



SANYO Semiconductors

DATA SHEET

LA42102

Monolithic Linear IC
 Audio Output for TV application
 10W × 2ch Power Amplifier

Overview

LA42102 is 10W 2-channel AF power amplifier intended for televisions.

Functions

- 10W × 2 channels ($V_{CC} = 14V$, $R_L = 8\Omega$).
- 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 $T_a = 25^\circ C$

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|---------------|----------------------------|-------------|--------------|
| Maximum supply voltage | $V_{CC\ max}$ | | 17 | V |
| Allowable power dissipation | $P_d\ max$ | Infinitely large heat sink | 15 | W |
| Maximum junction temperature | $T_j\ max$ | | 150 | $^\circ C$ |
| Thermal resistance | θ_{jc} | | 3 | $^\circ C/W$ |
| Operating temperature | T_{opr} | | -25 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} | | 14 | V |
| Recommended load resistance | R_L | | 8 | Ω |
| Allowable operating supply voltage range | $V_{CC\ op}$ | Under conditions such that Maximum ratings are not exceeded | 10 to 17 | V |

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LA42102

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 14\text{V}$, $R_L = 8\Omega$, $f = 1\text{kHz}$, $R_g = 600\Omega$

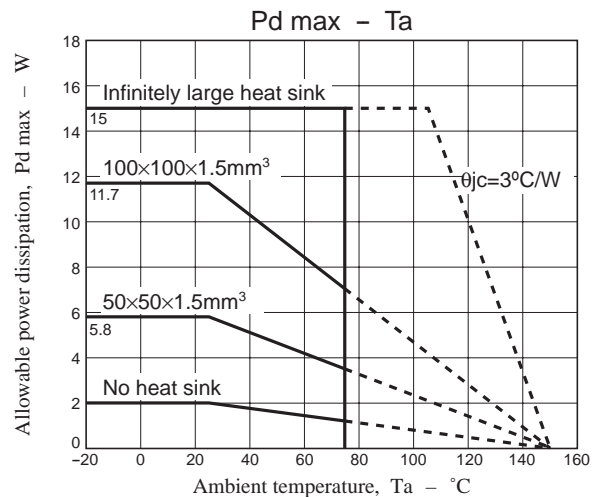
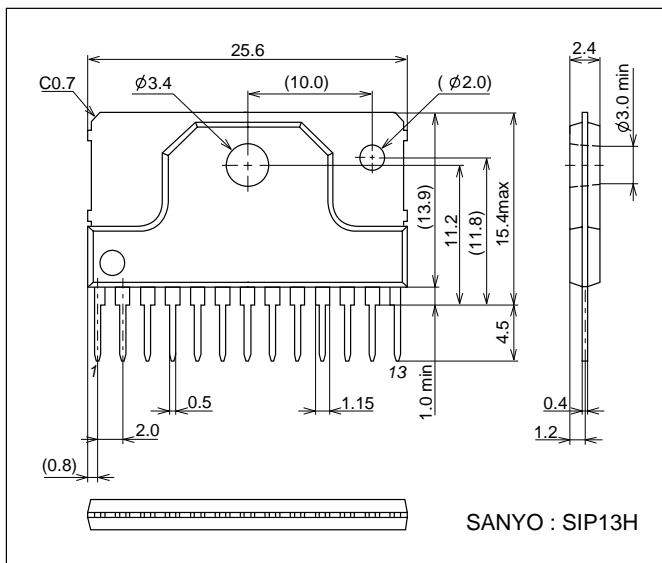
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---------------------------------|------------|--|---------|------|----------|------------------|
| | | | min | typ | max | |
| Standby current | I_{st} | Amplifier OFF | | 0 | 10 | μA |
| Quiescent current | I_{CCO} | $R_g = 0$, $R_L = \text{OPEN}$ | 40 | 70 | 140 | mA |
| Output power | P_{O1} | THD = 10% | 8 | 10 | | 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 |
| Channel separation | CH.Sep | $R_g = 10\text{k}\Omega$, $V_O = 0\text{dBm}$ | 50 | 60 | | 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 | | V_{CC} | 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-electrostatic diode allowing the current to flow through the diode when the potential of V_{CC} 7 pin decreases below that of pin 5/6.

