Ordering number:ENN1463C

Monolithic Linear IC

LA4265

3.5W Monaural Power Amplifier

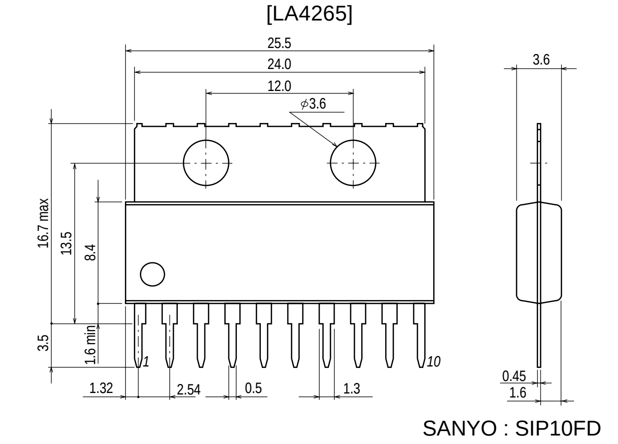
Features

- Minimum number of external parts requierd (No input capacitor, bootstrap capacitor requierd).
- High output : 3.5W typ (V_{CC}=16V, R_L=8Ω, THD=10%).
- Soft clip, causing little harmonic disturbance to radios.
- Small pop noise at the time of power switch ON/OFF.
- Built-in protector against abnormal modes (Thermal shut-down, overvoltage)

Package Dimensions

unit:mm

3018A-SIP10FD



Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		25	V
Maximum output current	I_O peak		2	A
Allowable power dissipation	Pd max	With 100×120×1.5mm^3 Al heat sink	7.5	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}		16	V
Recommended load resistance	R_L		8	Ω
Operating supply voltage range	V_{CC}		9 to 24	V

Operating Characteristics at Ta = 25˚C, V_{CC}=16V, R_L=8Ω, f=1kHz, Rg=600Ω, See specified test circuit (based on sample application circuit).

Parameter	Symbol	Conditions	Ratings min	Ratings typ	Ratings max	Unit
Quiescent current	I_{CCO}			35	50	mA
Voltage gain	VG		48	50	52	dB
Output power	P_O	THD=10%	3.0	3.5		W
Total harmonic distortion	THD	P_O=0.5W		0.3	1.0	%
Output noise voltage	V_{NO}	Rg=10kΩ, BPF=20Hz to 20kHz		0.65	1.5	mV
Ripple rejection	SVRR	Rg=0, f_R=100Hz, V_R=0.5V	40	50		dB

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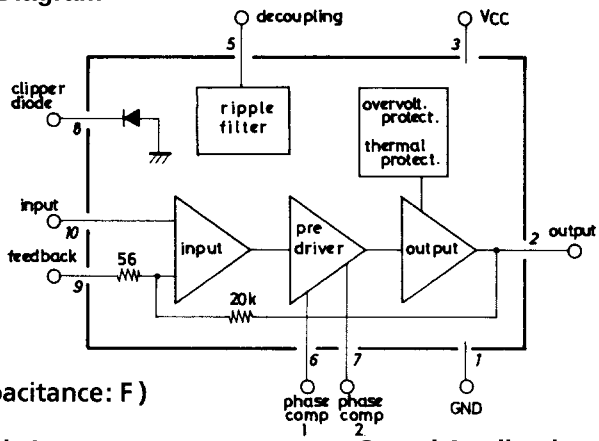
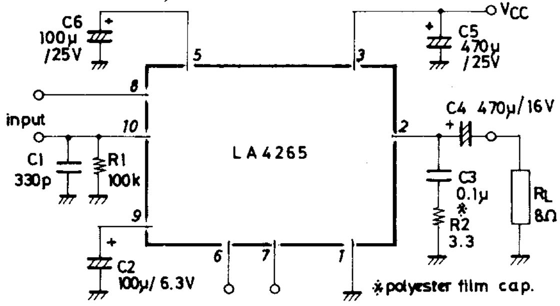
Equivalent Circuit Block Diagram



Unit (resistance: Ω, capacitance: F)

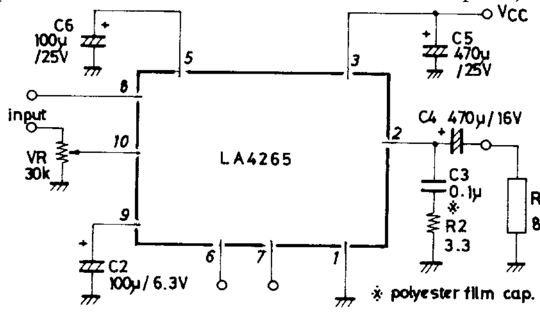
Sample Application Circuit 1

(Recommended circuit)

