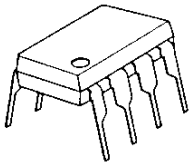
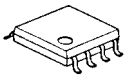
# LOW VOLTAGE AUDIO POWER AMPLIFIER

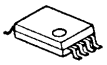
## ■ GENERAL DESCRPTION

The **NJM2149** is an audio power amplifier designed for telephone applications.
No external coupling capacitors are required because of the differential outputs. The closed loop gain is adjusted by two external resistors, and a CD pin permit powering down with muting the input signal.
The **NJM2149** improves the tern noise reduction in switching Power Down mode and external high band noise reduction, compared with **NJM2135**.
It is suitable for portable telephone , wireless telephone, button telephone, and other speaker amplifier applications.

## ■ PACKAGE OUTLENE


NJM2149D


NJM2149M


NJM2149V

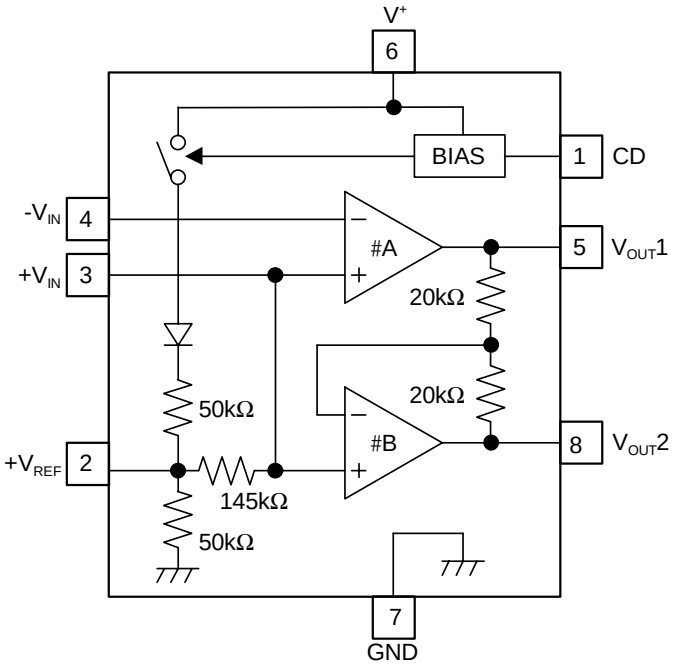
NJM2149R

NJM2149RB1

## ■ FEATURES

| | |
|---|---|
| ●Operating Voltage | +2 - +6V |
| ●Operating Current | 2.2mA typ., at $V^+$=3V |
| ●Supply Current in Power Down Mode | 0.1μA typ |
| ●Output Power Exceeds250mW | $V^+$=6V,$R_L$=32Ω |
| ●Gain Range | GVD=0-43dB,Voise Band |
| ●Load Impedance | $R_L$=8-200Ω |
| ●Bipolar Technology | |
| ●Package Outline | DIP8,DMP8,SSOP8,VSP8,TVSP8 |

## ■ PIN CONFIGURATION




PIN FUNCTION
1.CD
2.+$V_{REF}$
3.+$V_{IN}$
4.-$V_{IN}$
5.$V_{OUT}$1
6.$V^+$
7.GND
8.$V_{OUT}$2

## ■ ABSOLUTE MAXMUM RANGE

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V^+$ | +7 | V |
| Power Dissipation | $P_D$ | (DIP8) 500<br>(DMP8) 500 (note1)<br>(SSOP8) 360 (note1)<br>(VSP8/TVSP8) 320 | mW |
| Operating Temperature Range | Topr | -40 to +85 | °C |
| Storage Temperature Range | Tstg | -40 to +125 | °C |

