

## LOW VOLTAGE AUDIO POWER AMPLIFIER

### ■ GENERAL DESCRIPTION

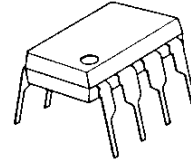
The **NJM2149** is an audio power amplifier designed for telephone applications.

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.

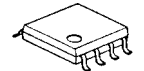
The **NJM2149** improves the tern noise reduction in switching Power Down mode and external high band noise reduction, compared with **NJM2135**.

It is suitable for portable telephone, wireless telephone, button telephone, and other speaker amplifier applications.

### ■ PACKAGE OUTLINE



NJM2149D



NJM2149M



NJM2149V



NJM2149R

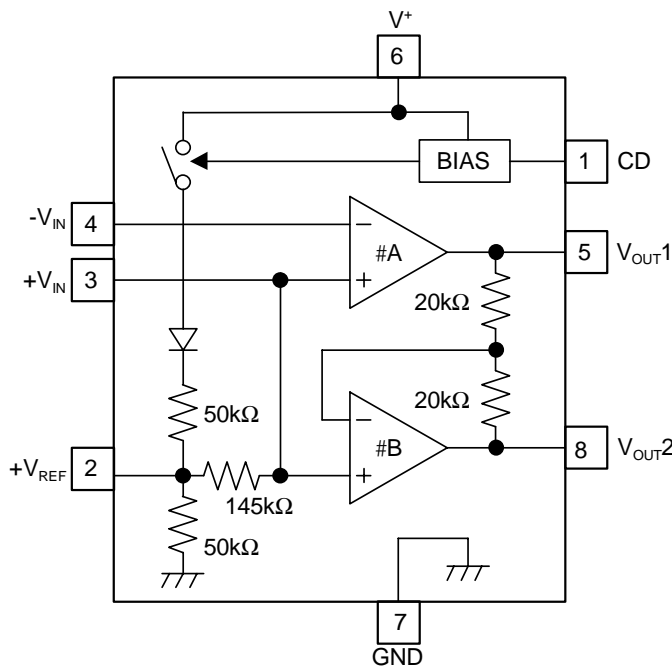


NJM2149RB1

### ■ FEATURES

- Operating Voltage +2 - +6V
- Operating Current 2.2mA typ., at  $V^+=3V$
- Supply Current in Power Down Mode 0.1 $\mu$ A typ
- Output Power Exceeds 250mW  $V^+=6V, R_L=32\Omega$
- Gain Range GVD=0-43dB, Voice Band
- Load Impedance  $R_L=8-200\Omega$
- Bipolar Technology
- Package Outline DIP8, DMP8, SSOP8, VSP8, TVSP8

### ■ PIN CONFIGURATION



### PIN FUNCTION

1. CD
2. +V<sub>REF</sub>
3. +V<sub>IN</sub>
4. -V<sub>IN</sub>
5. V<sub>OUT1</sub>
6. V<sup>+</sup>
7. GND
8. V<sub>OUT2</sub>

