

**LA4446**

Car Stereo-Use 5.5W 2-Channel AF Power Amplifier

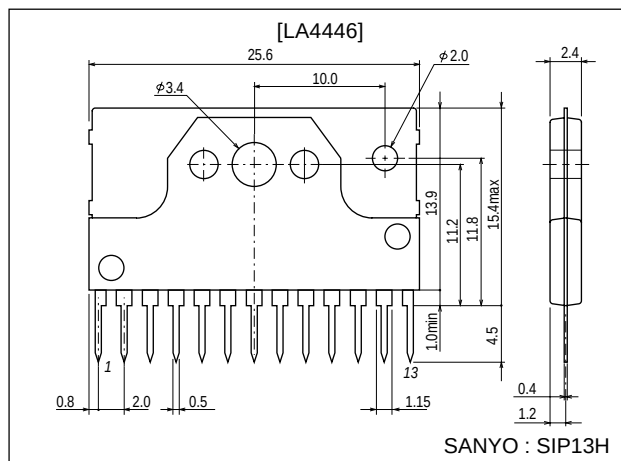
Features

- Dual channels.
Output : $5.5W \times 2$ (typ.)
- Low pop noise at the time of power supply ON/OFF and good starting balance.
- Good ripple rejection : 46dB (typ.)
- Good channel separation.
- Low residual noise ($R_g=0$).
- On-chip protectors.
 - a. Thermal protector
 - b. Overvoltage/surge protector
 - c. Adjacent pins (7-8, 6-7) short protector

Package Dimensions

unit:mm

3107-SIP13H



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max1	Quiescent (t=30s)	25	V
	V _{CC} max2	Operating	18	V
Surge supply voltage	V _{CC} surge	t≤0.2s	50	V
Maximum output current	I _O peak	Per channel	3.5	A
Allowable power dissipation	P _d max	See P _d max – T _a characteristic.	15	W
Operating temperature	T _{opr}		–20 to +75	°C
Storage temperature	T _{stg}		–40 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		13.2	V
Recommended load resistance	R_L	2 channels	4	Ω
Operating voltage range	$V_{CC, op}$		10 to 16	V

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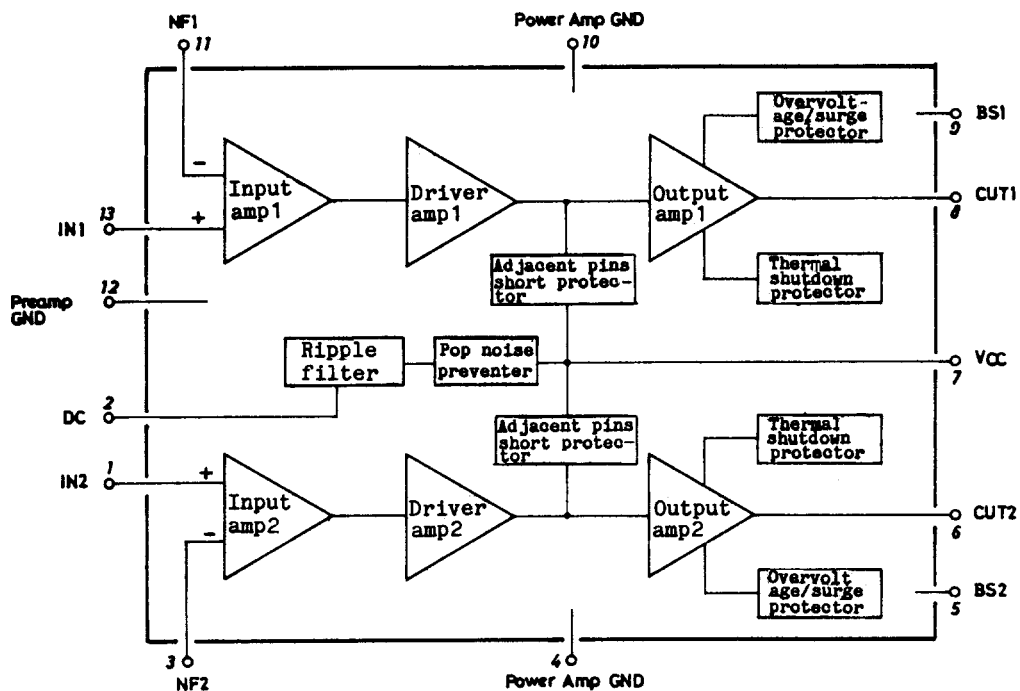
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LA4446

