

**LA4742****45 W Four-Channel (Bridge Circuit) Power Amplifier****Overview**

The LA4742 is a 45 W 4-channel power amplifier IC for car stereo systems. It features a built-in bridge circuit and the ability to radically reduce the number of external components required.

**Features**

- Maximum output power: 45 W × 4 channels ( $V_{CC} = 14.4$  V, 4  $\Omega$  load, 1 kHz)
- 40 W × 4 channels ( $V_{CC} = 13.7$  V, 4  $\Omega$  load, 1 kHz)
- Requires only seven external components and does not require an oscillation prevention RC circuit, a noise filter, or a BS capacitor.

**Functions**

- Output offset detection function (DDL)
- Warning tone (beep) generation function
- Muting function
- Built-in standby switch
- Full complement of built-in protection circuits, including protection from shorting to  $V_{CC}$ , shorting to ground, load shorting, overvoltages, and overheating.
- Maximum supply voltage before damage in the open ground state: 16 V

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

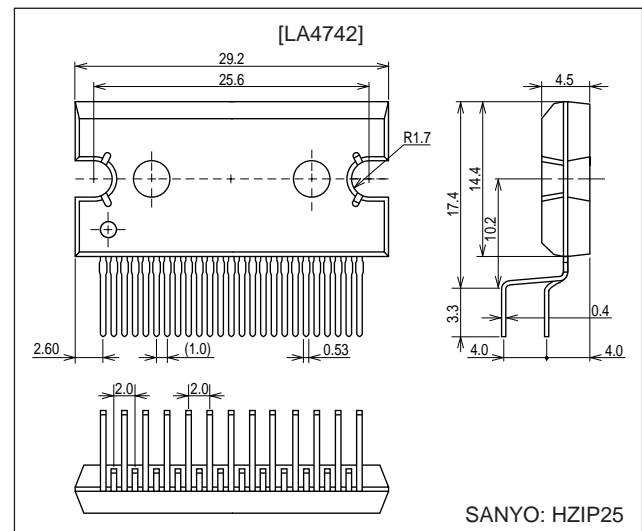
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}$ max1	Signal present	18	V
	$V_{CC}$ max2	No signal (for 1 minute)	26	V
Maximum output current	$I_{Opeak}$		4.5/ch	A
Allowable power dissipation	$P_d$ max	With an arbitrarily large heat sink	50	W
Operating temperature	$T_{opr}$		-40 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +150	$^\circ\text{C}$
Package thermal resistance	$\theta_{jc}$		1	$^\circ\text{C/W}$