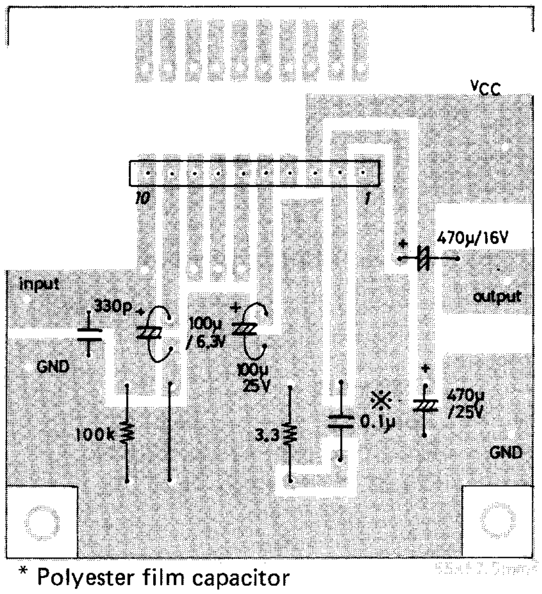


Sampl Application Circuit 2

(Circuit with minimum number of external parts)

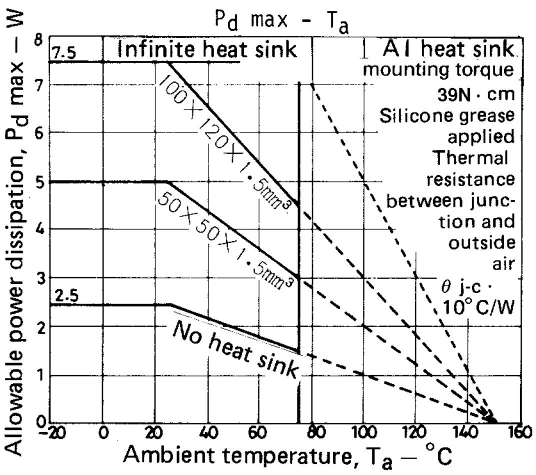


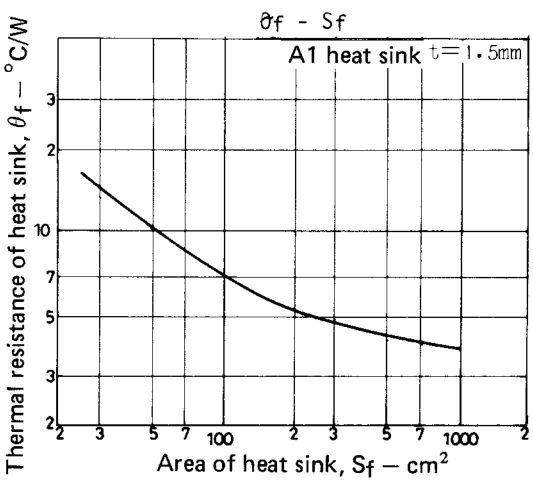
Sample Printed Circuit Pattern



Cu-foiled area
55×57.5 mm2

* Polyester film capacitor





Description of External Parts

C1 (330pF)	:	Input short capacitor Reduces the high frequency noise when the input impedance is increased. Not required when the input impedance is decreased.
C2 (100μF)	:	Feedback capacitor Decreasing the capacitance value lowers the low frequency response. Increasing the capacitance value makes the starting time later.
C3 (0.1μF polyester film capacitor)	:	Oscillation blocking capacitor Decreasing the capacitance value causes oscillation to occur easily. Use a polyester film capacitor that is good in high frequency response and temperature characteristic. The use of an electrolytic capacitor may cause oscillation to occur at low temperatures.
C4 (470μF)	:	Output capacitor Decreasing the capacitance value causes insufficient power at low frequencies.
C5 (470μF)	:	Power capacitor Decreasing the capacitance value causes ripple to occur easily. Locating at a distance from the IC or removing this capacitor may cause oscillation to occur.
C6 (100μF)	:	Ripple filter capacitor Decreasing the capacitance value excessively or removing this capacitor causes ripple to occur. However, increasing the capacitance value does not always cause ripple to be reduced. Decreasing the capacitance value makes the starting time earlier.
R1 (100kΩ)	:	Input bias resistor Determines the bias (bias of zero potential) to be applied to the input pin and the input impedance. Not required if a variable resistor is also used as this resistor.
R2 (3.3Ω)	:	Resistor connected in series with oscillation blocking capacitor Prevents phase shift attributable to the oscillation blocking capacitor so that oscillation is hard to occur.

Note for Changing Voltage Gain

The voltage gain can be reduced by adding an external resistor (R_{NF}) in series with the feedback capacitor. (See VG · R_{NF} characteristic curve). However, it should be noted that various characteristics are also changed (THD-VG, V_{NO}-VG, Vro-VG). The voltage gain must not be reduced to be less than 30dB. Since the frequency response is extended and oscillation is liable to occur when the voltage gain is reduced, high-cut must be made as required. (High-cut is made by connecting a capacitor of approximately 30pF across pins (6) and (7).)