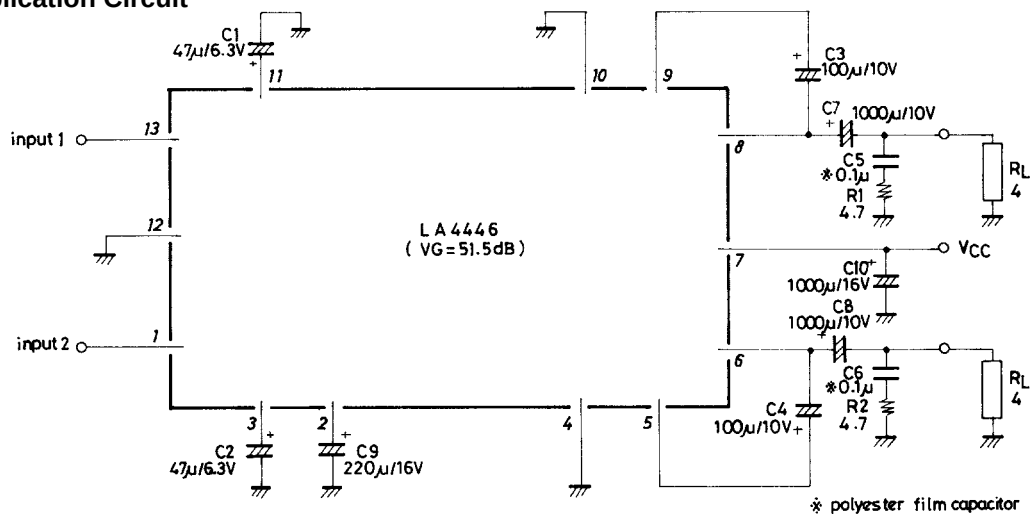
Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC}=13.2\text{V}$, $R_L=4\Omega$, $f=1\text{kHz}$, $R_g=600\Omega$, with $100\times 100\times 1.5\text{mm}^3$ Al heat sink

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}			75	150	mA
Voltage gain	VG		49.5	51.5	53.5	dB
Output power	P_O	THD=10%, 2 channels	5.0	5.5		W
Total harmonic distortion	THD	$P_O=1\text{W}$		0.2	1.0	%
Input resistance	r_i			30		$k\Omega$
Output noise voltage	V_{NO}	$R_g=0$		0.6	1.0	mV
		$R_g=10k\Omega$		1.0	2.0	mV
Ripple rejection	SVRR	$R_g=0$, $V_{CCR}=200\text{mV}$, $f_r=100\text{Hz}$		46		dB
Channel separation	CH sep	$R_g=10k\Omega$, $V_o=0\text{dBm}$	45	55		dB

