Ordering number:ENN2636C

Monolithic Linear IC

LA4446

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

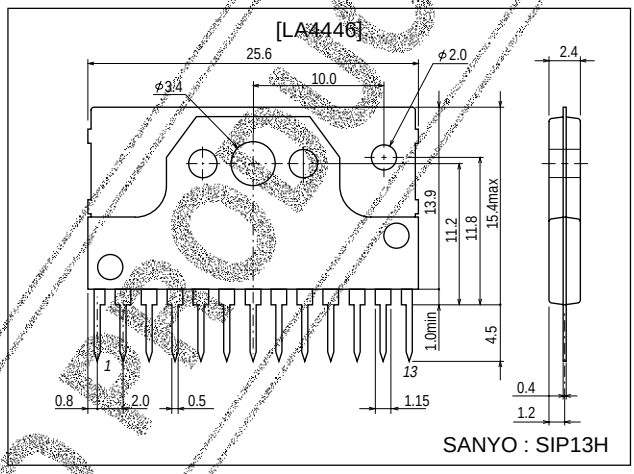
Features

- Dual channels.
  Output : 5.5W×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 (Rg=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 Ta = 25˚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	Pd max	See Pd max – Ta characteristic.	15	W
Operating temperature	Topr		–20 to +75	˚C
Storage temperature	Tstg		–40 to +150	˚C

Operating Conditions at Ta = 25˚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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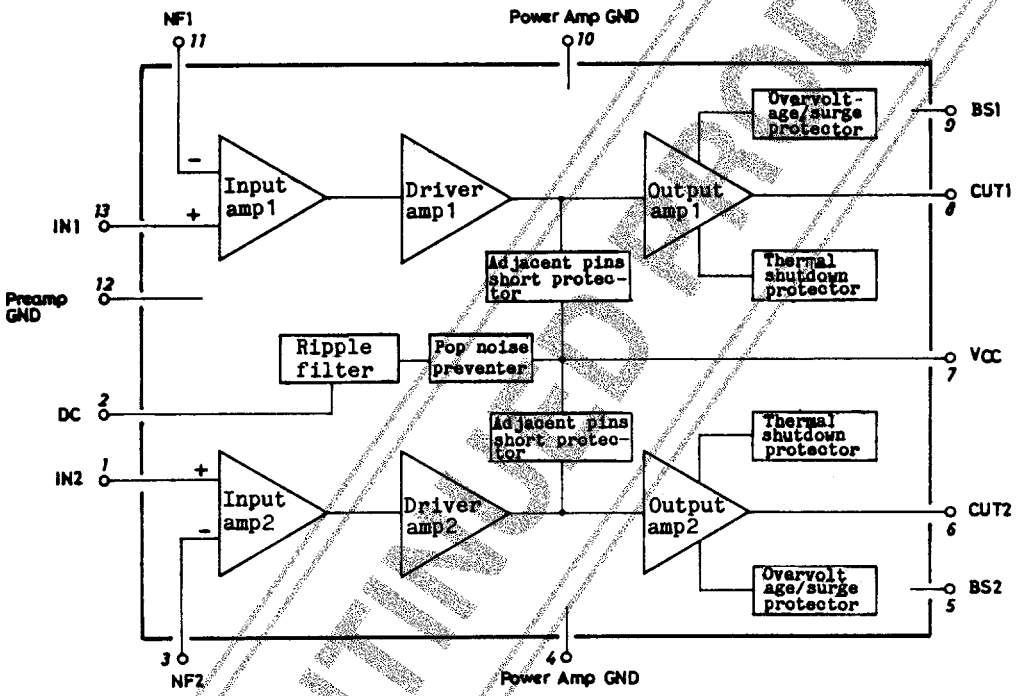
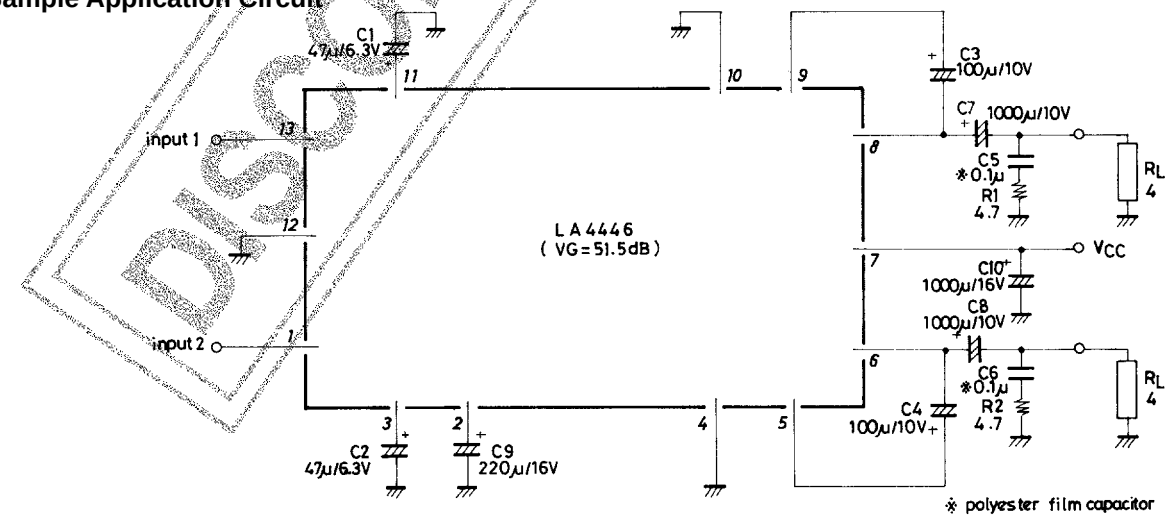
Operating Characteristics at Ta = 25˚C, V_{CC}=13.2V, R_L=4Ω, f=1kHz, Rg=600Ω, with 100×100×1.5mm³ Al heat sink

