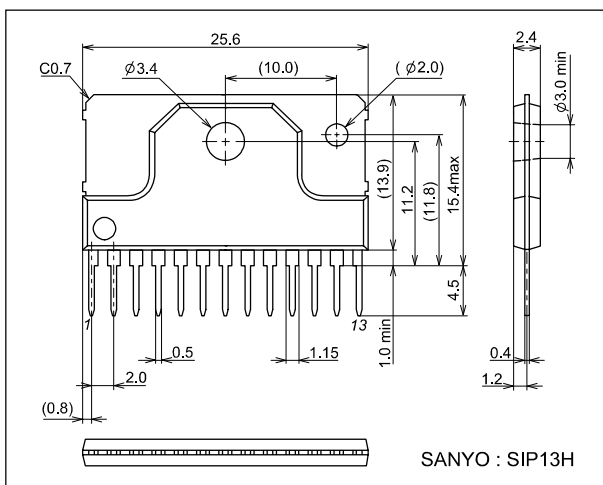
| Parameter                                      | Symbol      | Conditions   | Ratings |      |      | Unit             |
|--|-------------|--|---------|------|------|------------------|
|  |             |  | min     | typ  | max  |                  |
| Standby current                                | $I_{STB}$   | Amplifier off  |         | 1    | 10   | $\mu\text{A}$    |
| Quiescent current                              | $I_{CCO}$   | $R_g = 0$ , Volume = 0V  | 35      | 65   | 130  | mA               |
| Output power                                   | $P_O$       | THD = 10%  | 4       | 5    |      | W                |
| Total harmonic distortion                      | THD         | $P_O = 1\text{W}$  |         | 0.1  | 0.8  | %                |
| Voltage gain                                   | VG          | $V_O = 0\text{dBm}$  | 32.5    | 34.5 | 36.5 | dB               |
| Output noise voltage                           | $V_{NO}$    | $R_g = 0$ , Volume = 0V,<br>BPF = 20Hz to 20kHz                |         | 0.13 | 0.4  | mVrms            |
| Volume Attenuation                             | Att         | $V_{IN} = 100\text{mV}$ , $V_{cont} = 0\text{V}$ , with 1k-BPF | 70      | 80   |      | dB               |
| Channel separation                             | Sep.        | $R_g = 10\text{k}\Omega$ , $V_O = 0\text{dBm}$                 | 48      | 55   |      | dB               |
| Standby control voltage<br>(The Pin 5 voltage) | $V_{STB-H}$ | Amplifier on   | 2.5     |      | 10   | V                |
|  | $V_{STB-L}$ | Amplifier off  | 0       |      | 0.5  | V                |
| Input resistance                               | $R_i$       |  | 14      | 20   | 26   | $\text{k}\Omega$ |