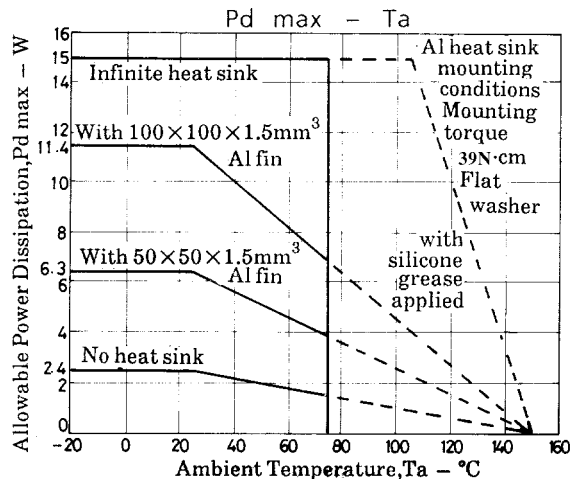
Equivalent Circuit Block Diagram



Sample Application Circuit

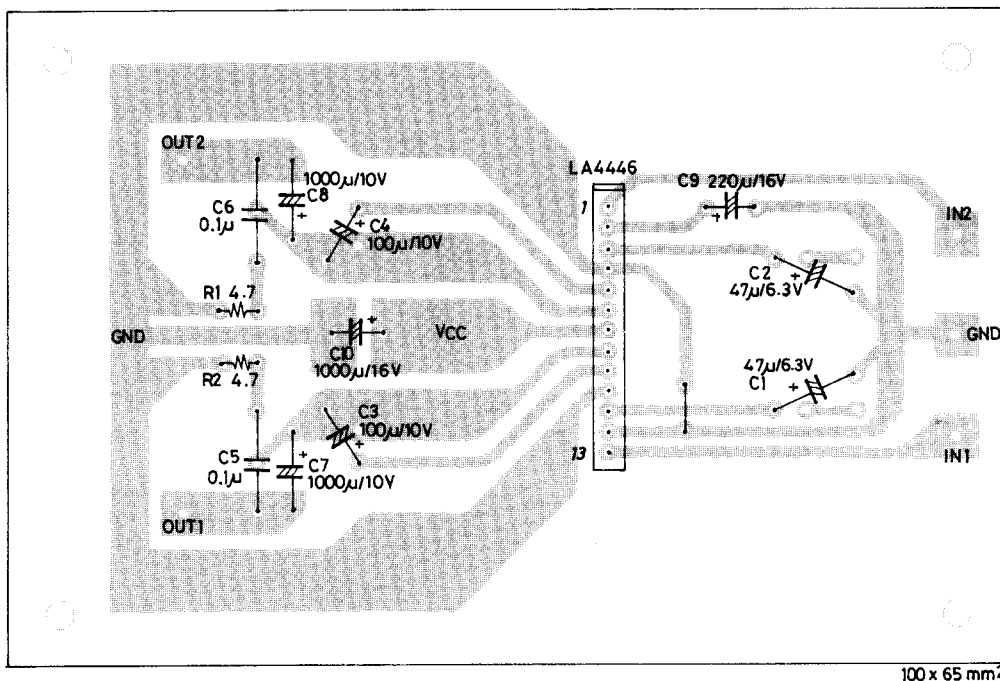


Unit (resistance: Ω , capacitance: F)



Sample Printed Circuit Pattern (Cu-foiled area)

Unit (resistance: Ω , capacitance: F)



* Mounting the heat sink, use a flat screw. Mounting torque : 39 to 59N · cm

Features of IC System

- 2-channel use.
- Decoupling capacitor $C9=220\mu\text{F}$ is used to reject ripple and determine the delay time at the time of application of power.
- A low roll-off frequency depends on the NF capacitor. Refer to the graph. To extend f_L , the output capacitor must be also considered.
- To make the pop noise much less, connect R_{NF}' to NF capacitors C1, C2 to decrease the gain.

$$VG \approx 20 \log \frac{R_f}{R_{NF}} \quad [\text{dB}] \quad R_{NF} \approx 50\Omega, R_f = 20\text{k}\Omega \text{ on chip}$$

When $R_{NF}'=50\Omega$ is connected to NF capacitors C1, C2 externally, the gain becomes approximately 46dB. When $R_{NF}'=150\Omega$ is connected additionally, the gain becomes approximately 40dB.

- Ripple rejection, total harmonic distortion, and oscillation depend on the layout of the printed circuit board. Large-signal GND, small-signal GND processing and parts GND points must be considered particularly.
- When providing external audio muting intentionally, the IC can be out off by connecting decoupling pin ② to GND through limiting resistor 50 to 100Ω.