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	Icco			75	150	mA
Voltage gain	VG		49.5	51.5	53.5	dB
Output power	Po	THD=10%, 2 channels	5.0	5.5		W
Total harmonic distortion	THD	P_O=1W		0.2	1.0	%
Input resistance	ri			30		kΩ
Output noise voltage	V_{NO}	Rg=0		0.6	1.0	mV
		Rg=10kΩ		1.0	2.0	mV
Ripple rejection	SVRR	Rg=0, V_{CCR}=200mV, fr=100Hz		46		dB
Channel separation	CH sep	Rg=10kΩ, Vo=0dBm	45	55		dB

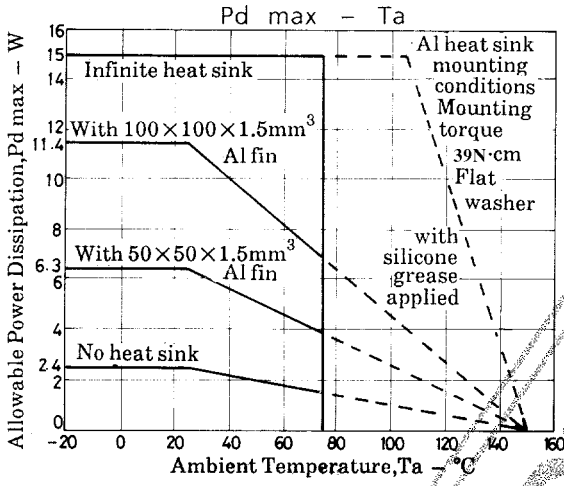
Equivalent Circuit Block Diagram



Sample Application Circuit

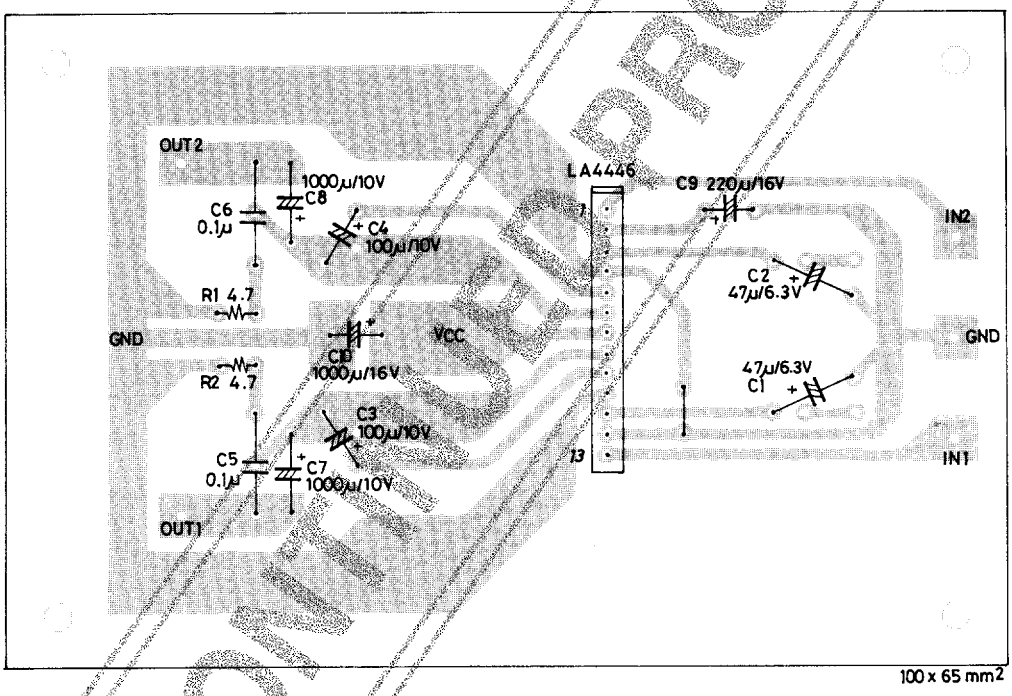


Unit (resistance: Ω, capacitance: F)