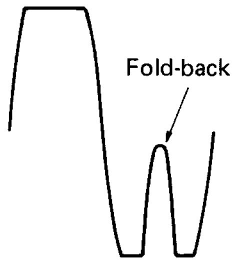
External Muting

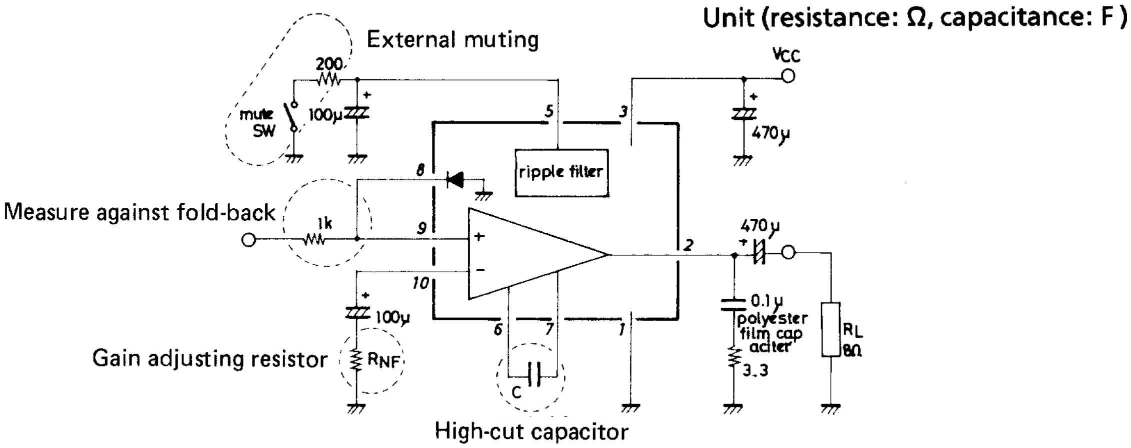
If external muting is required, make the circuit as shown on next page. In this case, the pop noise is similar to that which occurs at the time of power switch ON/OFF. If the value of the series resistor is decreased, more pop noise is heard at the time of attack ; if increased, muting is hard to work.

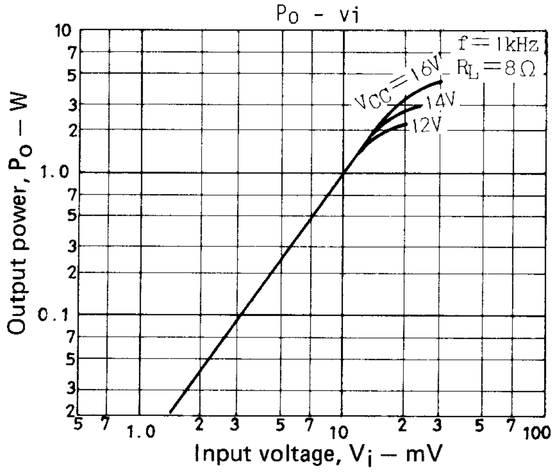
Measure against Fold-back of Output Waveform

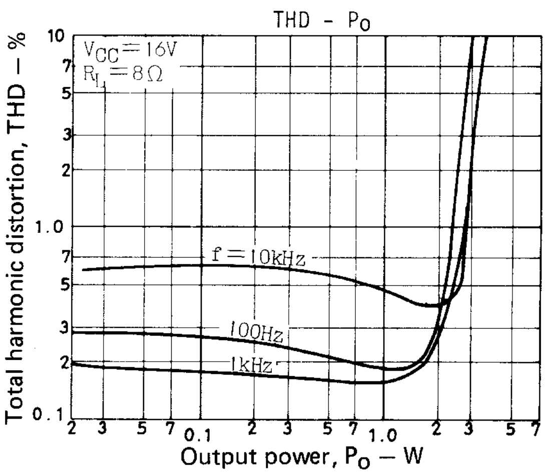
Since the input pin is zero-biased, the circuit may be saturated at an overinput, causing a part of the output waveform to be folded back (e. g. when the peak input voltage exceeds 600mV). In such a case, the fold-back of the waveform can be prevented by using the built-in diode (also can be prevented by using an external diode). When the built-in diode is used, a resistor must be connected in series with the input pin to cause the diode to conduct no overcurrent (10mA or less).