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- The V_{CCout} pin adjacent to other pins with a space of 2mm pitch is liable to undergo breakdown caused by solder bridge in the manufacturing process. Therefore, pins ⑦-⑧, ⑦-⑥ DC short protectors are contained. The LA4446 is designed to operate from car-use voltage regulation 10.5 to 15.6V.

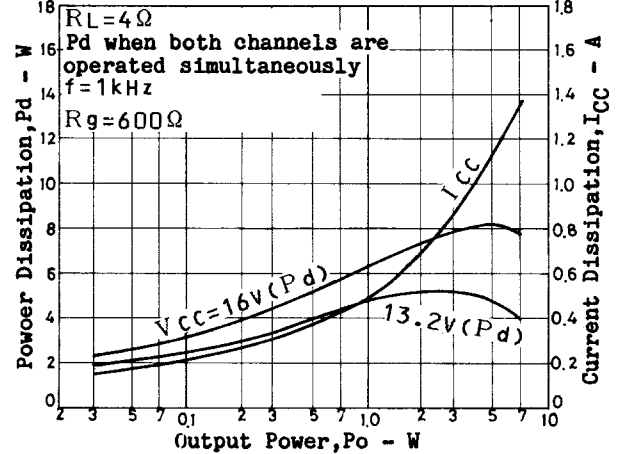
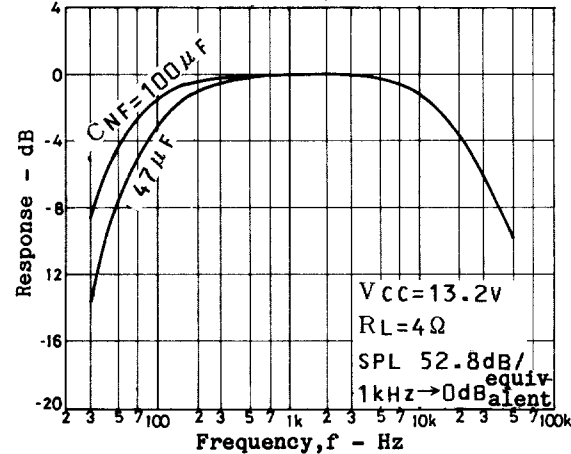
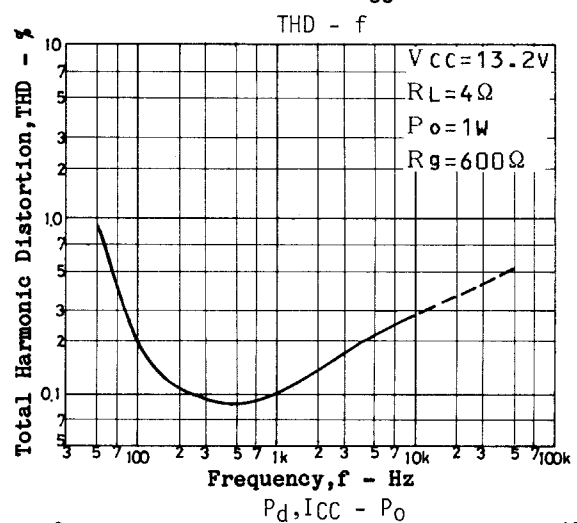
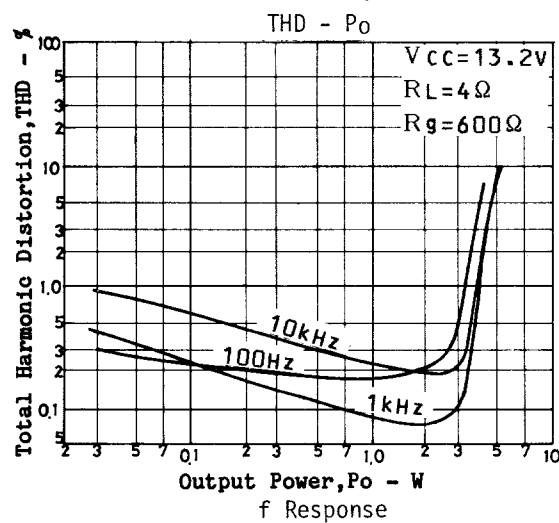
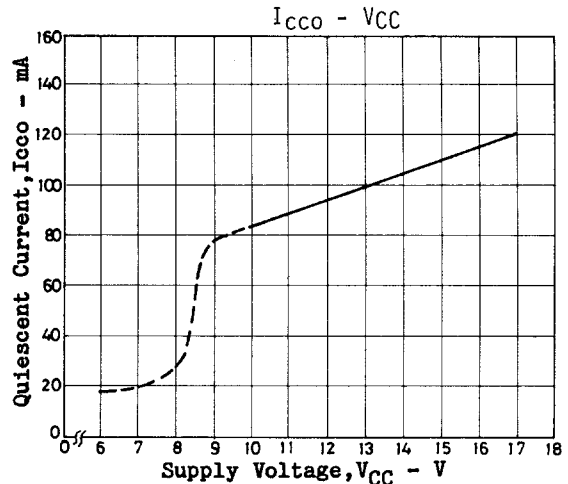
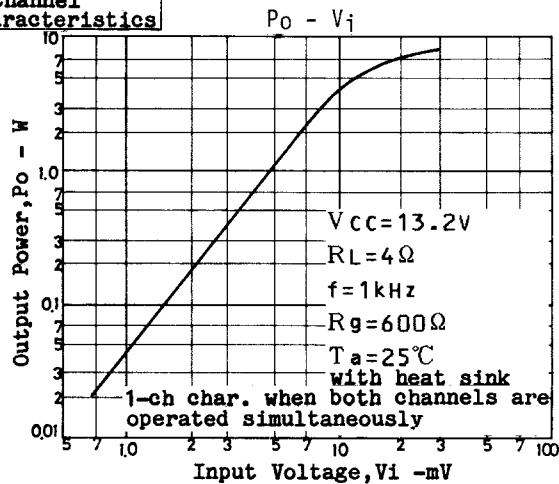
- Overvoltage/surge protector.