\*0dBm = 1mW (600 $\Omega$ ) = 774.6mVrms

## Package Dimensions

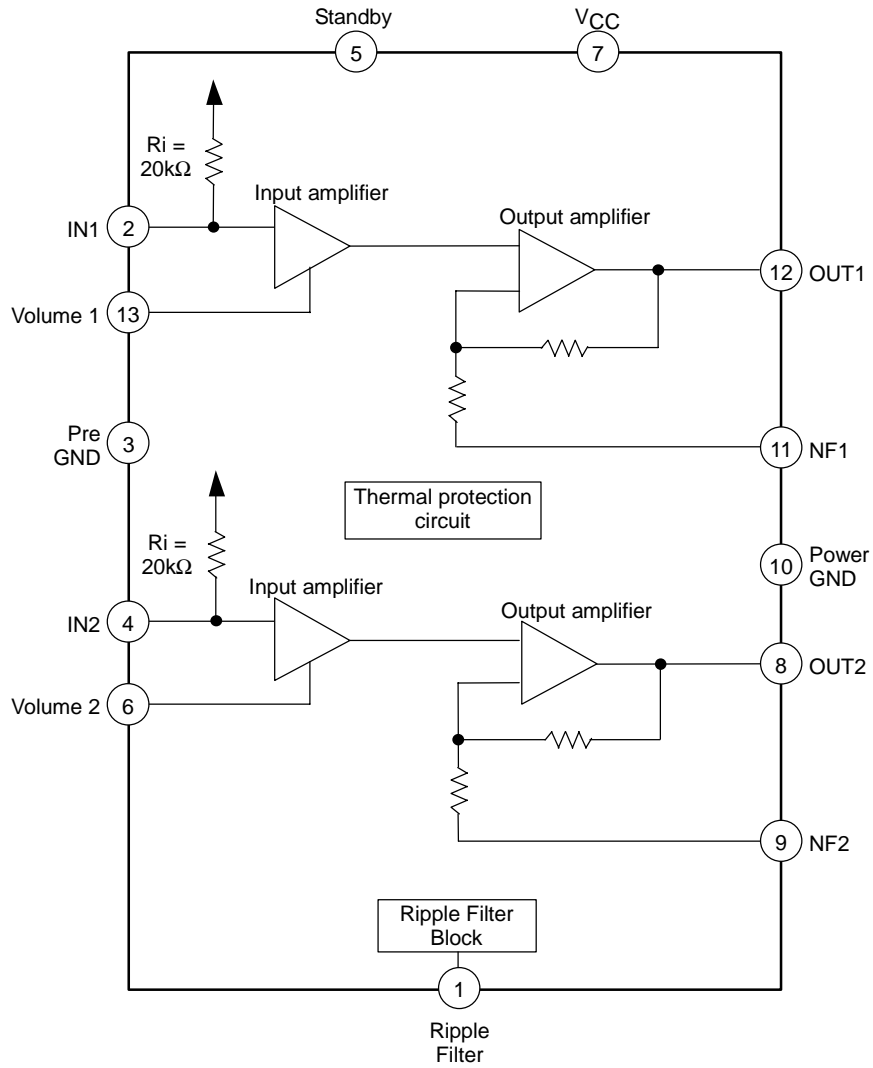
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3107B