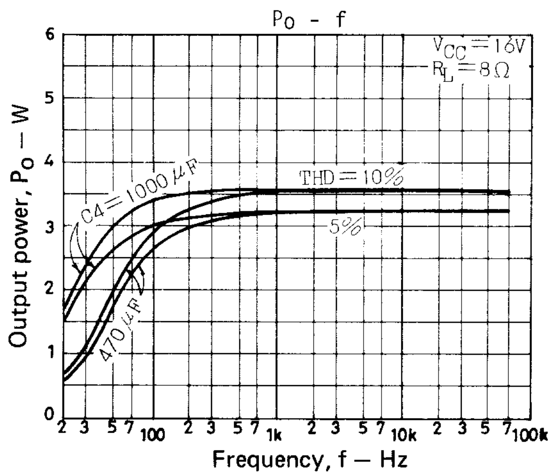
Fold-back Output Waveform

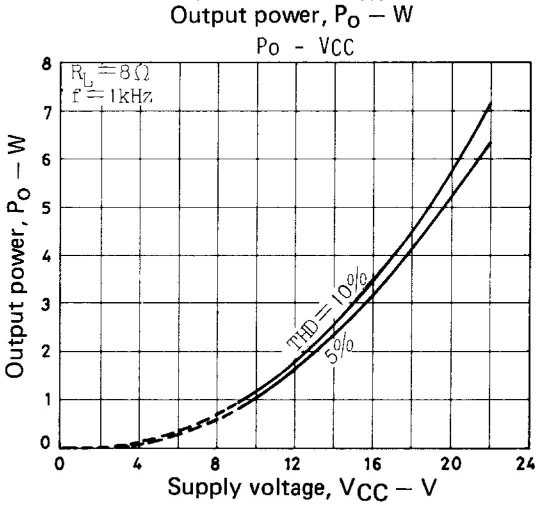


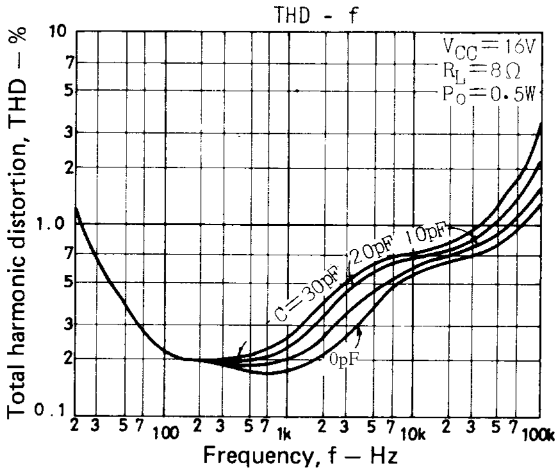


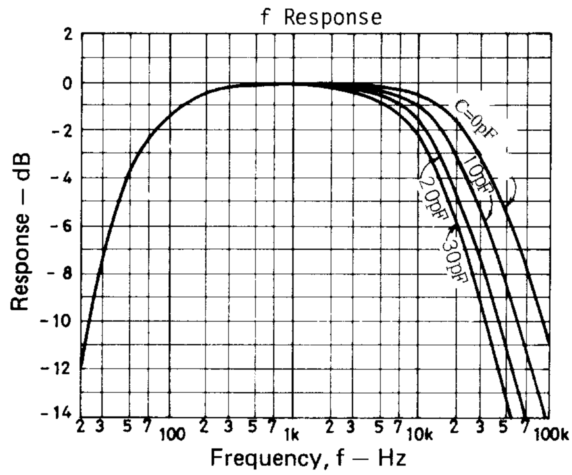


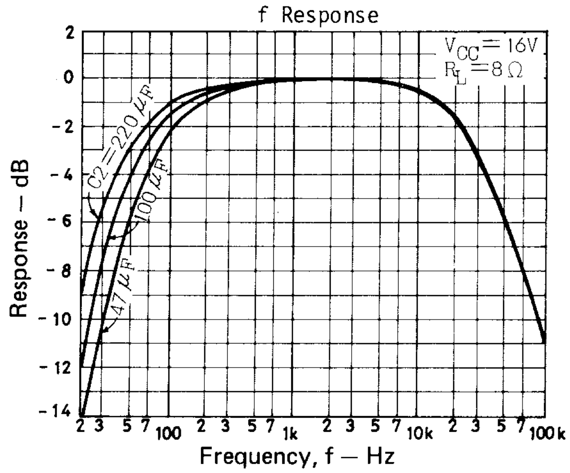


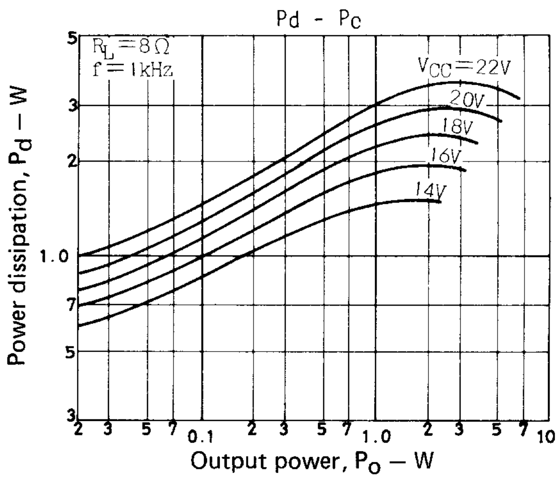


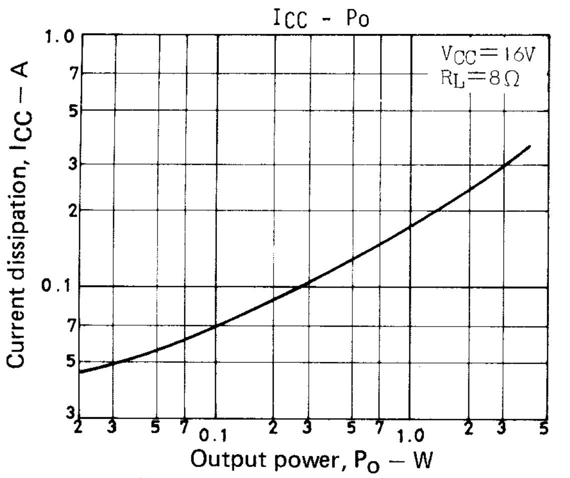


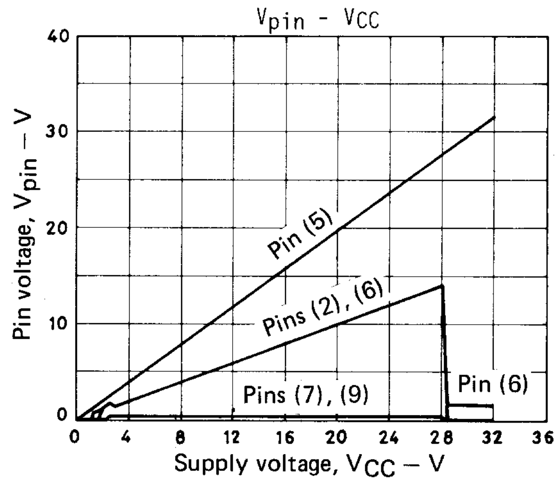

THD - f
Total harmonic distortion, THD — %
Frequency, f — Hz