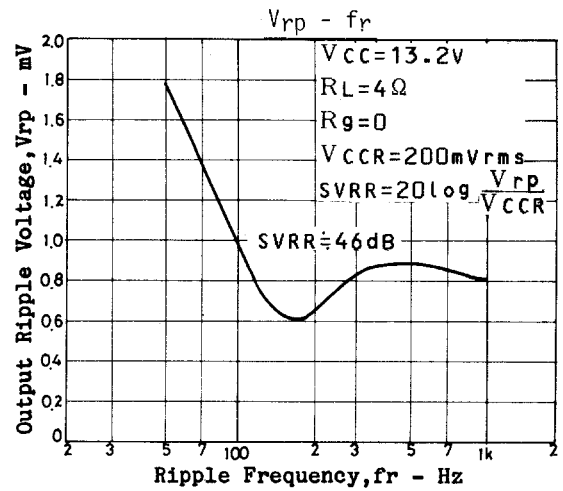
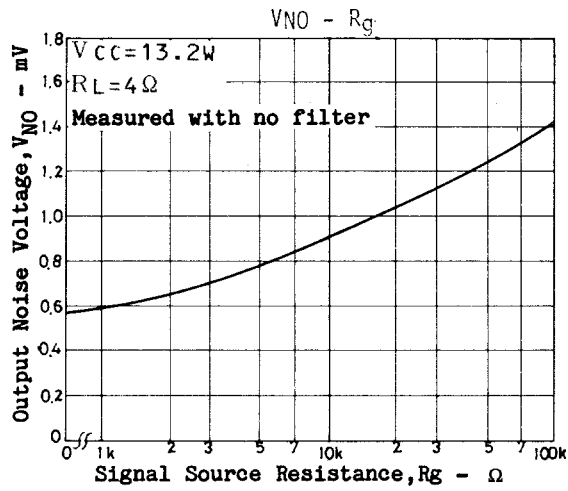
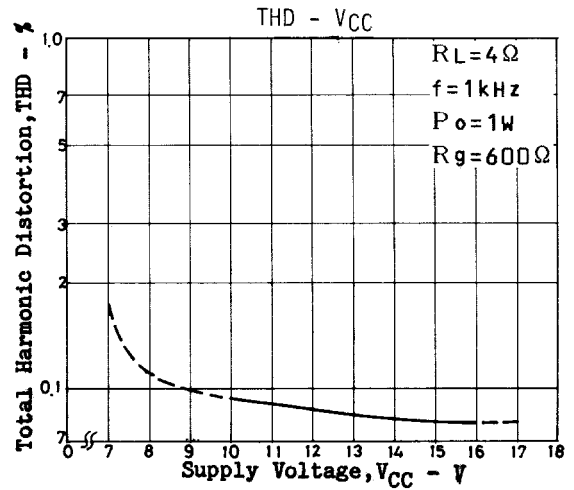
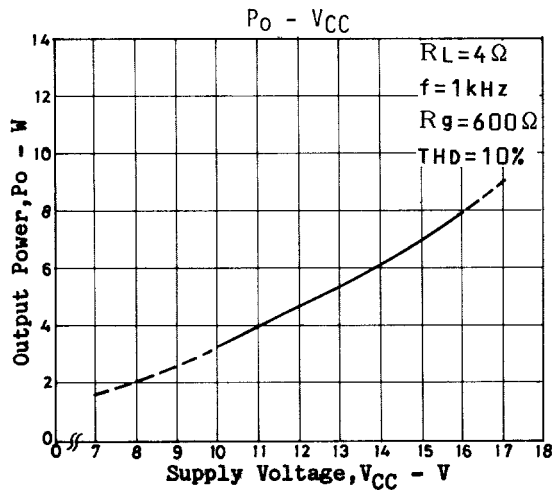
Used to withstand giant pulses of positive surge 50V/200ms. The test is conducted based on the JASO standard in principle. The overvoltage protector is activated at $V_{CCX} \approx 24.5V$.