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**Package Dimensions**

unit: mm

**3236-HZIP25****SANYO Electric Co.,Ltd. Semiconductor Company**

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## LA4742

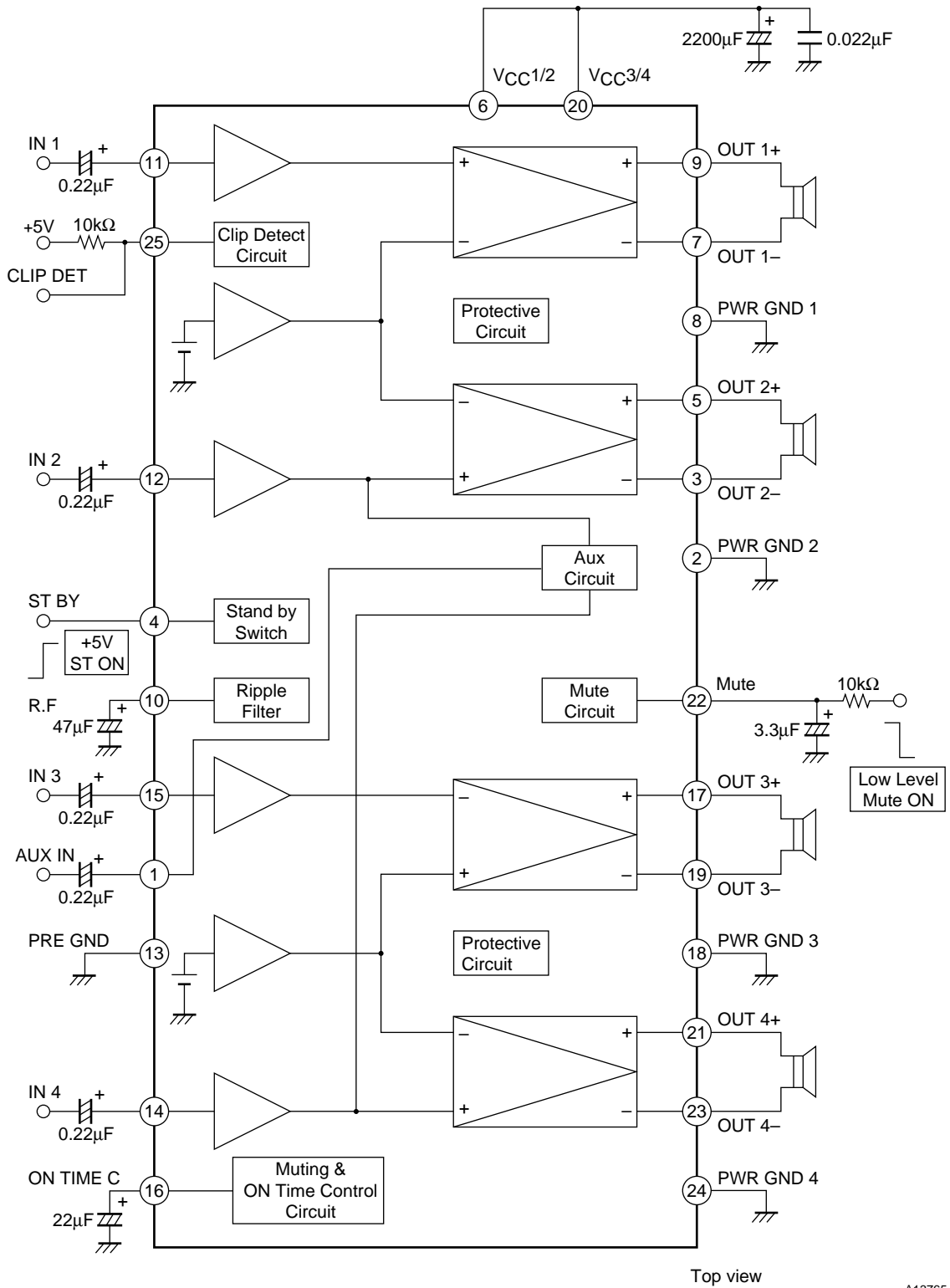
### Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		14.4	V
Recommended load resistance	$R_L$		4	$\Omega$
Operating supply voltage range	$V_{CC\ op}$		9 to 18	V

### Operating Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 14.4\text{ V}$ , $f = 1\text{ kHz}$ , $R_L = 4\ \Omega$ , $R_g = 600\ \Omega$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	$I_{CCO}$	$R_L = \infty$ , $R_g = 0$	100	200	350	mA
Standby current	$I_{st}$	$V_{st} = 0\text{ V}$			10	$\mu\text{A}$
Output offset voltage	$V_{Noffset}$	$R_g = 0$	-100		+100	mV
Voltage gain	VG	$V_O = 0\text{ dBm}$	25	26	27	dB
Voltage gain difference	$\Delta\text{VG}$		-1		+1	dB
Output power	$P_{O1}$	THD = 10 %	23	28		W
	$P_{O\ max1}$	$V_{CC} = 13.7\text{ V}$ , $V_{IN} = 5\text{ Vrms}$		40		W
	$P_{O\ max2}$	$V_{IN} = 5\text{ Vrms}$		45		W
Total harmonic distortion	THD	$P_O = 4\text{ W}$		0.05	0.4	%
Channel separation	CHsep	$V_O = 0\text{ dBm}$ , $R_g = 10\text{ k}\Omega$	55	65		dB
Ripple rejection ratio	SVRR	$f_r = 100\text{ Hz}$ , $V_R = 0\text{ dBm}$ , $R_g = 0$	50	60		dB
Output noise voltage	$V_{NO}$	$R_g = 0$ , B.P.F. = 20 Hz to 20 kHz		100	200	$\mu\text{Vrms}$
Muting attenuation	Mute(att)	$V_O = 20\text{ dBm}$	70	80		dB

Sample Application Circuit and Block Diagram



A13765

LA4742

Pin Functions and Equivalent Circuits at  $V_{CC} = 14.4\text{ V}$ ,  $ST-BY = 5\text{ V}$