Package Dimensions

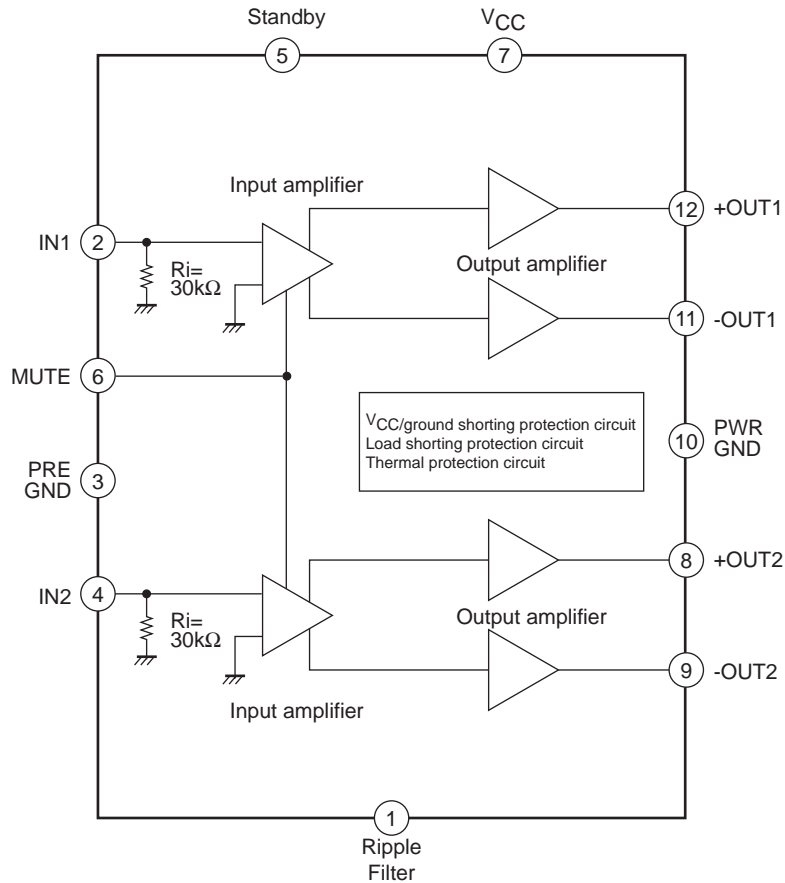
unit : mm (typ)

3107B

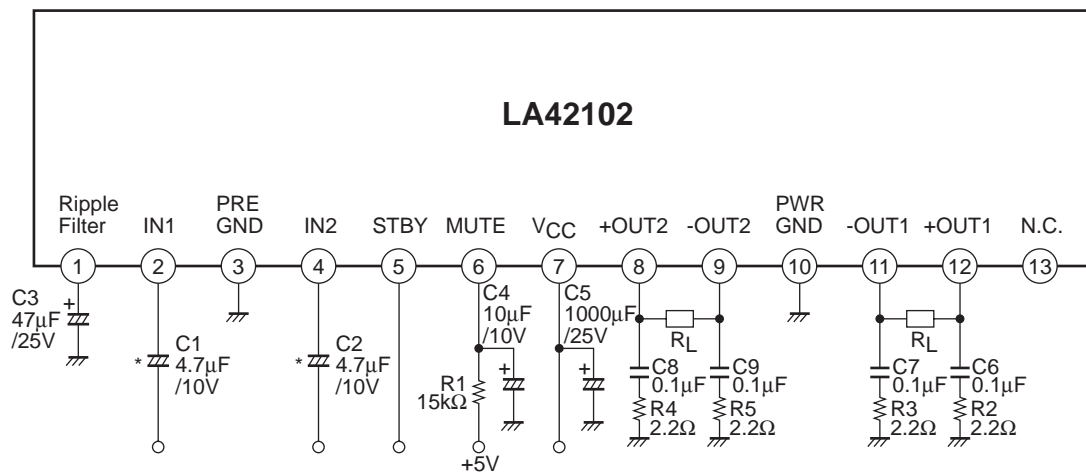


LA42102

Block Diagram



Test Circuit



PCA00898

* LA42102 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 LA42102.