- Thermal protector.

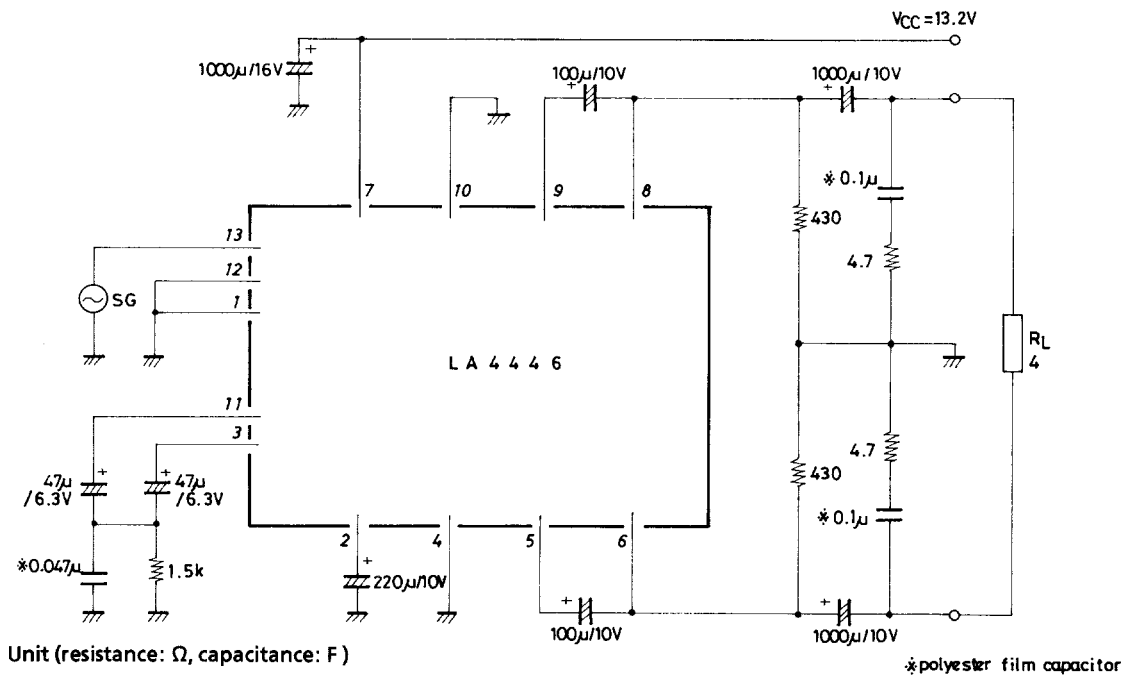
Used to prevent instantaneous breakdown of the IC that may be caused by improper thermal design or abnormal state such as AC load short. The thermal protector is activated at $T_j = 160^\circ C$.