Pin No.	Function	DC voltage [V]	Notes	Internal equivalent circuit
1	AUX IN			
2 8 18 24	POWER GND			
3 5 7 9 17 19 21 23	-OUT2 +OUT2 -OUT1 +OUT1 +OUT3 -OUT3 +OUT4 -OUT4	2.7		<p style="text-align: right;">A13766</p>
4	ST-BY		<ul style="list-style-type: none"> <li>The amplifier will be on when the applied voltage is between 2 V and <math>V_{CC}</math>.</li> </ul>	<p style="text-align: right;">A13767</p>
6 20	$V_{CC}1/2$ $V_{CC}3/4$			
10	SVR	13.2	<ul style="list-style-type: none"> <li>Low ripple power supply line for all internal IC blocks</li> </ul>	<p style="text-align: right;">A13768</p>

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Pin No.	Function	DC voltage [V]	Notes	Internal equivalent circuit
11 12 14 15	IN1 IN2 IN4 IN3	3.1	<ul style="list-style-type: none"> <li>Input amplifiers that require no capacitor in the input noise filter.</li> </ul>	<p>Input amplifier ST-BY power supply line</p> <p>30 kΩ 5 pF 1 kΩ 100 Ω</p> <p>V<sub>REF</sub></p> <p>Inverter amplifier</p> <p>11 12 14 15</p> <p>A13769</p>
13	PRE GND			
16	ON TIME MUTE	2.6	<ul style="list-style-type: none"> <li>Amplifier turn-on time control circuit</li> <li>Impulse noise prevention circuit</li> <li>With a 22 μF capacitor, the turn-on time will be 0.6 s.</li> </ul>	<p>Bias circuit power supply line</p> <p>20 kΩ 2 kΩ 10 kΩ 2 kΩ 40 kΩ 13 kΩ</p> <p>V<sub>REF</sub></p> <p>200 Ω</p> <p>16</p> <p>A13770</p>
22	MUTE	4.1	<ul style="list-style-type: none"> <li>The muting function is activated when the applied voltage is under 1 V.</li> </ul>	<p>Input amplifier ST-BY power supply line</p> <p>3 kΩ 1 kΩ 100 Ω</p> <p>V<sub>REF</sub></p> <p>Amplifier bias circuit</p> <p>7.5 kΩ 10 kΩ</p> <p>100 kΩ</p> <p>22</p> <p>V<sub>REF</sub></p> <p>A13771</p>
25	CLIPDET			

**Notes on Usage and Handling**

• Oscillator stabilization

In some cases, details of the printed circuit board layout may lead to induced parasitic oscillation. This oscillation can be prevented by adding any one of the following components. Verify the optimal values for these capacitors by testing in actual end products.

Technique 1 ... Connect Mylar capacitors (0.1  $\mu\text{F}$ ) between the BTL amplifier outputs.

Technique 2 ... Connect an RC circuit (2.2  $\Omega$  and 0.1  $\mu\text{F}$  in series) between each output and ground.

• Audio quality (low band)

The low-band frequency characteristics can be improved by adjusting the values of the input capacitors. The recommended value is 2.2  $\mu\text{F}$ .