(note1)Mounted on PC Board

## ■ ELECTRICAL CHARACTERISTICS

($V^+$=6.0V, 1pin=2V, Ta=25°C unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Operating Voltage | $V^+$ | | 2.0 | - | 6.0 | V |
| Operating Current | $I_{CC}$ | $V^+$=3.0V, $R_L$=∞, No Signal | - | 2.2 | 3.5 | mA |
| Operating Current at Power Down Mode | $I_{CCD}$ | $V^+$=3.0V, $R_L$=∞, 1pin=0.8V, No Signal | - | 0.1 | 1.0 | μA |
| Open Loop Gain | $A_V1$ | Amp#A, f<100Hz | 84 | 90 | - | dB |
| Closed Loop Gain | $A_V2$ | Amp#B, f=1kHz, $R_L$=32Ω | -0.35 | 0 | +0.35 | dB |
| Output Power | $P_O1$ | $V^+$=3.0V, $R_L$=16Ω, THD≤10% (note2) | 55 | - | - | mW |
| | $P_O2$ | $V^+$=6.0V, $R_L$=32Ω, THD≤10% (note2) | 250 | - | - | mW |
| Total Harmonic Distortion | THD1 | $V^+$=6V, $R_L$=32Ω, $P_O$=125mW, f =1kHz, $G_{VD}$=34dB | - | 0.5 | 1.0 | % |
| | THD2 | $V^+$≥3V, $R_L$=8Ω, $P_O$=20mW, f=1kHz, $G_{VD}$=12dB | - | 0.5 | - | % |
| Power Supply Rejection Ratio ($V^+$=3.0V-6.0V) | SVR1 | C1=∞, C2=0.01μF, DC | 50 | - | - | dB |
| | SVR2 | C1=0.1μF, C2=0, f=1kHz | - | 12 | - | dB |
| | SVR3 | C1=1.0μF, C2=5.0μF, f=1kHz | - | 47 | - | dB |
| Mute Attenuation | MAT | f =1kHz-20kHz, 1pin=0.8V | - | 70 | - | dB |
| Output Voltage ($R_f$=75kΩ, DC) | $V_O1$ | $V^+$=3.0V, $R_L$=16Ω | 1.00 | 1.15 | 1.25 | V |
| | $V_O2$ | $V^+$=6.0V | - | 2.60 | - | V |
| Output High Level | $V_{OH}$ | $I_{OUT}$=-75mA, $V^+$=2.0-6.0V | - | $V^+$-1.1 | - | V |
| Output Low Level | $V_{OL}$ | $I_{OUT}$=75mA, $V^+$=2.0-6.0V | -30 | 0.21 | - | V |
| Output DC Offset | $\Delta V_O$ | $R_f$=75kΩ, $R_L$=32Ω, 5pin-8pin | -30 | 0 | +30 | mV |
| Input Bias Current | $I_B$ | 4pin | - | 0 | -200 | nA |
| Equivalent Resistance | $R_{+IN}$ | 3pin | 100 | 170 | 220 | kΩ |
| | $R_{REF}$ | 2pin | 18 | 26 | 40 | kΩ |
| CD Input Voltage H | $V_{CDH}$ | 1pin | 2.0 | - | $V^+$ | V |
| CD Input Voltage L | $V_{CDL}$ | 1pin | 0.0 | - | 0.8 | V |
| CD Input Resistance | $R_{CD}$ | $V^+$=$V_{CD}$=6.0V, 1pin | 50 | 85 | 175 | kΩ |