External Components

- C1, C2 : Input coupling capacitors, for which 4.7μF or less is recommended. LA42102 employs the zero-bias type input circuit, with the input pin potential being nearly zero. Accordingly, the polarity must be determined according to the DC potential of a circuit connected to the previous stage of LA42102.
- C3 : Capacitor for starting time of the ripple filter and amplifier, for which 47μF is recommended.
- C4, R1 : Capacitor and resistor for mute. C4 is necessary even when the mute function is not used.
- C5 : Power capacitor.
- C6 to C9 : Capacitor and resistor for oscillation prevention. For C6 to C9, the polyester film capacitor with superior temperature characteristics (Mylar capacitor) is recommended. Use R2 to R5 of 2.2Ω along with the capacitor.

1. Mute function (pin 6)

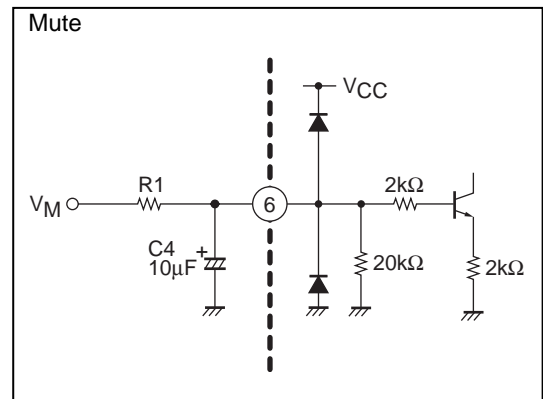
With the pin 6 voltage of 1.7V (minimum) or more, the mute function is turned ON.

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 C4. Determine the constant after careful review because it is related to the pop sound at mute ON/OFF.

C4 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-electrostatic diode, allowing the current to flow through the diode when the potential of V_{CC} 7 pin decreases below that of pin 6.