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=220μF 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.

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

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

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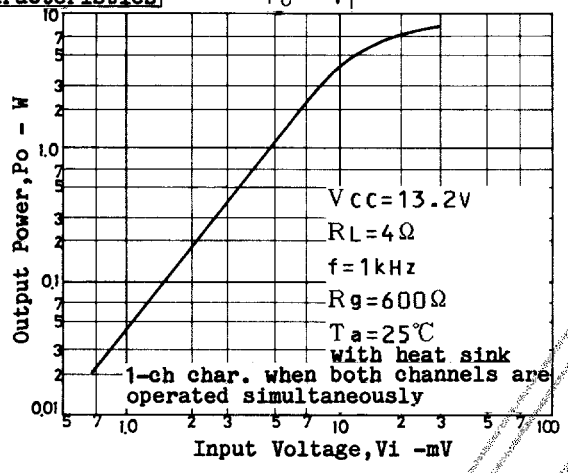
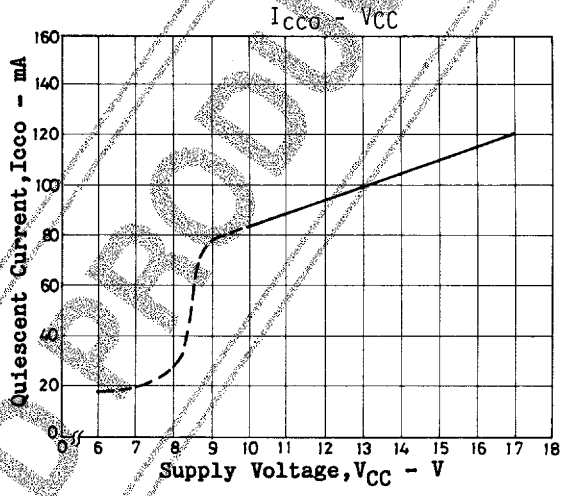
· The V_{CC}out pin adjacent to other pins with a space of 2mm pitch is liable to undergo breakdown caused by solder bridge in the manufacturing process. Therefore, pins ⑦-⑧, ⑦-⑥ DC short protectors are contained. The LA4446 is designed to operate from car-use voltage refulation 10.5 to 15.6V.