**■ ABSOLUTE MAXIMUM RANGE**

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	+7	V
Power Dissipation	P <sub>D</sub>	(DIP8) 500 (DMP8) 500 (note1) (SSOP8) 360 (note1) (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<sup>+</sup>=6.0V, 1pin=2V, Ta=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V <sup>+</sup>		2.0	-	6.0	V
Operating Current	I <sub>CC</sub>	V <sup>+</sup> =3.0V, R <sub>L</sub> =∞, No Signal	-	2.2	3.5	mA
Operating Current at Power Down Mode	I <sub>CCD</sub>	V <sup>+</sup> =3.0V, R <sub>L</sub> =∞, 1pin=0.8V, No Signal	-	0.1	1.0	μA
Open Loop Gain	A <sub>V1</sub>	Amp#A, f<100Hz	84	90	-	dB
Closed Loop Gain	A <sub>V2</sub>	Amp#B, f=1kHz, R <sub>L</sub> =32Ω	-0.35	0	+0.35	dB
Output Power	P <sub>O1</sub>	V <sup>+</sup> =3.0V, R <sub>L</sub> =16Ω, THD≤10% (note2)	55	-	-	mW
	P <sub>O2</sub>	V <sup>+</sup> =6.0V, R <sub>L</sub> =32Ω, THD≤10% (note2)	250	-	-	mW
Total Harmonic Distortion	THD1	V <sup>+</sup> =6V, R <sub>L</sub> =32Ω, P <sub>O</sub> =125mW, f=1kHz, G <sub>VD</sub> =34dB	-	0.5	1.0	%
	THD2	V <sup>+</sup> ≥3V, R <sub>L</sub> =8Ω, P <sub>O</sub> =20mW, f=1kHz, G <sub>VD</sub> =12dB	-	0.5	-	%
Power Supply Rejection Ratio (V <sup>+</sup> =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 <sub>f</sub> =75kΩ, DC)	V <sub>O1</sub>	V <sup>+</sup> =3.0V, R <sub>L</sub> =16Ω	1.00	1.15	1.25	V
	V <sub>O2</sub>	V <sup>+</sup> =6.0V	-	2.60	-	V
Output High Level	V <sub>OH</sub>	I <sub>OUT</sub> =-75mA, V <sup>+</sup> =2.0-6.0V	-	V <sup>+</sup> -1.1	-	V
Output Low Level	V <sub>OL</sub>	I <sub>OUT</sub> =75mA, V <sup>+</sup> =2.0-6.0V	-30	0.21	-	V
Output DC Offset	ΔV <sub>O</sub>	R <sub>f</sub> =75kΩ, R <sub>L</sub> =32Ω, 5pin-8pin	-30	0	+30	mV
Input Bias Current	I <sub>B</sub>	4pin	-	0	-200	nA
Equivalent Resistance	R <sub>+IN</sub>	3pin	100	170	220	kΩ
	R <sub>REF</sub>	2pin	18	26	40	kΩ
CD Input Voltage H	V <sub>CDH</sub>	1pin	2.0	-	V <sup>+</sup>	V
CD Input Voltage L	V <sub>CDL</sub>	1pin	0.0	-	0.8	V
CD Input Resistance	R <sub>CD</sub>	V <sup>+</sup> =V <sub>CD</sub> =6.0V, 1pin	50	85	175	kΩ