2. Standby function (pin 5)

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

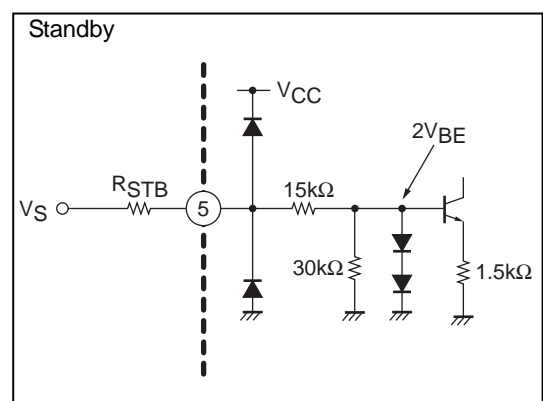
Pin 5 control voltage

| 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

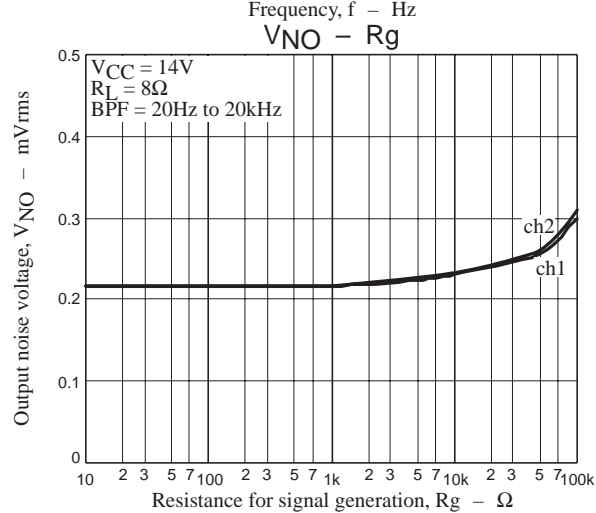
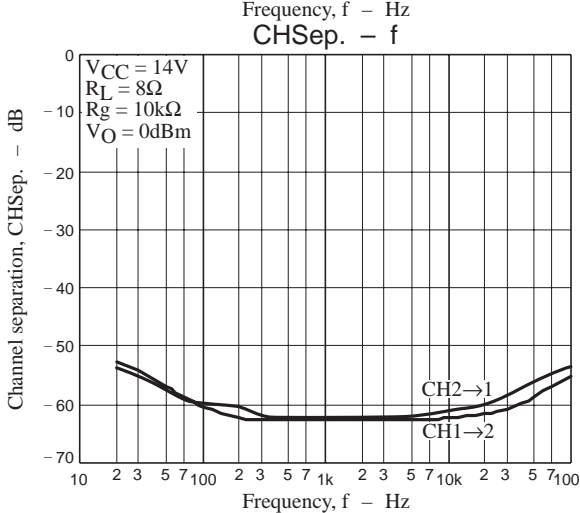
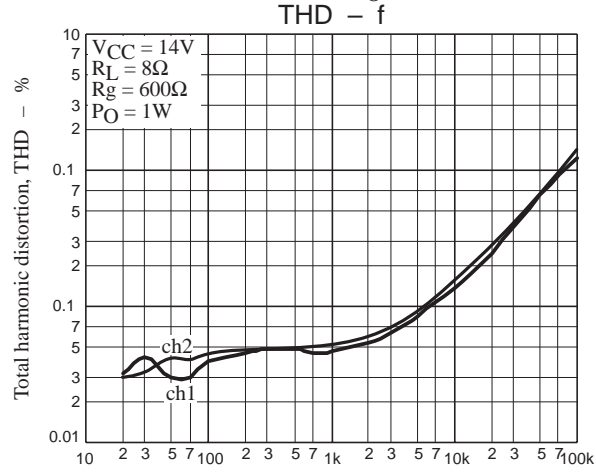