VCC = 16V
RL = 8Ω
PO = 0.5W
C=30pF
20pF
10pF
0pF

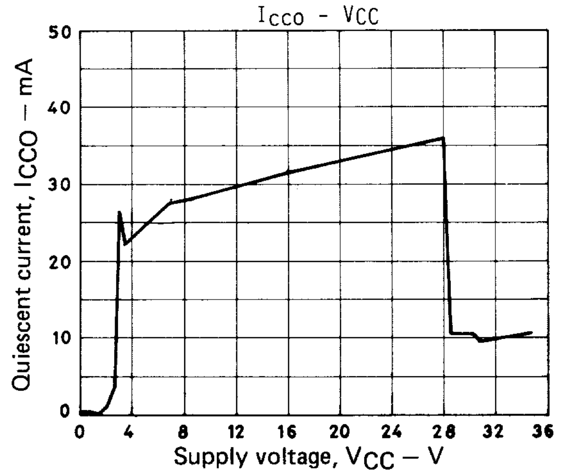

f Response
Response — dB
Frequency, f — Hz
C=0pF
10pF
20pF
30pF

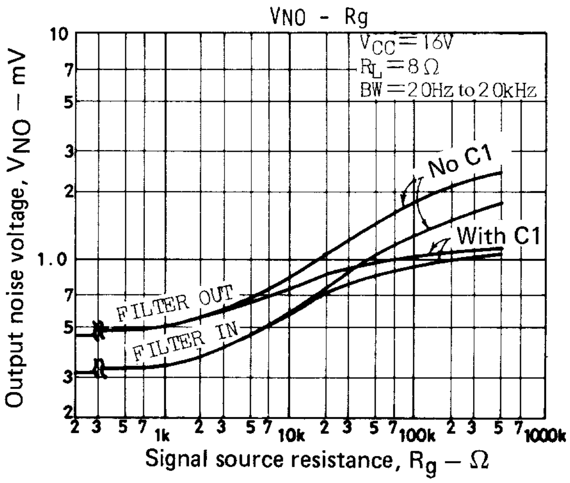

f Response
Response — dB
Frequency, f — Hz
VCC = 16V
RL = 8Ω
C2=220μF
100μF
47μF

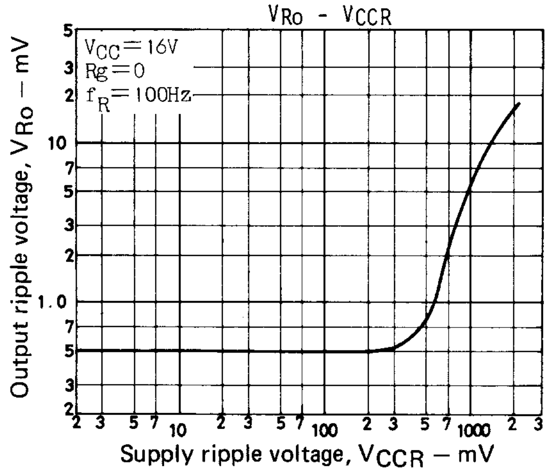

Pd - Pc
Power dissipation, Pd — W
Output power, PO — W
RL = 8Ω
f = 1kHz
VCC=22V
20V
18V
16V
14V