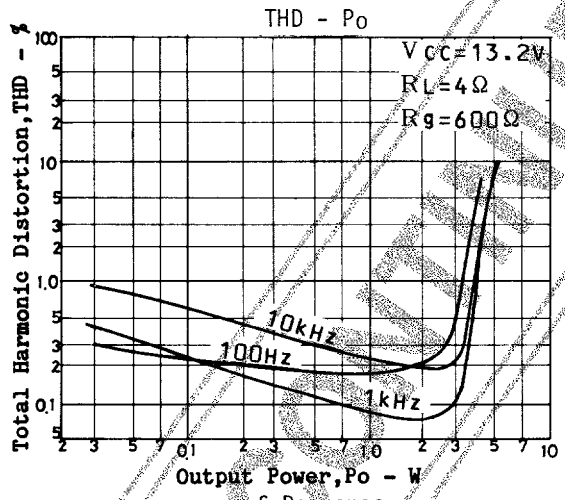
· Overvoltage/surge protector.
Used to withstand giant pulses of positive surge 50V/200ms. The test is conducted based on the JASO standard in principle. The overvoltage protector is activated at V_{CCX}≈24.5V.

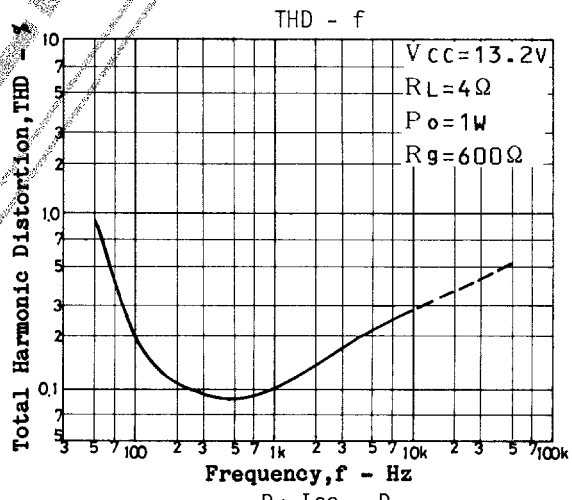
· Thermal protector.
Used to prevent instantaneous breakdown of the IC that may be caused by improper thermal design or abnormal state such as AC load short. The thermal protector is activated at Tj=160°C.