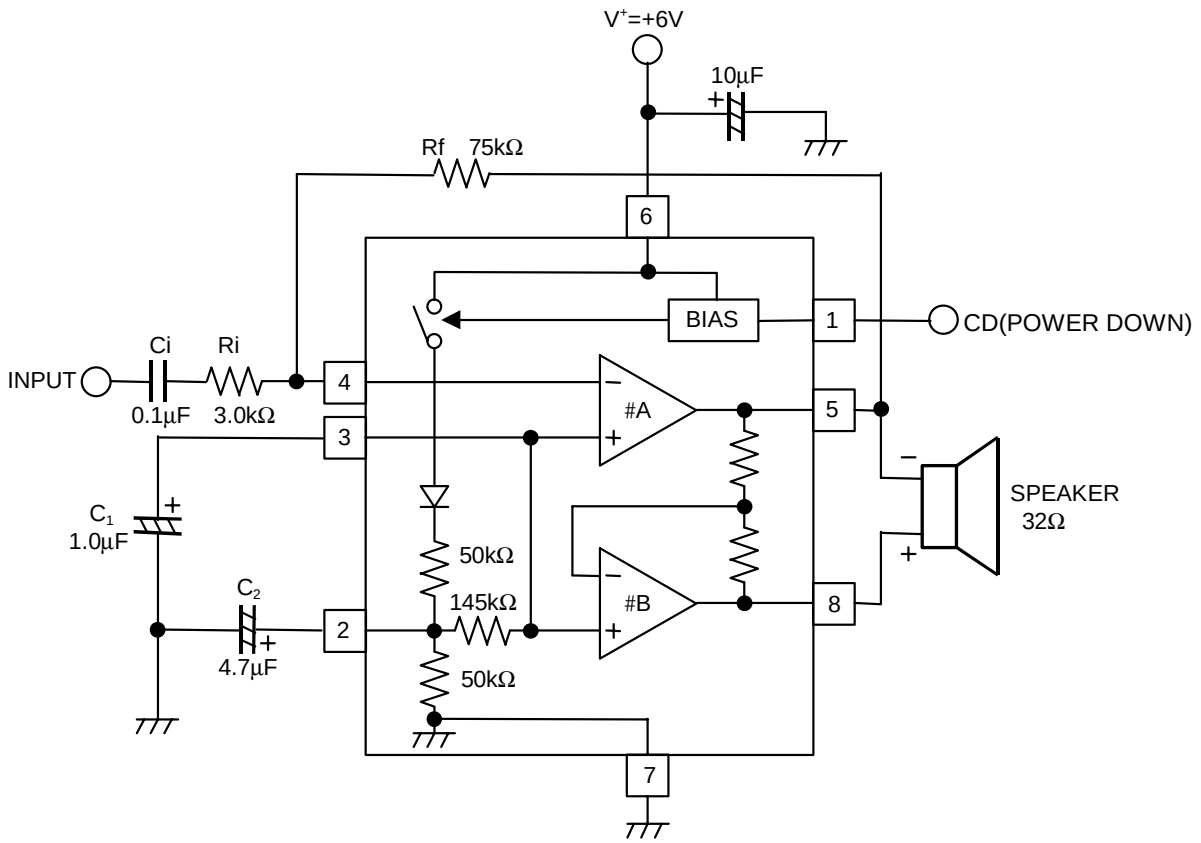
(note2) NJM2149M,NJM2149V,NJM2149R,NJM2149RB1:Mounted on PC Board

## ■ CONTROL TERMINAL EXPLANATION

CHIP DISABLE CONTROL(CD PIN)

| PARAMETER | CONTROL SIGNAL | STATUS |
|---|---|---|
| CD OFF | H(=$V_{CDH}$) | IC is active. |
| CD ON | L(=$V_{CDL}$) | IC is standby. (with Mute) |

## ■ APPLICATION CURCUIT

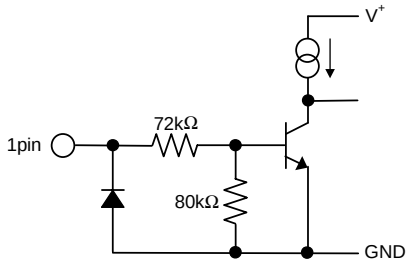



note:1.The CD terminal(1pin) should connect High level(>2.0V), when NJM2149 is active.
The standby mode, when the CD terminal is Low level(<0.8V).

2.To add the C1 and C2 capacitor, the power-supply-rejection-ratio will be improved.
When C1 is large value, C2 will be unnecessary.

3.The power-up time depend on the C1 and C2 capacitor.

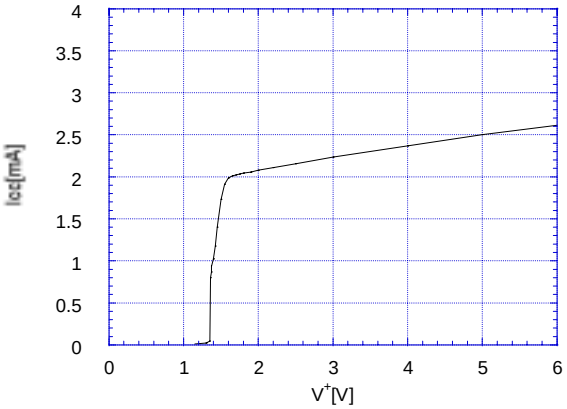
4.The input current of CD terminal is as shown below figure.