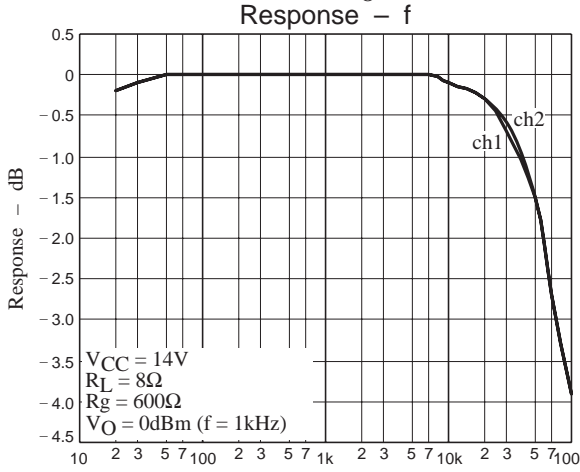
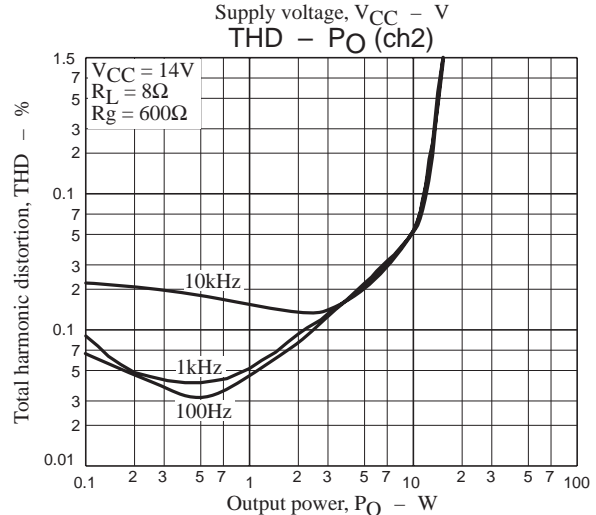
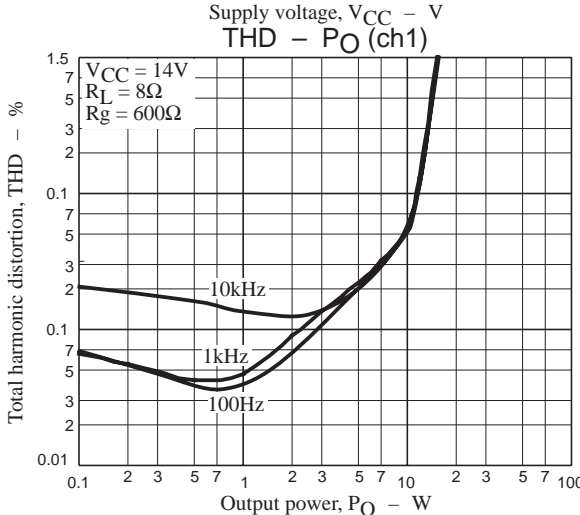
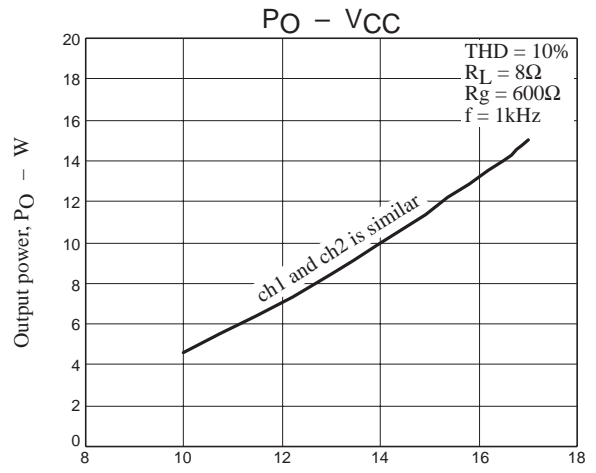
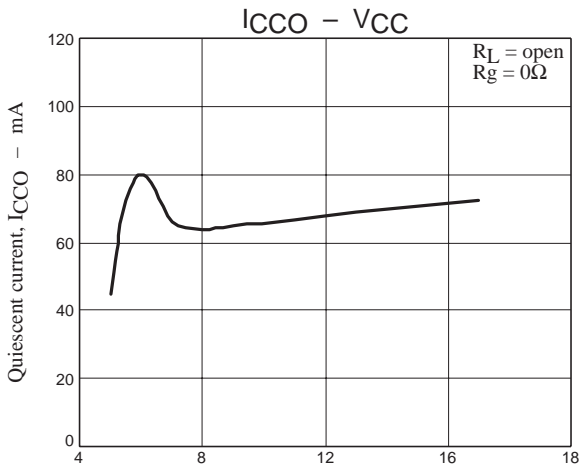
$$R_{STB} = \frac{\text{Applied voltage } (V_{STB}) - 2V_{BE} \text{ (About 1.4V)}}{500\mu\text{A}} - 15\text{k}\Omega$$