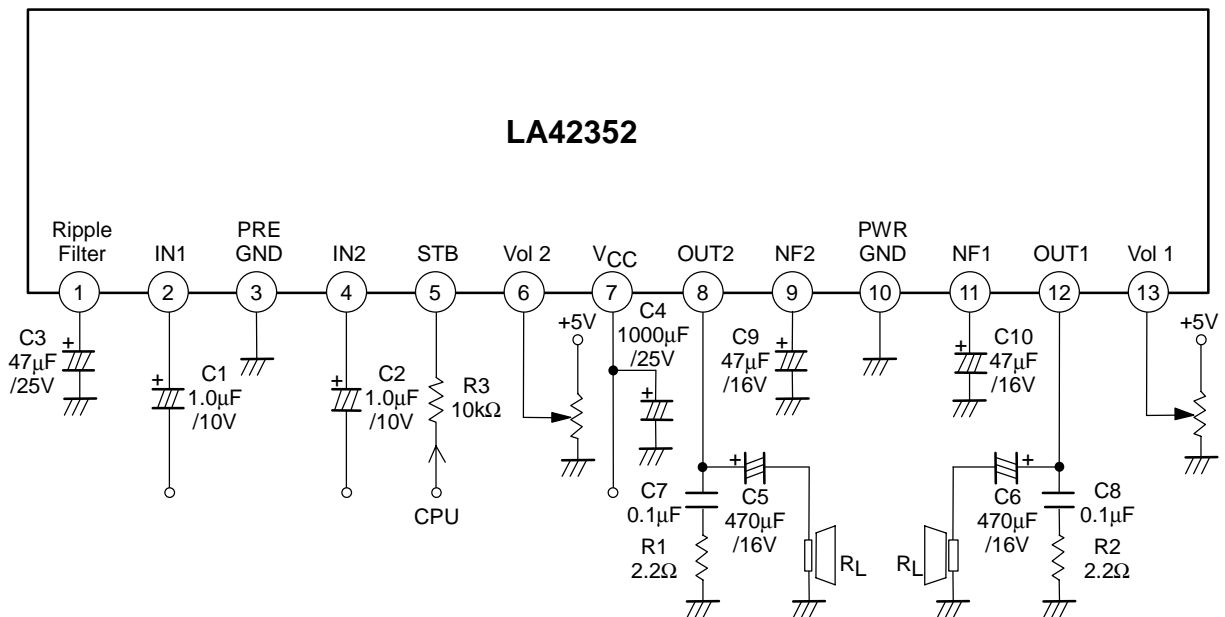


# LA42352

## Block Diagram



## Sample Application Circuit



# LA42352

## Pin Descriptions

| Pin No  | Symbol         | Pin Voltage                | Equivalent Circuit | Description   |
|---------|----------------|----------------------------|--------------------|---|
|         |                | $V_{CC} = 18V$             |                    |   |
| 1       | RF             | 17.6                       |                    | <ul style="list-style-type: none"> <li>Ripple filter reference</li> </ul>   |
| 2<br>4  | IN1<br>IN2     | 4.4                        |                    | <ul style="list-style-type: none"> <li>Input pin</li> </ul>   |
| 3       | PRE_GND        | 0                          |                    | <ul style="list-style-type: none"> <li>Pre GND pin</li> </ul>   |
| 5       | STB            | 0 to 5V<br>(Input voltage) |                    | <ul style="list-style-type: none"> <li>Standby pin</li> <li>The standby function is on when this pin at ground level</li> </ul> |
| 6<br>13 | Vol 2<br>Vol 1 | 0 to 5V<br>(Input voltage) |                    | <ul style="list-style-type: none"> <li>Control Volume</li> </ul>  |
| 7       | $V_{CC}$       | 18                         |                    | <ul style="list-style-type: none"> <li>Power supply</li> </ul>  |

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| Pin No  | Symbol       | Pin Voltage    | Equivalent Circuit | Description  |
|---------|--------------|----------------|--------------------|--|
|         |              | $V_{CC} = 18V$ |                    |  |
| 8<br>12 | OUT2<br>OUT1 | 8.9            |                    | <ul style="list-style-type: none"> <li>• Output pin</li> </ul>   |
| 9<br>10 | NF2<br>NF1   | 8.8            |                    | <ul style="list-style-type: none"> <li>• Negative feedback pin at Power amplifier</li> <li>• Connect NF capacitor</li> </ul> |
| 10      | PWR_GND      | 0              |                    | <ul style="list-style-type: none"> <li>• Power GND pin</li> </ul>  |

## Description of External parts

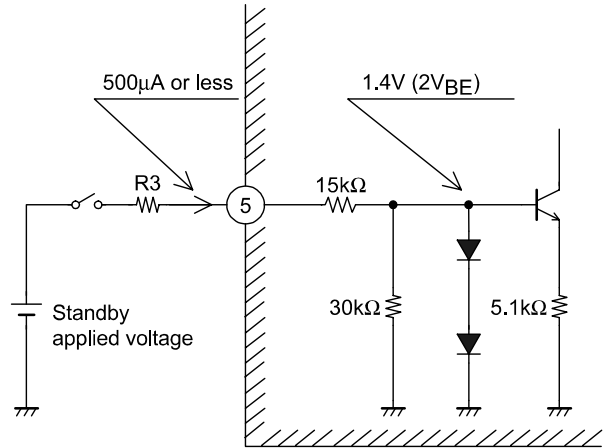
- C1, C2 : Input capacitors. A value of  $1.0\mu F$  is recommended for capacitors. Note that the low-frequency area characteristics can be adjusted by changing  $f_L$ .
- C3 : Ripple filter capacitor. A value of  $47\mu F$  is recommended for capacitors. Decreasing the capacitance value excessively or removing this capacitor causes ripple to occur. However, increasing the capacitance value does not always cause ripple to reduced. Decreasing the capacitance value makes the starting time earlier.
- C4 : Power capacitor.
- C5, C6 : Output capacitors. A value of  $470\mu F$  is recommended for capacitors.
- C7, C8 : Oscillation blocking capacitor. Use a polyester film capacitor that is good in high frequency response and temperature characteristic.
- C9, C10 : Feedback capacitor. A value of  $47\mu F$  is recommended for capacitors. Decreasing the capacitance value lowers the low frequency response. Increasing the capacitance value makes the starting time later.
- R1, R2 : Resistor connected in series with oscillation blocking capacitor. Prevents phase shift attributable to the oscillation blocking capacitor so that oscillation is hard to occur.
- R3 : Standby switch current limiting resistor. A value of  $10k\Omega$  is recommended for resistance (when the applied voltage for the standby switch is 3V to 10V). This resistor cannot be removed.