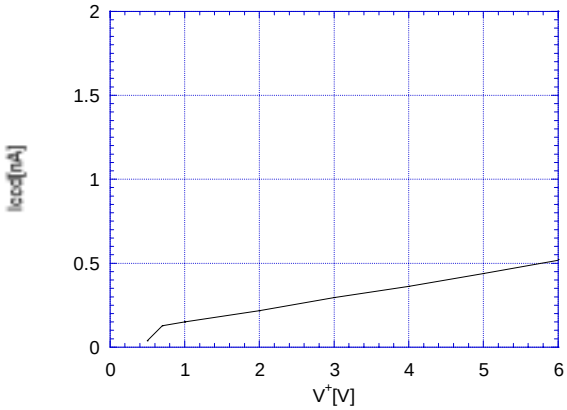

5.No connect oscillation-protect RC required.
To connect oscillation-protect RC, if the NJM2149 oscillate with PC board/stray capacitor/long speaker wire and others condition.

## ■ TYPCAL CHARACTERISTICS

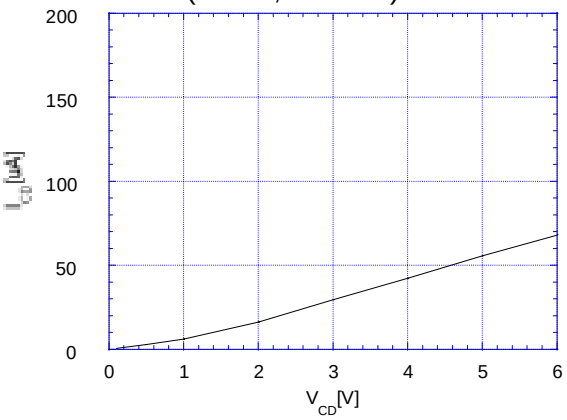
Operating Current vs. Operating Voltage
($V_{CD}$=$V^+$,Ta=25°C)



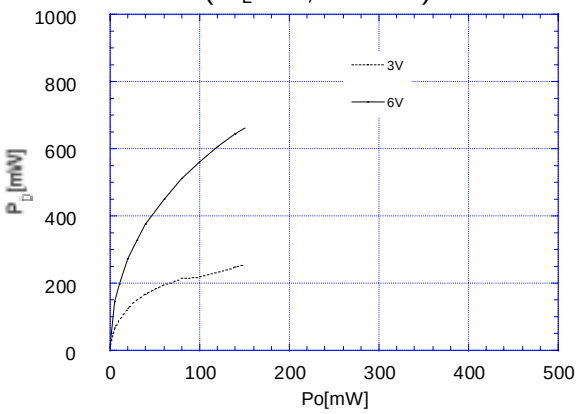

Standby Current vs. Operating Voltage
($V_{CD}$=GND,Ta=25°C)



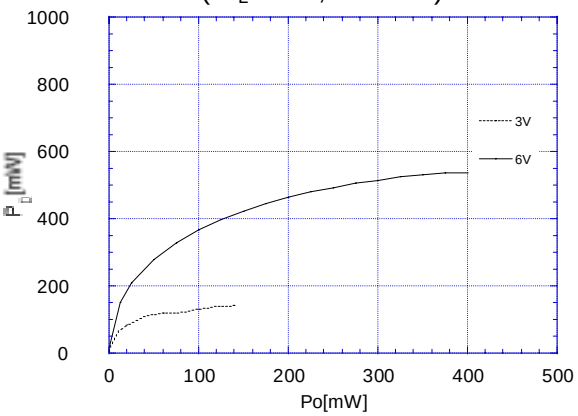

CD Sink Current vs. CD Voltage
($V^+$=6V,Ta=25°C)



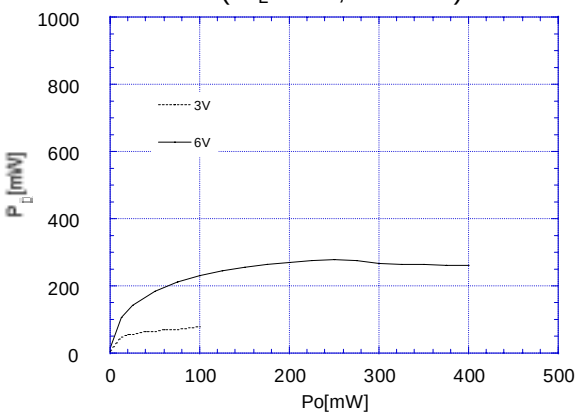

Power Dissipation vs. Output Power
($R_L$=8Ω,Ta=25°C)