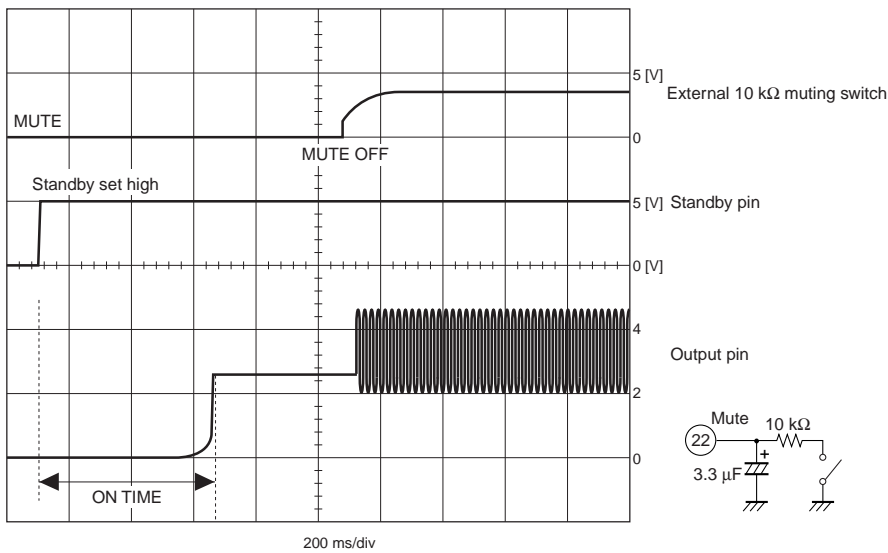
• Impulse noise

The LA4742 includes a built-in impulse noise suppression circuit. However, further improvement can be achieved by using the muting circuit. When first applying power, activate the muting function at the same time as applying power. Then, after the output DC potential has stabilized, turn off the muting function. When turning off the power, first activate the muting function and then turn off the power. Sample transient responses are attached (see the timing charts).

**Transient Responses at Power On**

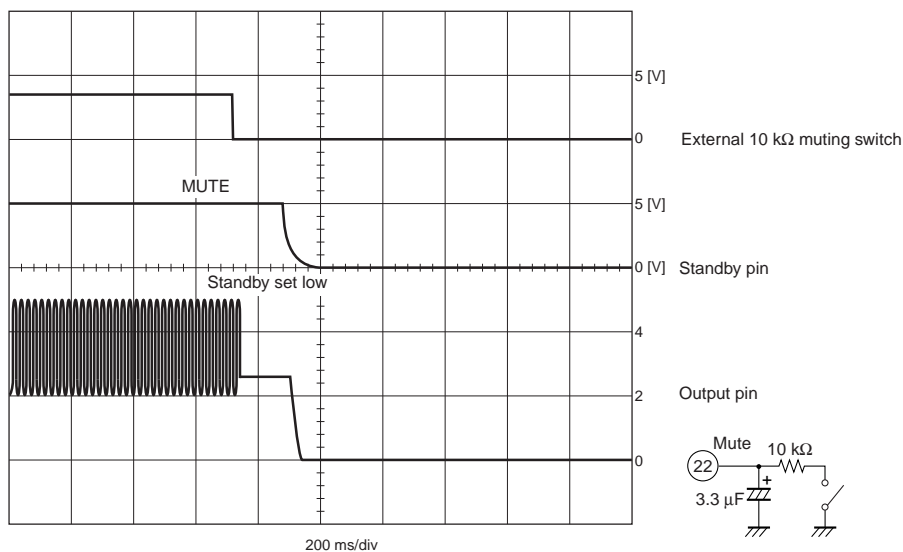
Power on: Standby and muting activated at the same time.