## Features of IC Inside and Usage Note

### Standby function

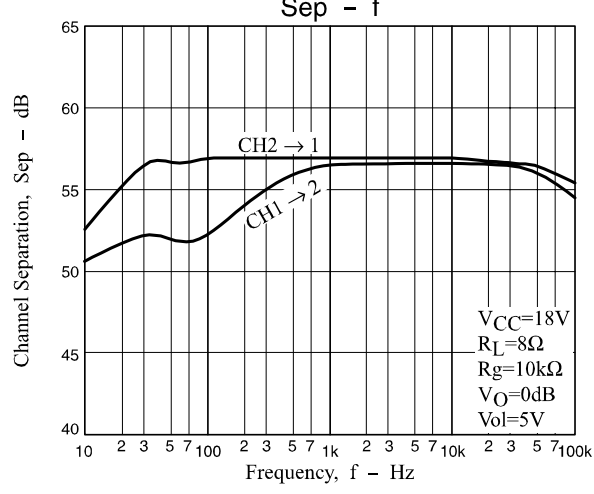
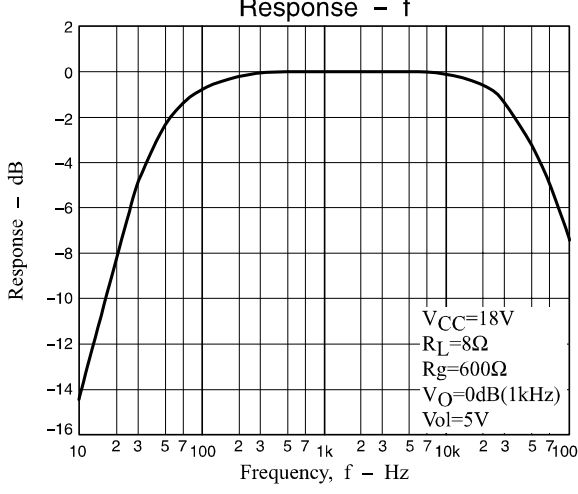
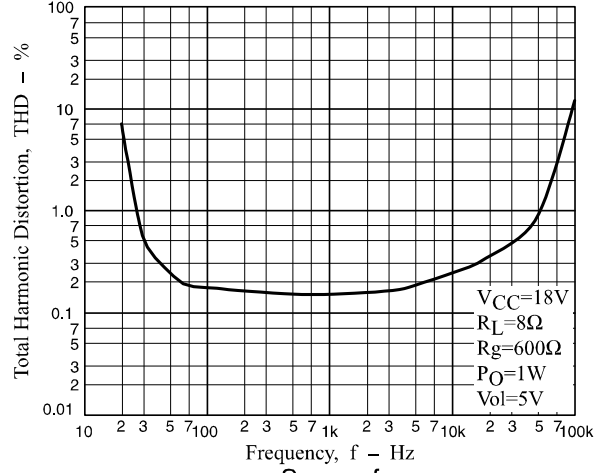
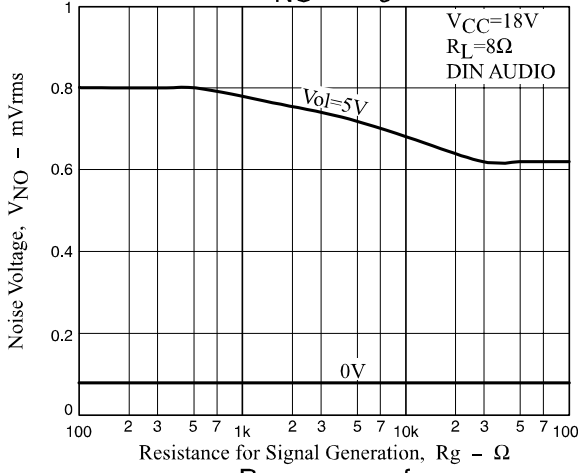
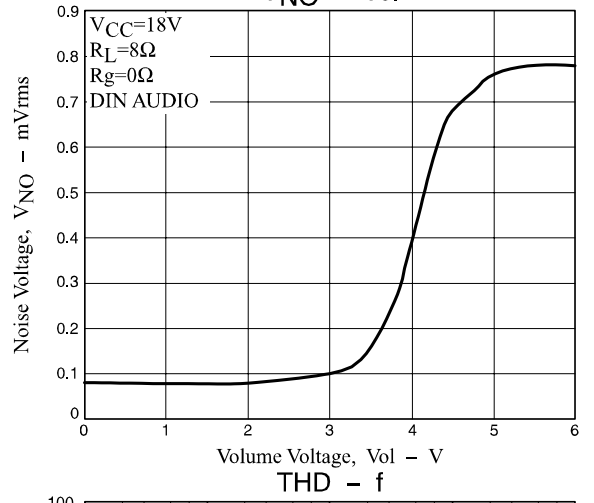
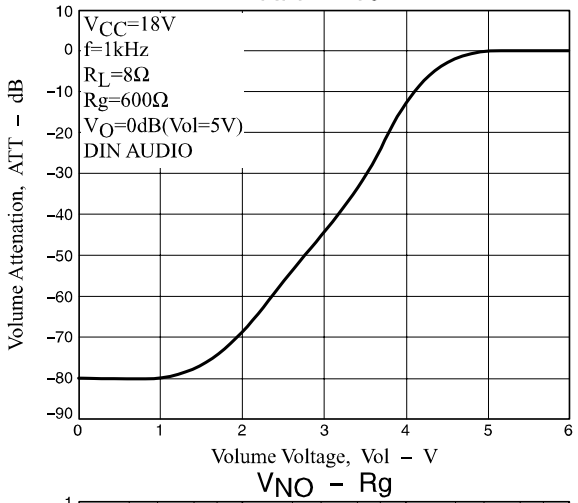
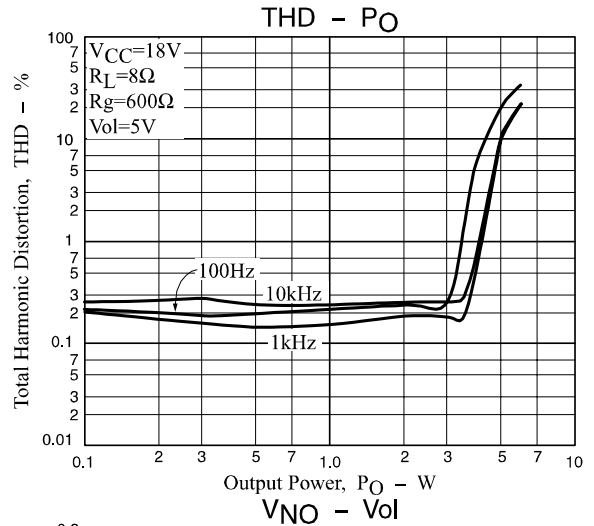