Power Dissipation vs. Output Power
($R_L$=16Ω,Ta=25°C)

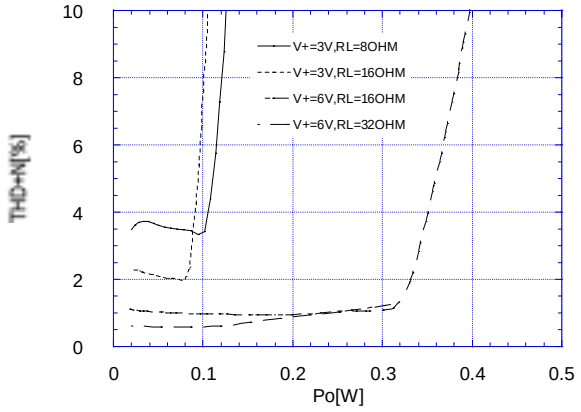



Power Dissipation vs. Output Power
($R_L$=32Ω,Ta=25°C)

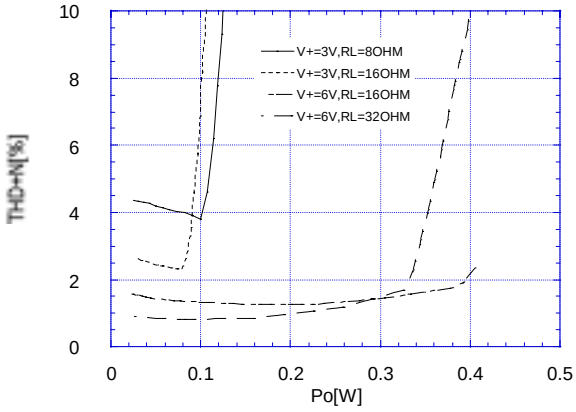


## ■ TYPCAL CHARACTERISTICS

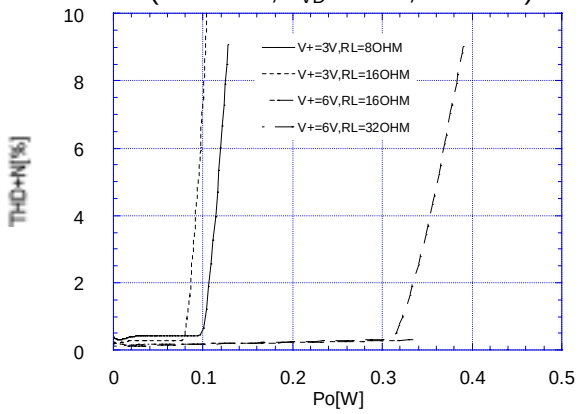
Total Harmonic Distortion vs. Output Power
(f=1kHz,$G_{VD}$=34dB,Ta=25°C)



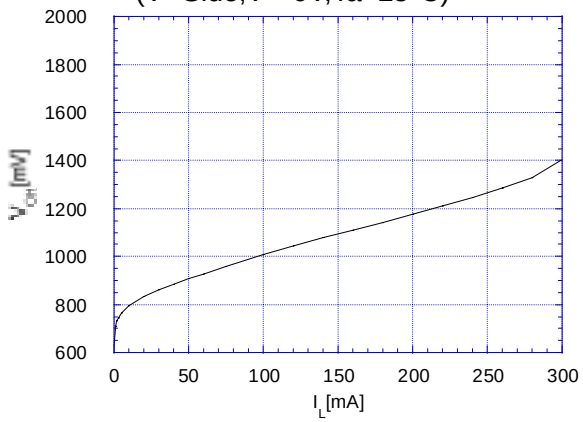

Total Harmonic Distortion vs. Output Power
(f=3kHz,$G_{VD}$=34dB,Ta=25°C)