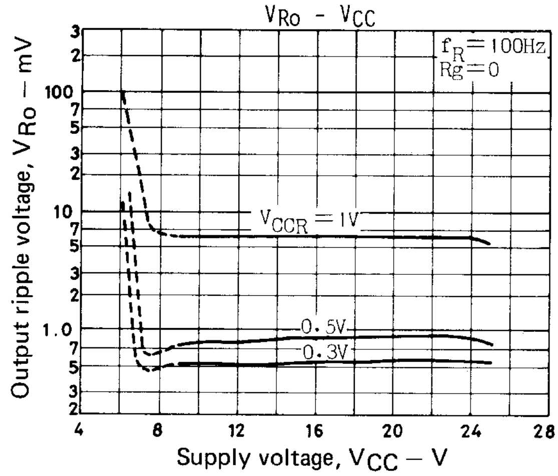

ICC - Po
Current dissipation, ICC — A
Output power, PO — W
VCC = 16V
RL = 8Ω

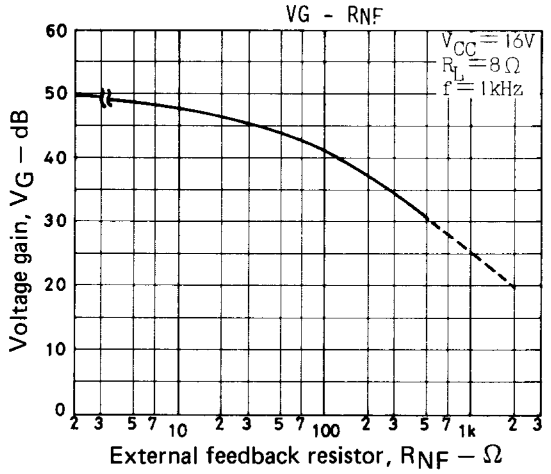

Vpin - VCC
Pin voltage, Vpin — V
Supply voltage, VCC — V
Pin (5)
Pins (2), (6)
Pins (7), (9)
Pin (6)

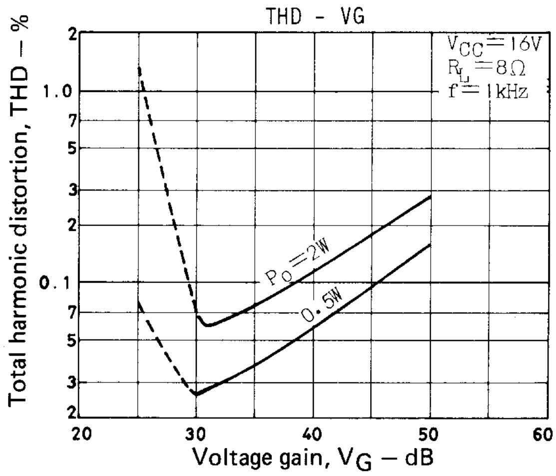

Icco - VCC
Quiescent current, ICCO — mA
Supply voltage, VCC — V

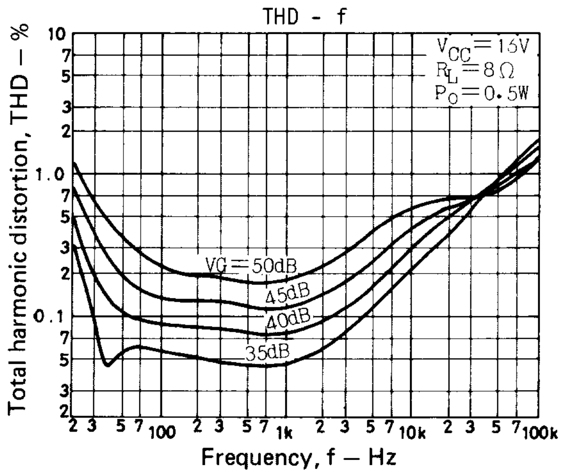

VNO - Rg
Output noise voltage, VNO — mV
Signal source resistance, Rg — Ω
VCC = 16V
RL = 8Ω
BW = 20Hz to 20kHz
No C1
With C1
FILTER OUT
FILTER IN

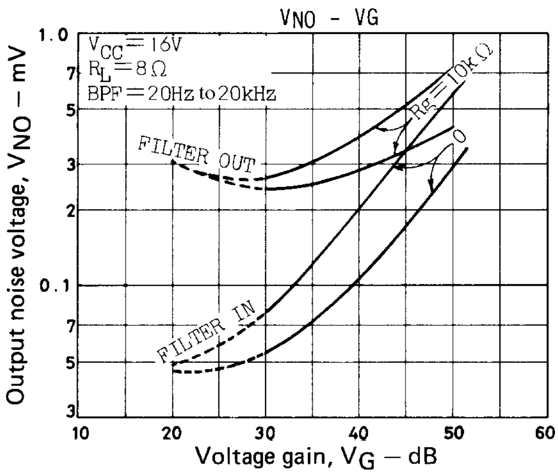

VRo - VCCR
VCC=16V
Rg=0
fR=100Hz
Output ripple voltage, VRo – mV
Supply ripple voltage, VCCR – mV