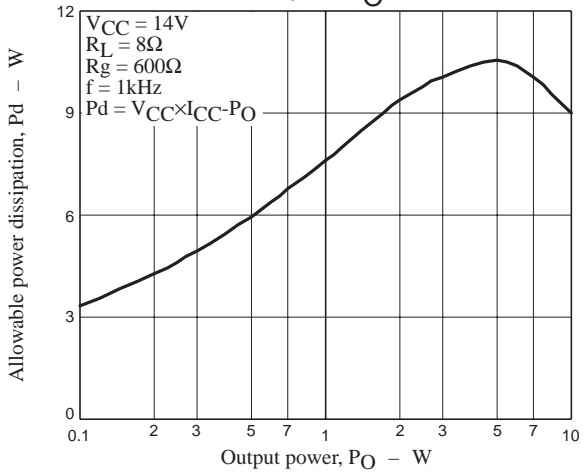
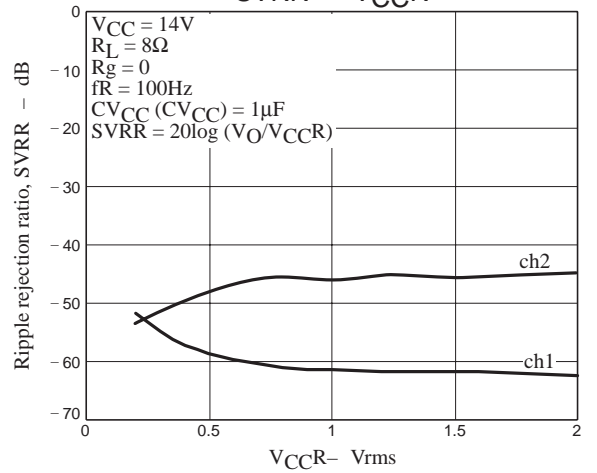
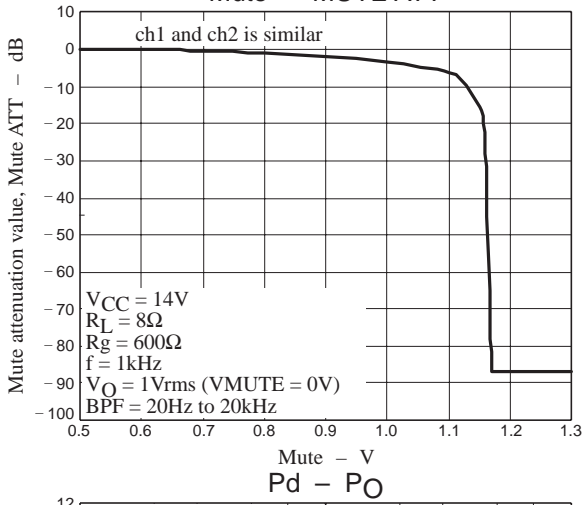
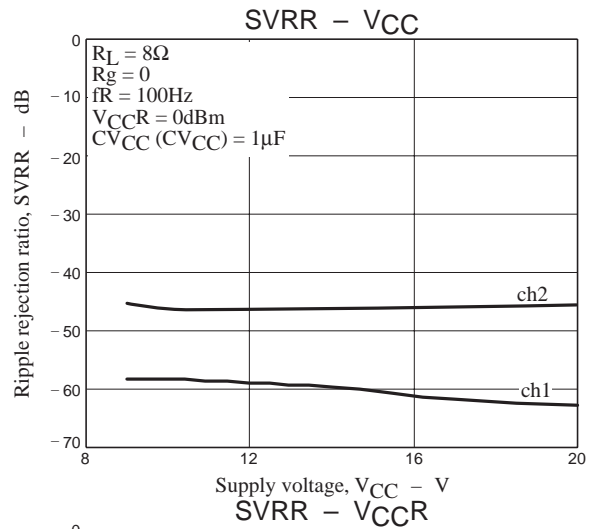
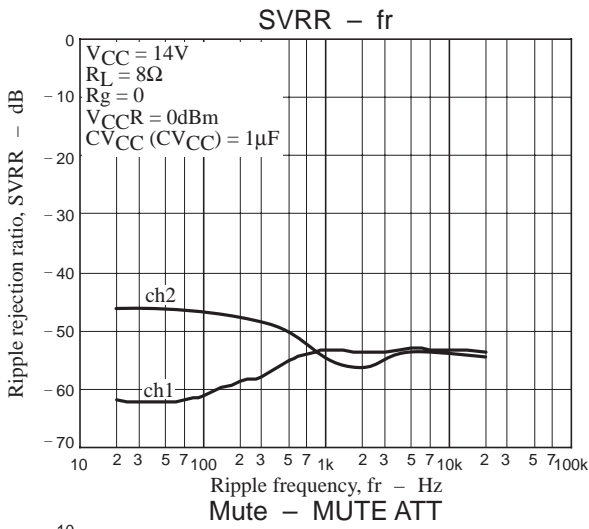


Note that the standby pin (pin 5) incorporates the anti-electrostatic diode, allowing the current to flow through the diode when the potential of V_{CC} pin 7 decreases below that of pin 5.

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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