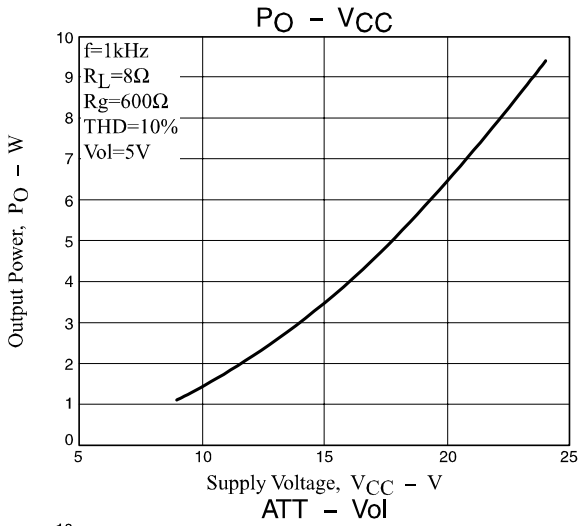
- Pin 5 is the standby switch pin. The amplifier is turned on by applying approximately 3V or more to this pin through an external resistor (R3).
- If voltage in excess of 10V is to be applied to the standby switch, calculate the value of R3 using the following formula so that the current flowing into pin 5 is 500μA or less:

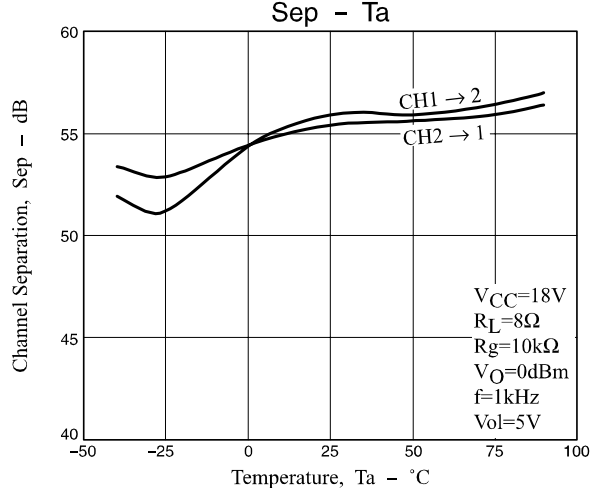
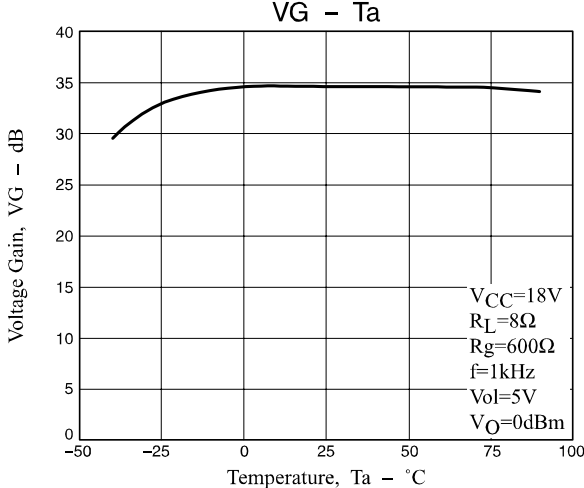
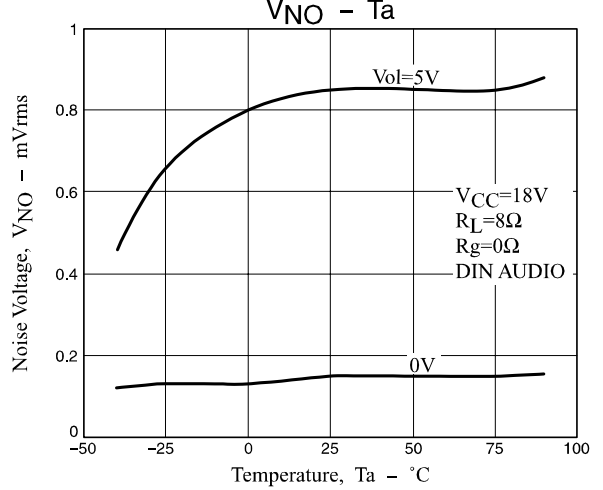
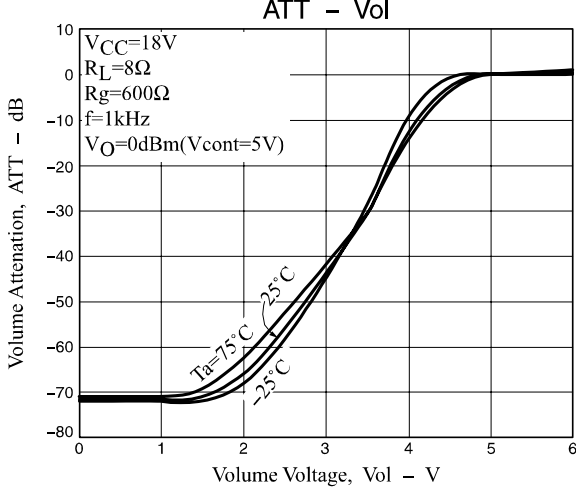
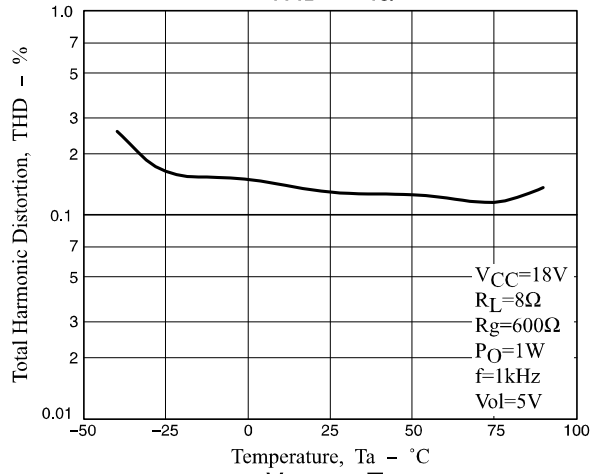