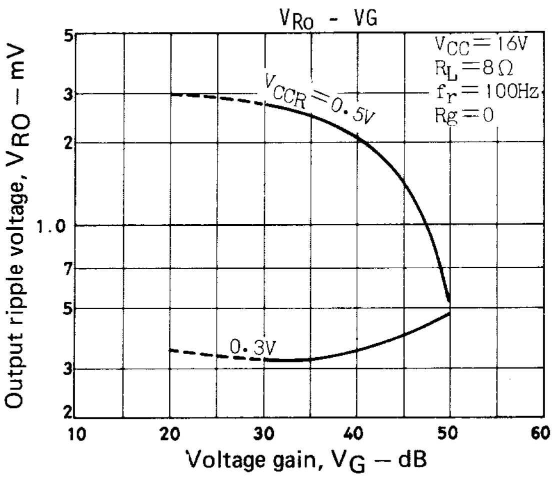

VRo - VCC
fR=100Hz
Rg=0
VCCR=1V
0.5V
0.3V
Output ripple voltage, VRo – mV
Supply voltage, VCC – V

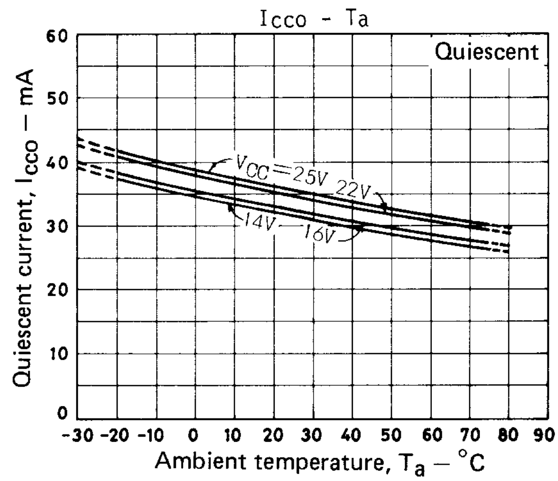

VG - RNF
VCC=16V
RL=8Ω
f=1kHz
Voltage gain, VG – dB
External feedback resistor, RNF – Ω

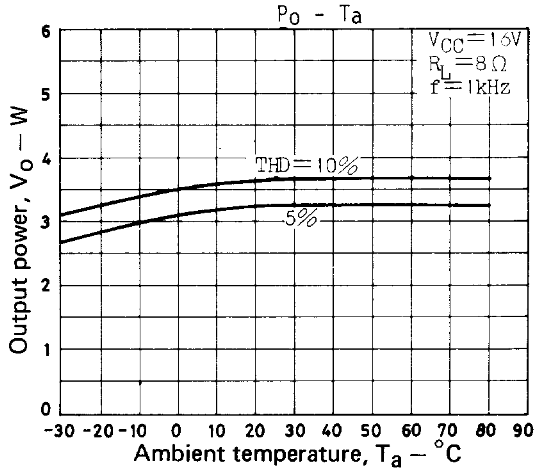

THD - VG
VCC=16V
RL=8Ω
f=1kHz
PO=2W
0.5W
Total harmonic distortion, THD – %
Voltage gain, VG – dB

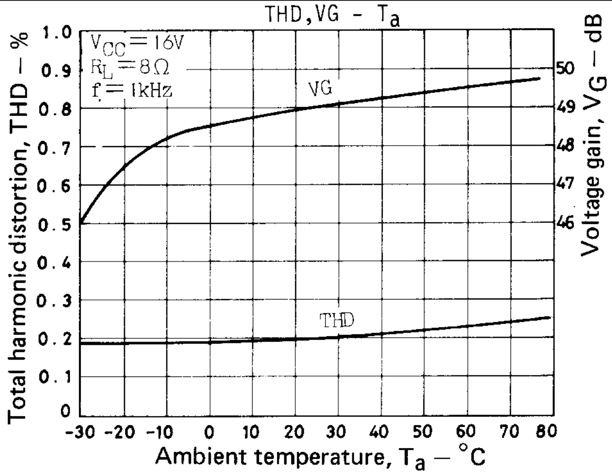

THD - f
VCC=16V
RL=8Ω
PO=0.5W
VG=50dB
45dB
40dB
35dB
Total harmonic distortion, THD – %
Frequency, f – Hz


VNO - VG
VCC=16V
RL=8Ω
BPF=20Hz to 20kHz
FILTER OUT
FILTER IN
Rg=10kΩ
0
Output noise voltage, VNO – mV
Voltage gain, VG – dB