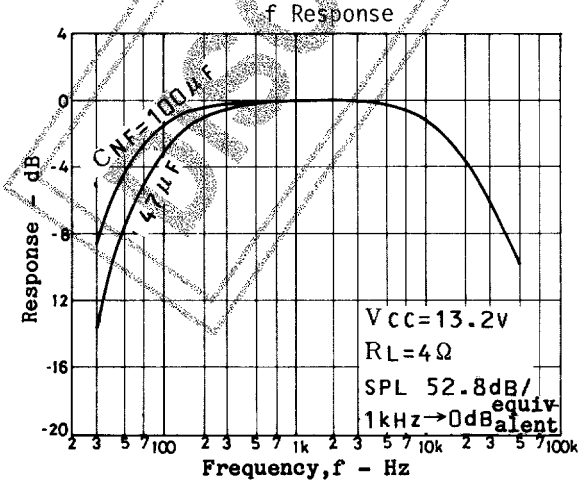
2-Channel Characteristics

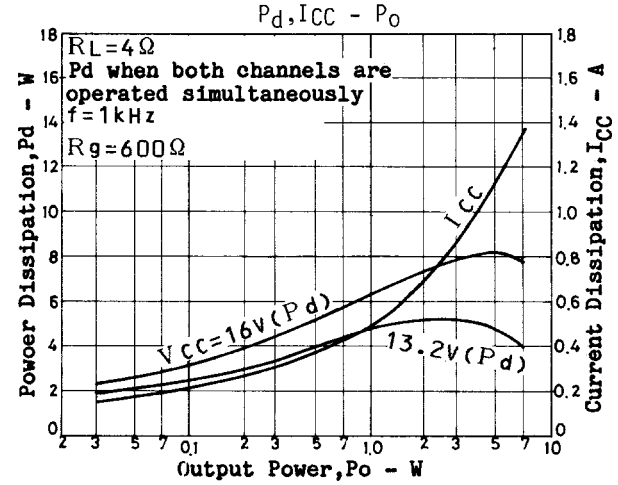


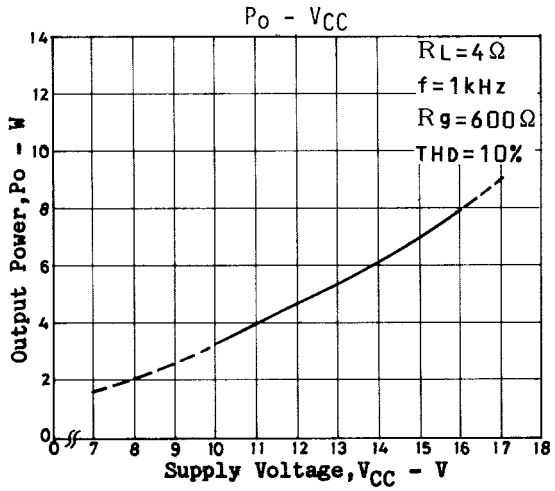


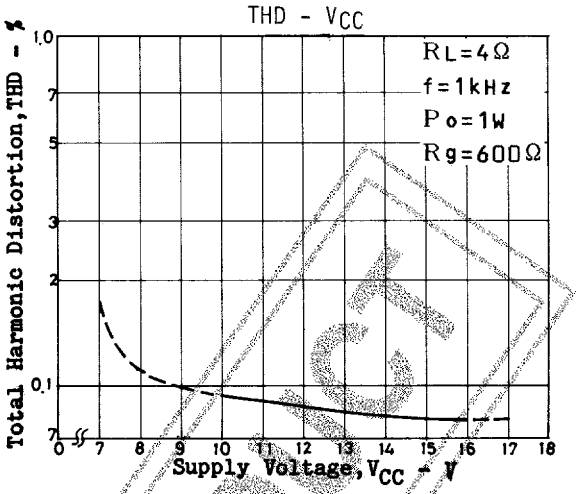


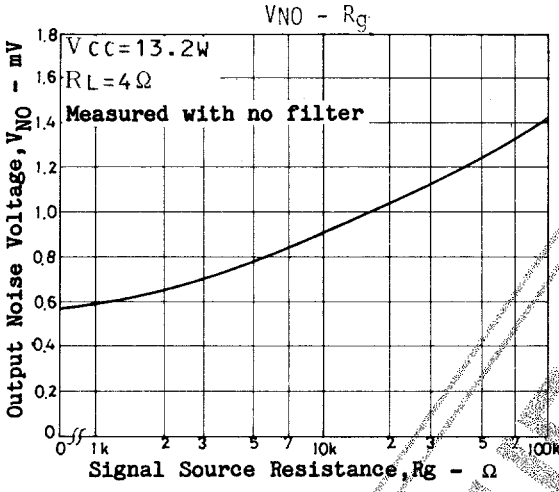