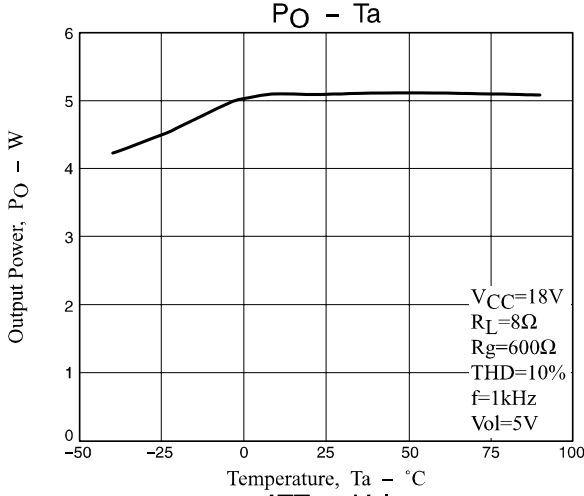
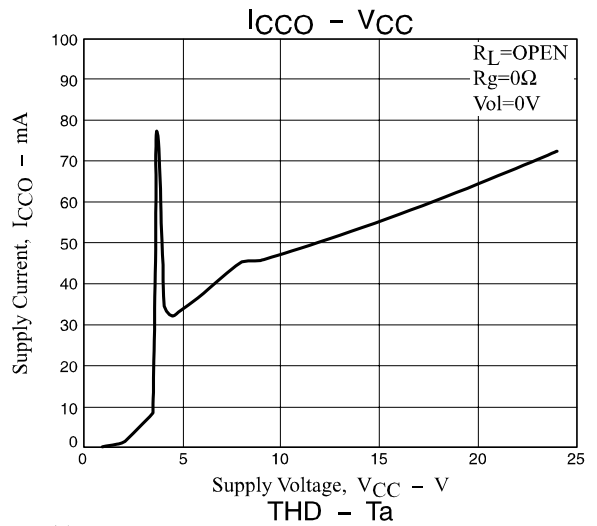
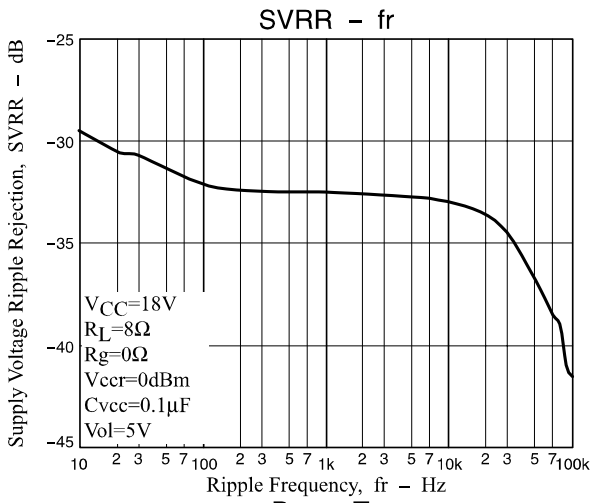
$$R3 = \frac{(\text{Applied voltage} - 2V_{BE} (\approx 1.4V))}{500\mu A} - 15k\Omega$$