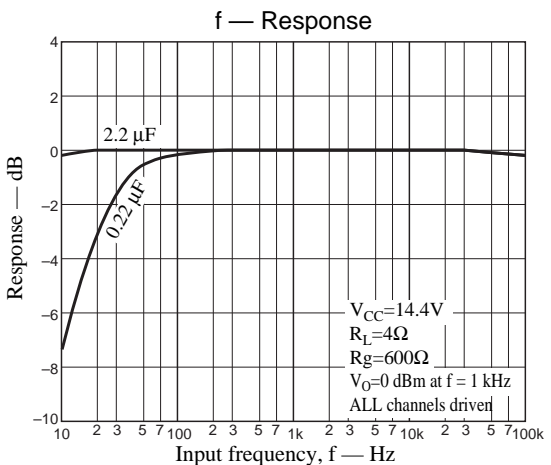
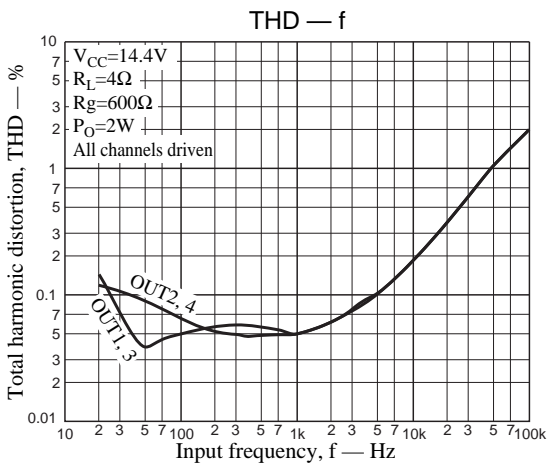
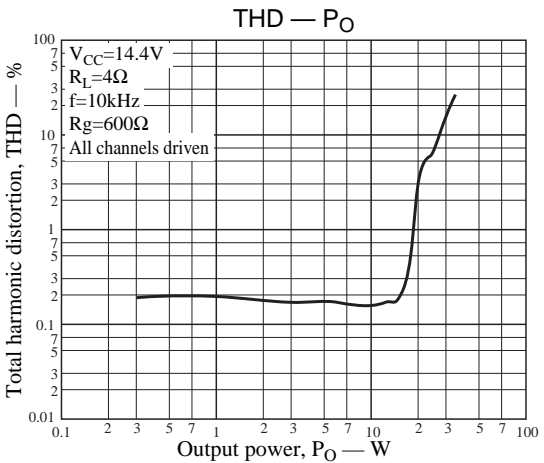
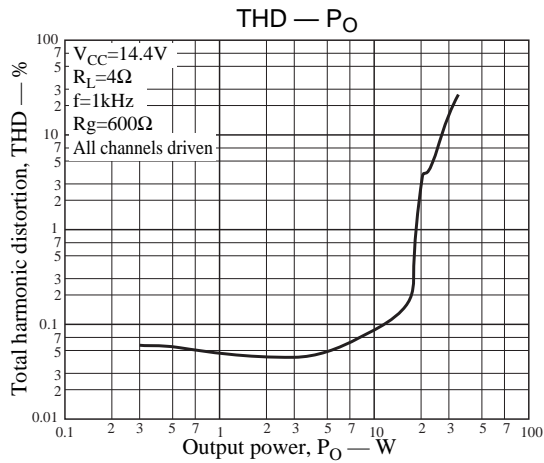
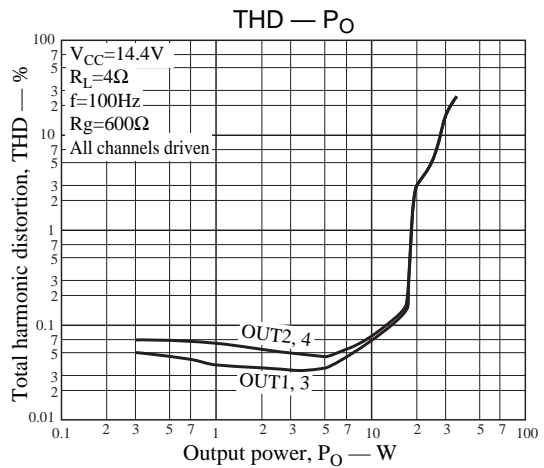
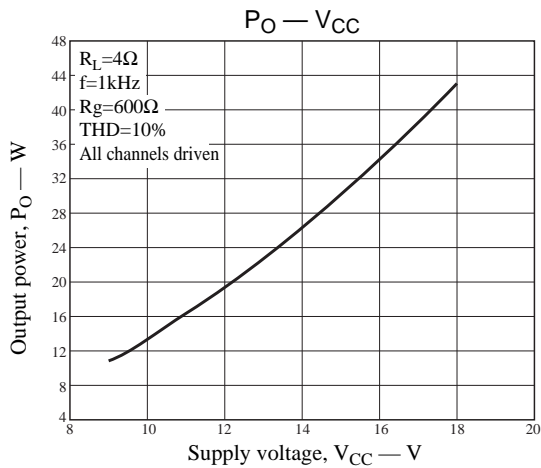
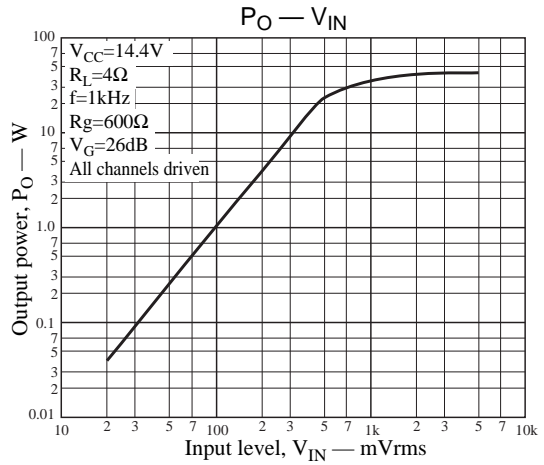
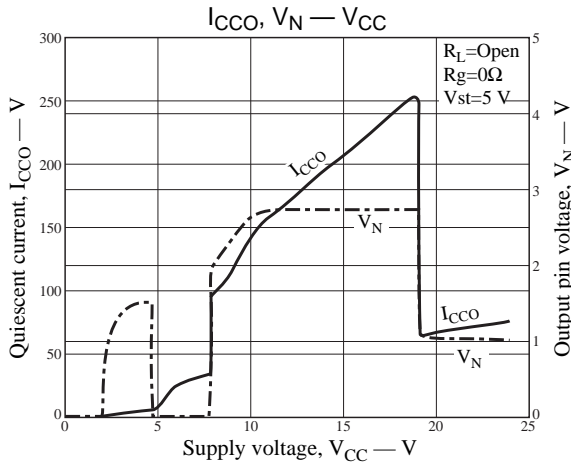
Muting is turned off after the output has stabilized.