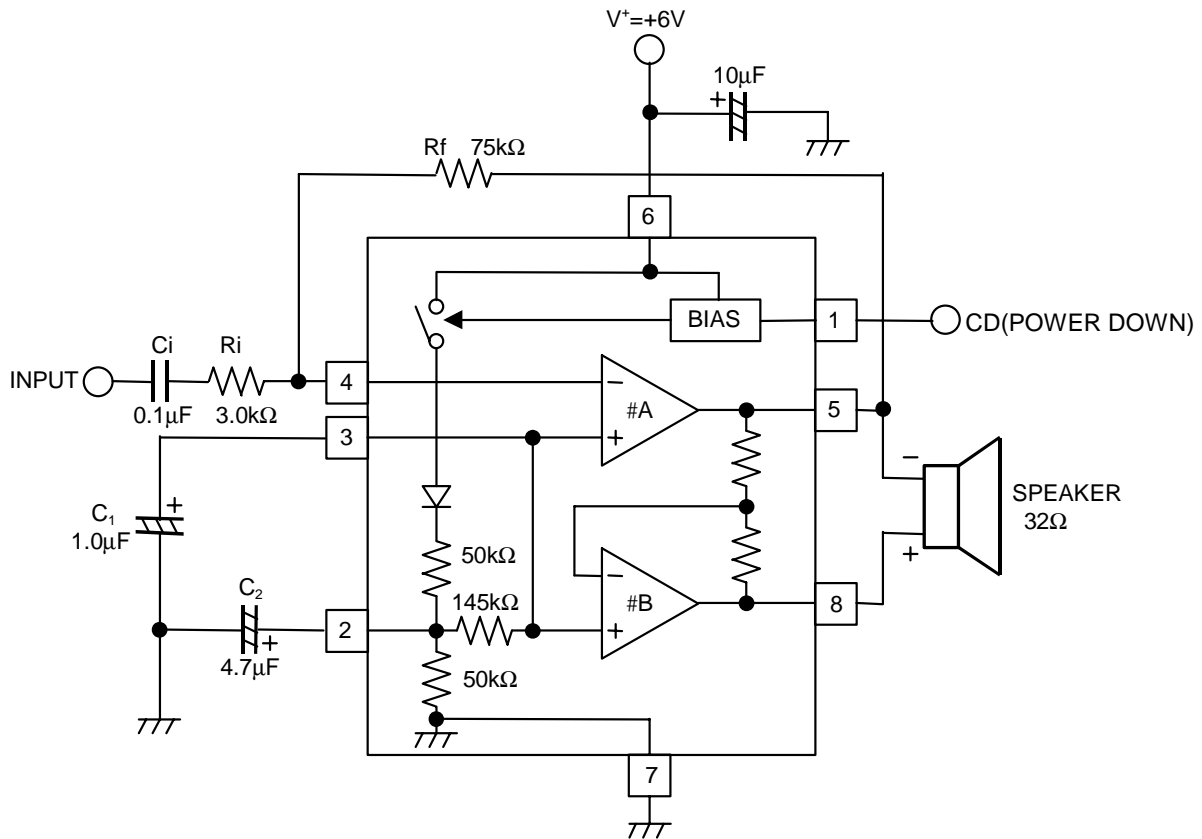
(note2) NJM2149M, NJM2149V, NJM2149R, NJM2149RB1: Mounted on PC Board

**■ CONTROL TERMINAL EXPLANATION**

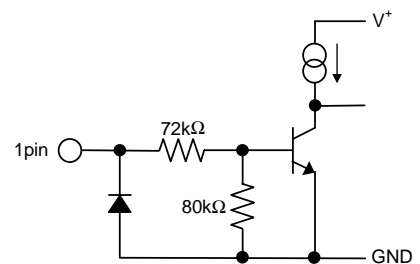
CHIP DISABLE CONTROL (CD PIN)

PARAMETER	CONTROL SIGNAL	STATUS
CD OFF	H(=V <sub>CDH</sub> )	IC is active.
CD ON	L(=V <sub>CDL</sub> )	IC is standby. (with Mute)

APPLICATION CURCUIT



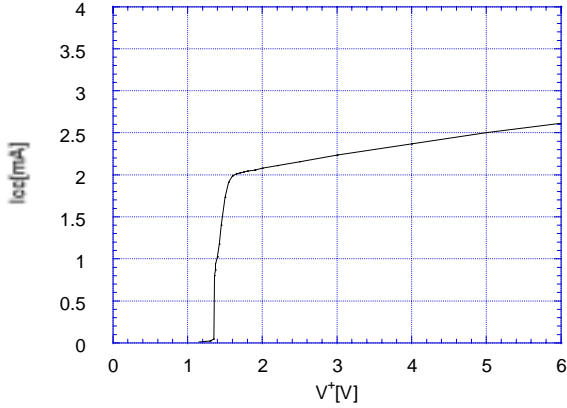
- note:1.The CD terminal(1pin) should connect High level(>2.0V), when NJM2149 is active.  
The standby mode, when the CD terminal is Low level(<0.8V).
- 2.To add the C1 and C2 capacitor, the power-supply-rejection-ratio will be improved.  
When C1 is large value, C2 will be unnecessary.
- 3.The power-up time depend on the C1 and C2 capacitor.
- 4.The input current of CD terminal is as shown below figure.