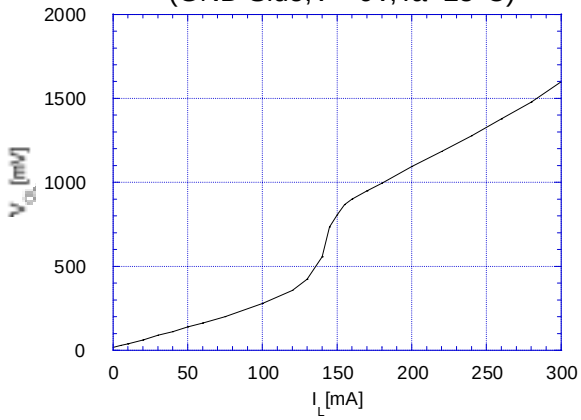

Total Harmonic Distortion vs. Output Power
(f=1.3kHz,$G_{VD}$=12dB,Ta=25°C)




Maximum Output Swing vs. Load Current
($V^+$ Side,$V^+$=6V,Ta=25°C)

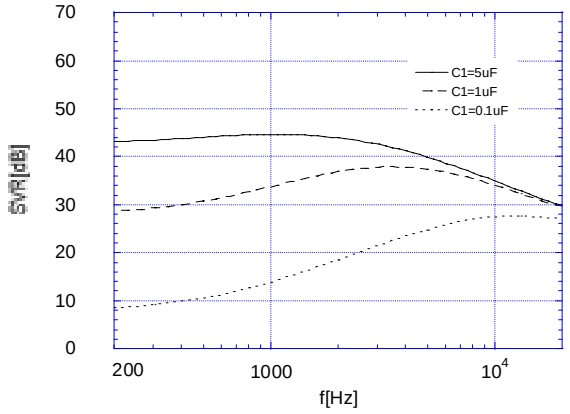



Maximum Output Swing vs. Load Current
(GND Side,$V^+$=6V,Ta=25°C)

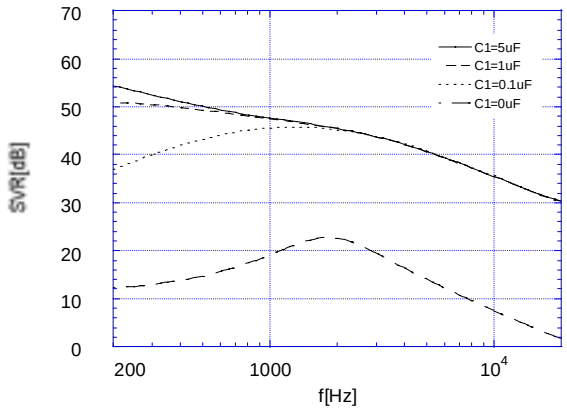


## ■ TYPCAL CHARACTERISTICS

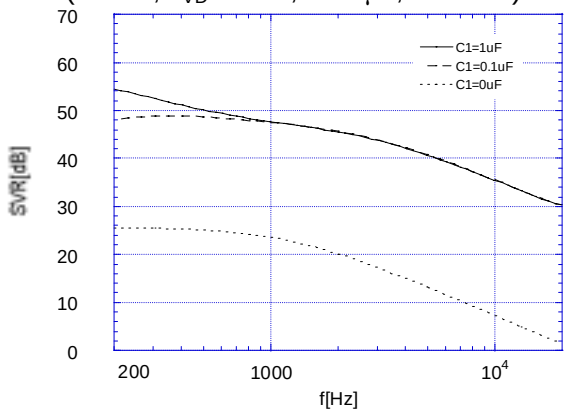
Supply Voltage Rejection Ratio vs. Frequency
($V^+$=6V,$G_{VD}$=34dB,C2=0µF,Ta=25°C)



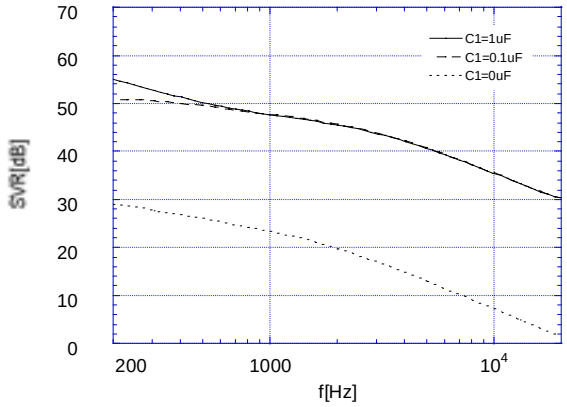

Supply Voltage Rejection Ratio vs. Frequency
($V^+$=6V,$G_{VD}$=34dB,C2=1µF,Ta=25°C)