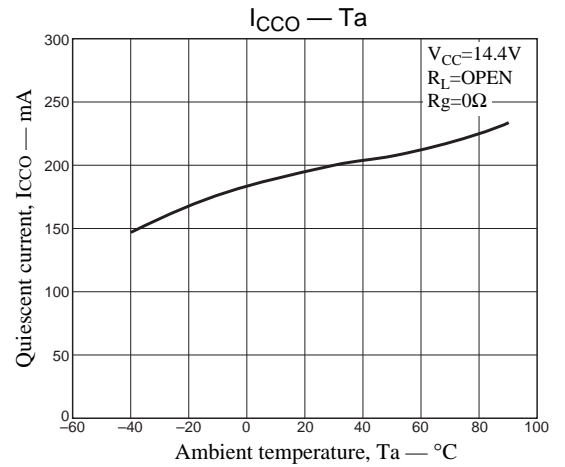
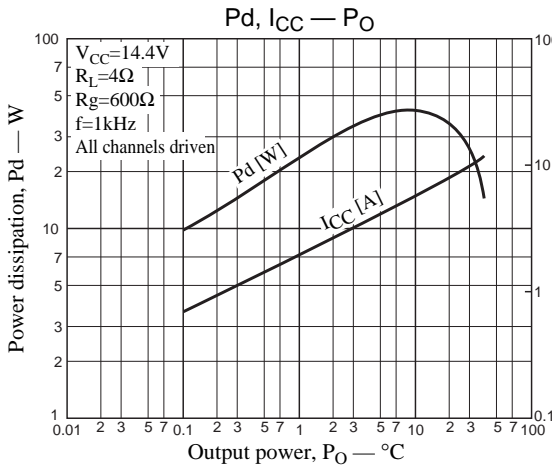
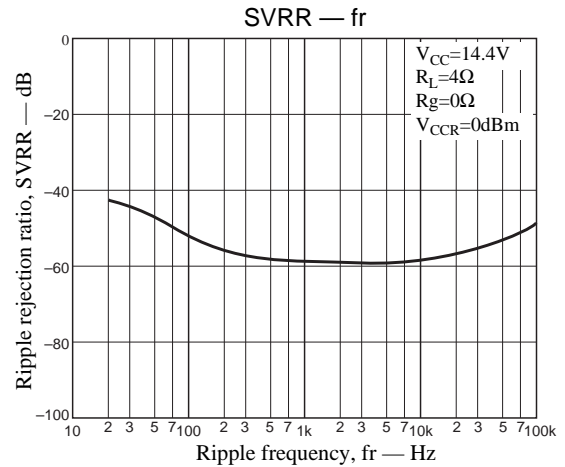
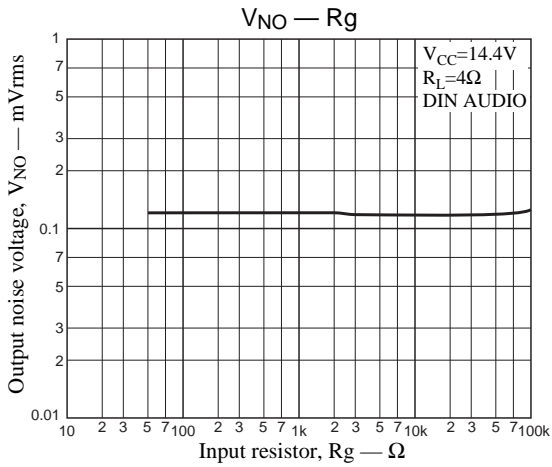
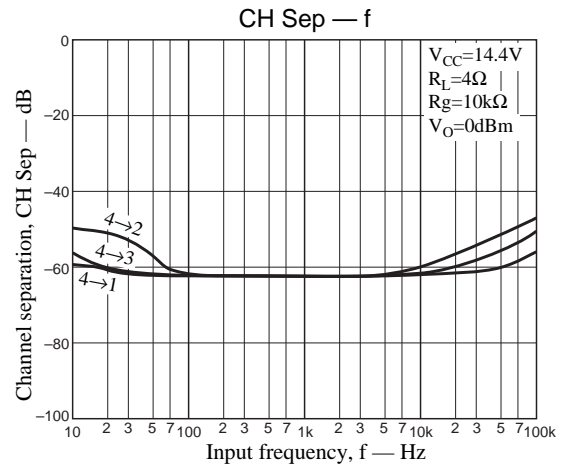
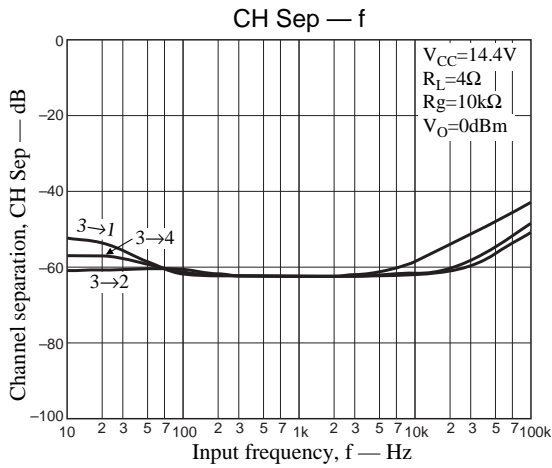
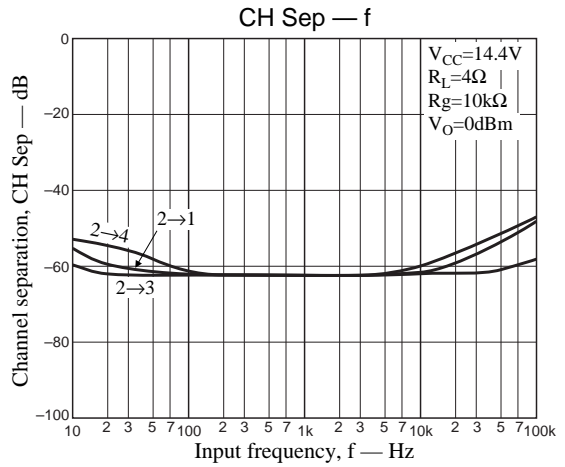