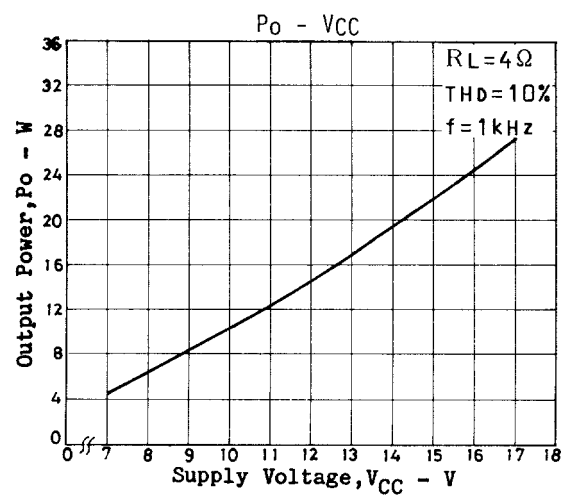
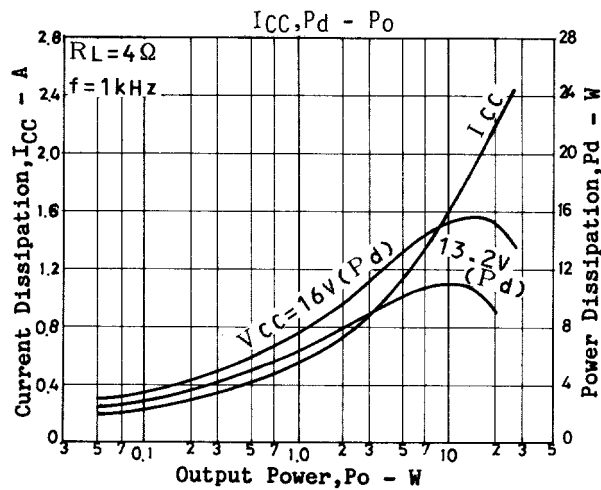
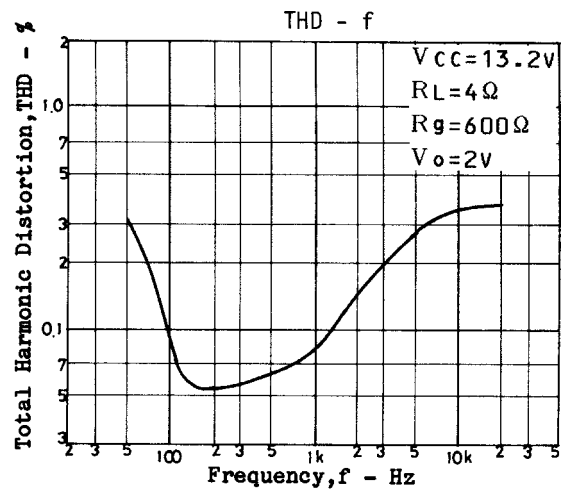
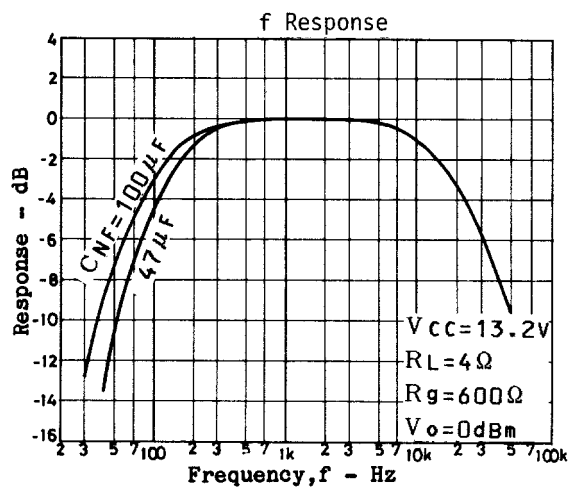
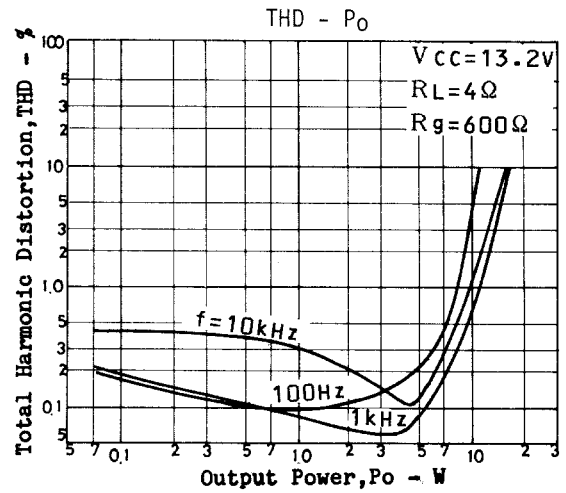