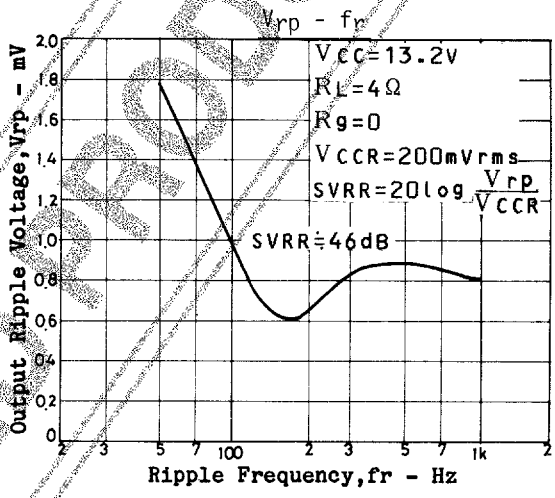




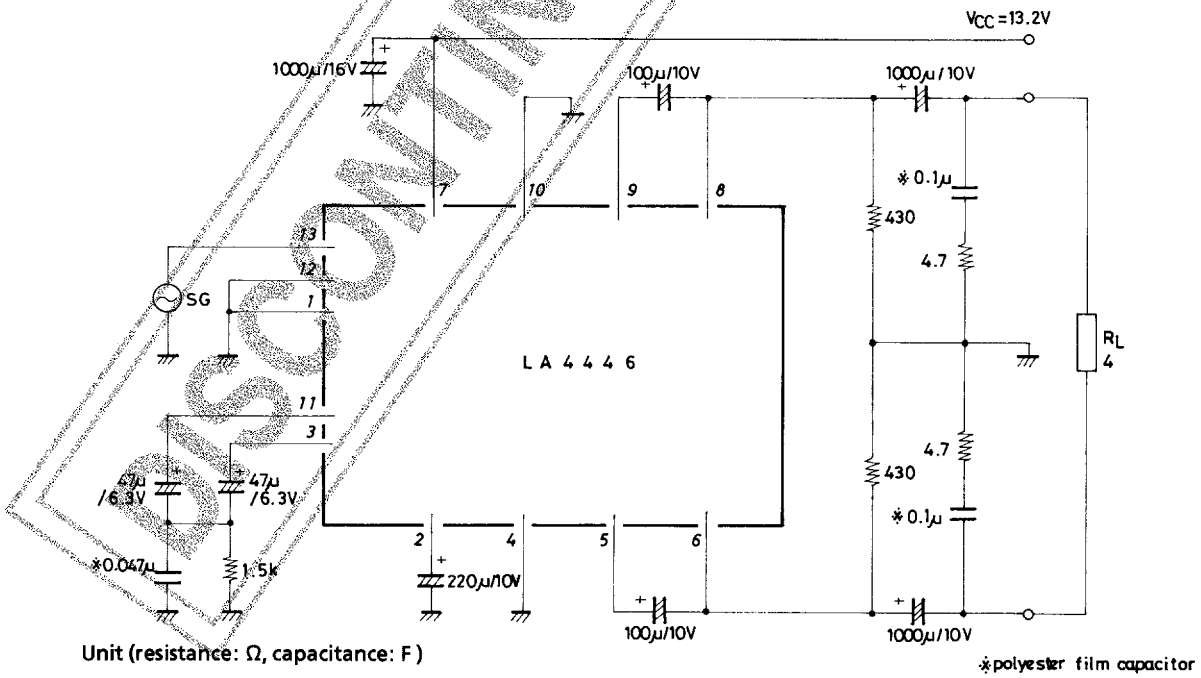






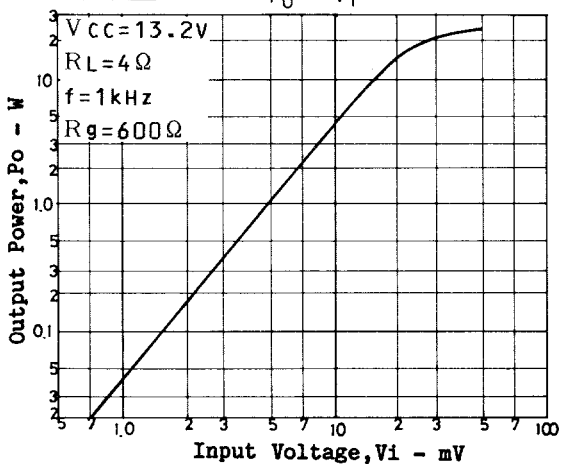


Sample BTL

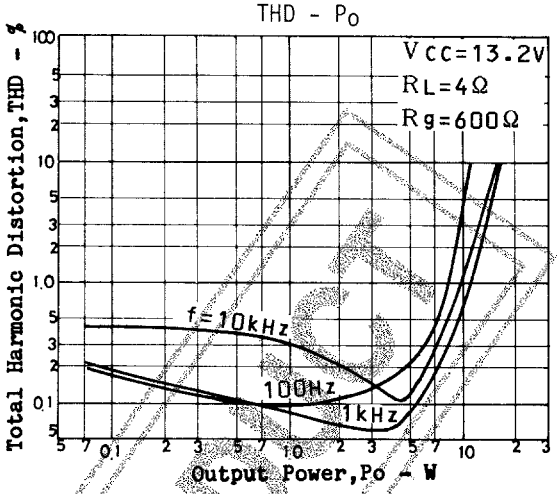