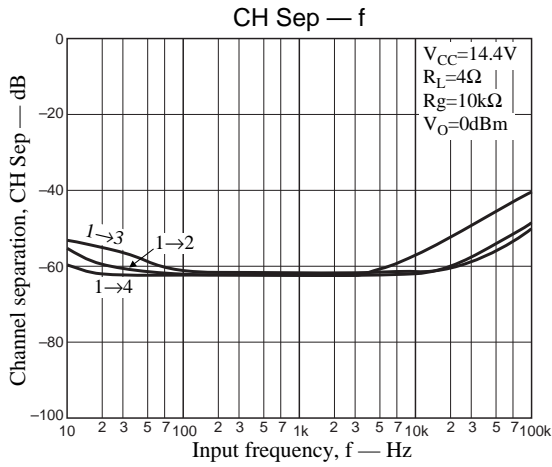


**Transient Responses at Power Off**

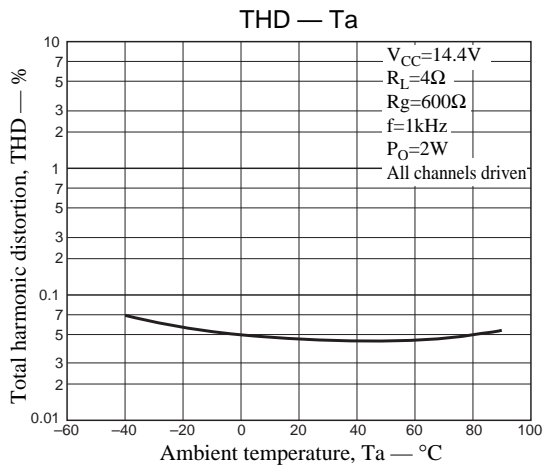
Power off: After activating the muting circuit, turn the power off.











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