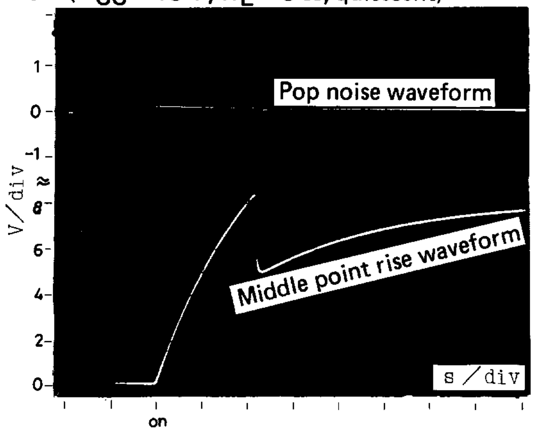

VRo - VG
VCC=16V
RL=8Ω
fr=100Hz
Rg=0
VCCR=0.5V
0.3V
Output ripple voltage, VRO – mV
Voltage gain, VG – dB


Icco - Ta
Quiescent
VCC=25V
22V
14V
16V
Quiescent current, Icco – mA
Ambient temperature, Ta – °C

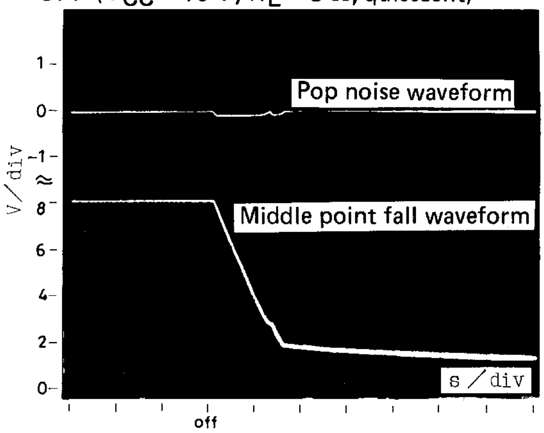




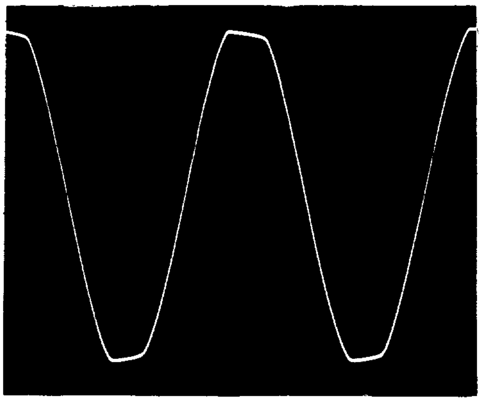
Pop noise waveform at the time of power switch ON (V_{CC} = 16 V, R_L = 8 Ω, quiescent)



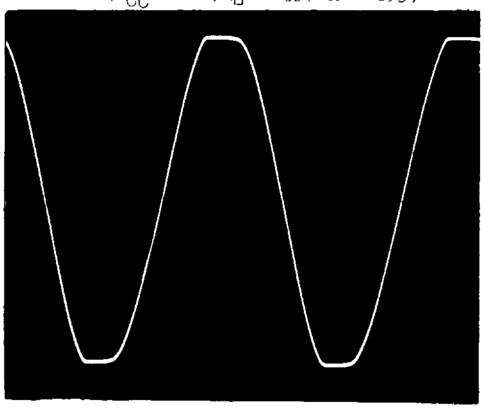
Pop noise waveform at the time of power switch OFF (V_{CC} = 16 V, R_L = 8 Ω, quiescent)



f = 1 kHz clip waveform
(V_{CC}=16V, R_L=8Ω, THD=5%)



f = 10 kHz clip waveform
(V_{CC}=16V, R_L=8Ω, THD=5%)



Proper Cares in Using IC

- Maximum ratings
  If the IC is used in the vicinity of the maximum ratings, even a slight variation in conditions may cause the maximum ratings to be exceeded, thereby leading to breakdown. Allow an ample margin of variation for supply voltage, etc. and use the IC in the range where the maximum ratings are not exceeded.

- Pin-to-pin short
  If power is applied when the space between pins is shorted, breakdown or deterioration may occur. When mounting the IC on the board or applying power, make sure that the space between pins is not shorted with solder, etc.

- When used in radio applications
  When using in radios, allow a sufficient space between IC and bar antenna.

- Printed circuit pattern
  When designing the printed circuit pattern, make the power supply, output, and ground lines thick and short and arrange the pattern and parts so that no feedback loop is formed between input and output. Place power capacitor C5, oscillation blocking capacitor C3 as close to IC pins as possible to prevent oscillation from occurring. Refer to the sample printed circuit pattern.

- Some plug jacks to be used for connecting to the external speaker can have the both poles short-circuited once when connecting. In this case, the load is short-circuited, which may break down the IC.