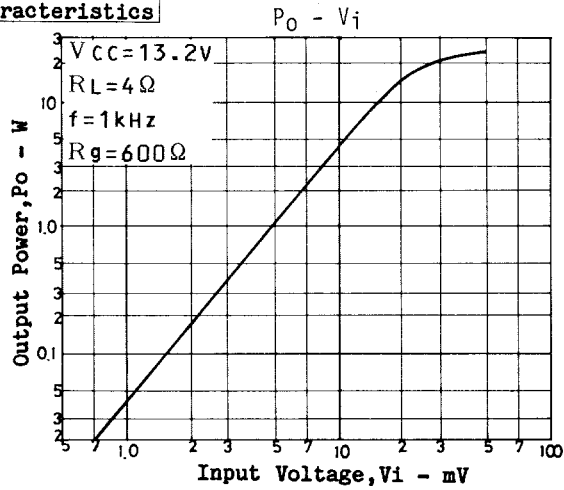
2-Channel Characteristics

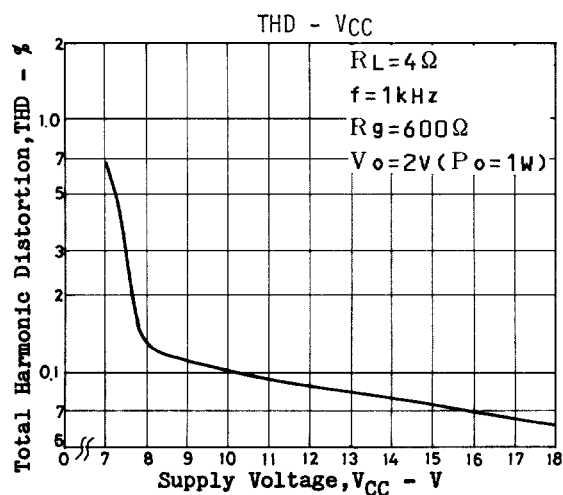




Sample BTL



BTL
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