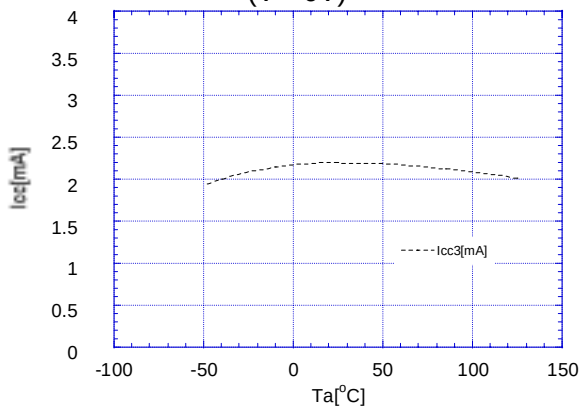

Supply Voltage Rejection Ratio vs. Frequency
($V^+$=6V,$G_{VD}$=34dB,C2=5µF,Ta=25°C)



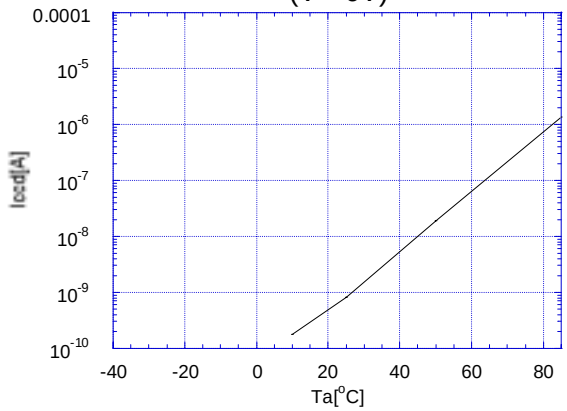

Supply Voltage Rejection Ratio vs. Frequency
($V^+$=6V,$G_{VD}$=34dB,C2=10µF,Ta=25°C)




Operating Current vs. Temperature
($V^+$=6V)

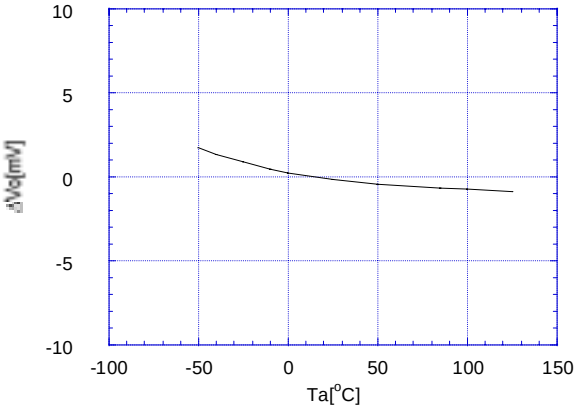



Standby Current vs. Temperature
($V^+$=6V)

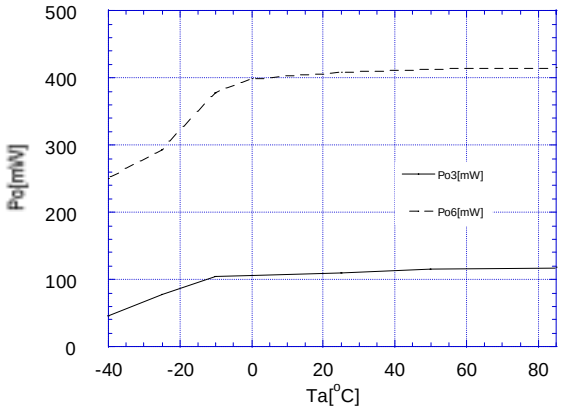


## ■ TYPCAL CHARACTERISTICS

Output Offset Voltage vs. Temperature
($V^+$=6V)




Output Power vs. Temperature
($V^+$=6V)




# MEMO

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