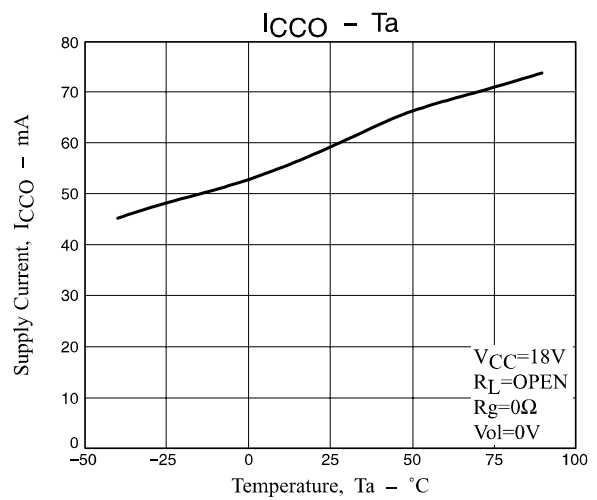
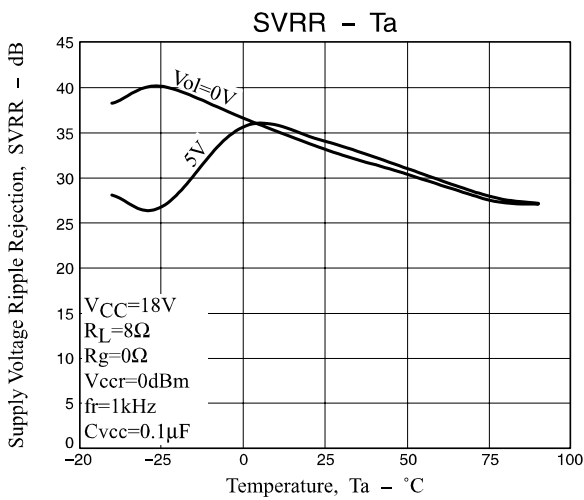
### Protector

- In order to prevent damage or degradation which may be caused by abnormally heated IC, the LA42352 has a thermal shutdown protector. Accordingly, if the IC junction temperature (T<sub>j</sub>) climbs to around 160°C due to inadequate heat dissipation, the thermal shutdown protector will operate to control the output gradually into attenuation.









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