BTL Characteristics

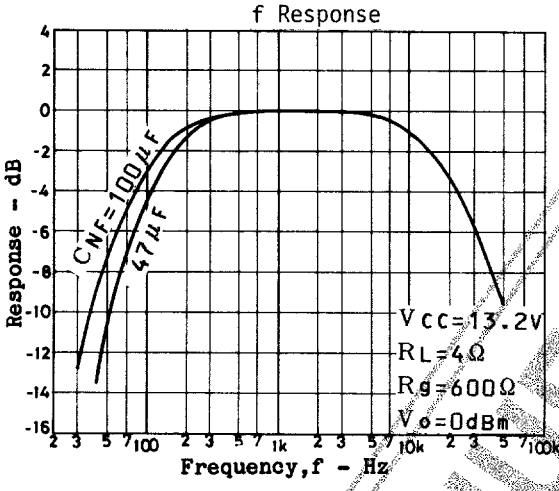
P_O - V_i



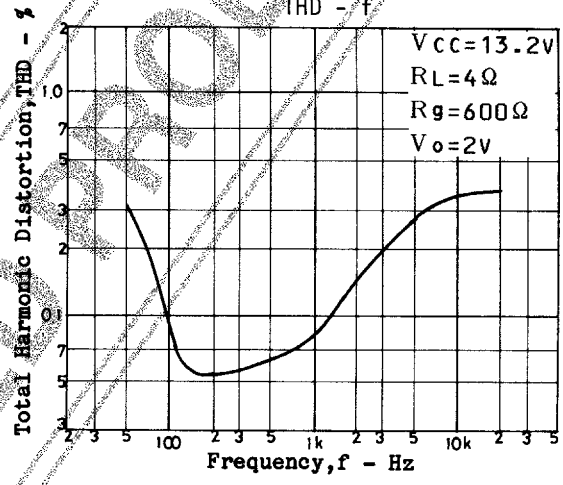
THD - P_O



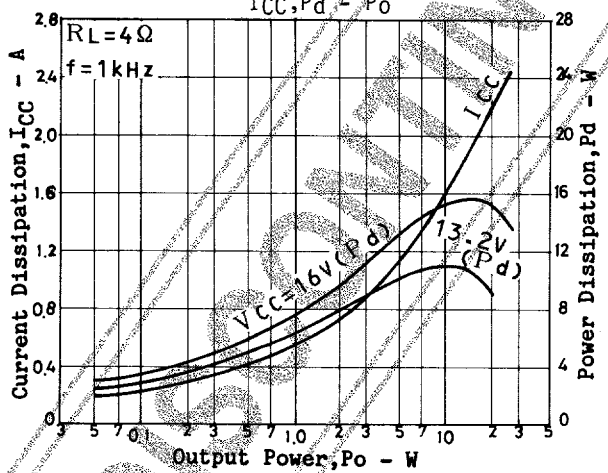
f Response



THD - f



I_{CC},Pd - P_O



P_O - V_{CC}