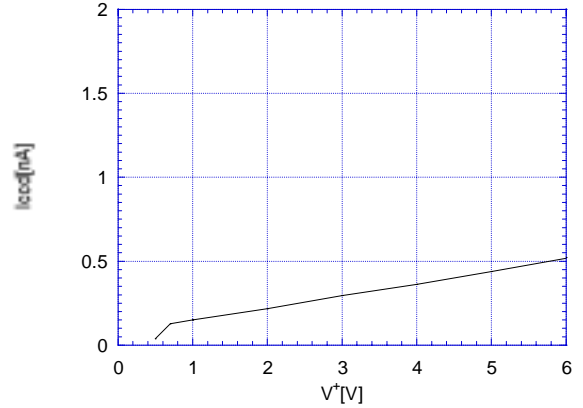
- 5.No connect oscillation-protect RC required.  
To connect oscillation-protect RC, if the NJM2149 oscillate with PC board/stray capacitor/long speaker wire and others condition.

■ TYPICAL CHARACTERISTICS

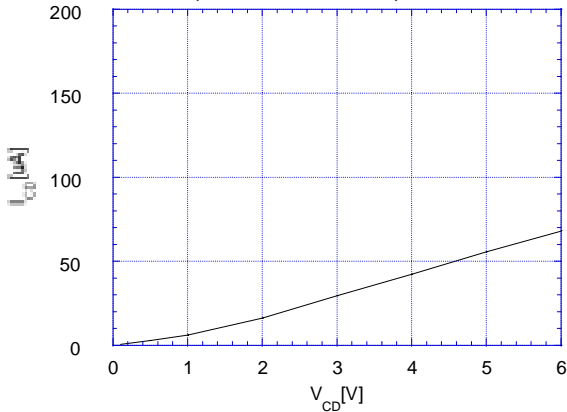
Operating Current vs. Operating Voltage  
( $V_{CD}=V^+$ ,  $T_a=25^\circ\text{C}$ )



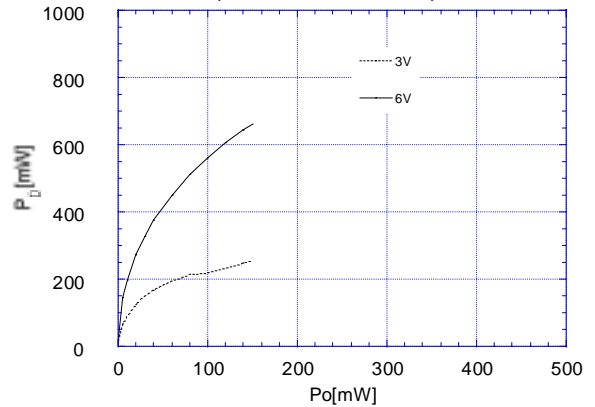
Standby Current vs. Operating Voltage  
( $V_{CD}=\text{GND}$ ,  $T_a=25^\circ\text{C}$ )



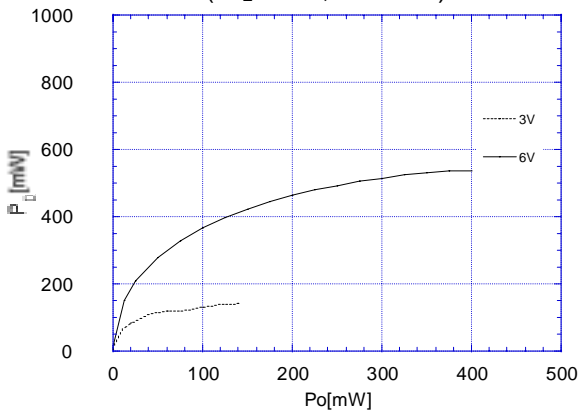
CD Sink Current vs. CD Voltage  
( $V^+=6\text{V}$ ,  $T_a=25^\circ\text{C}$ )



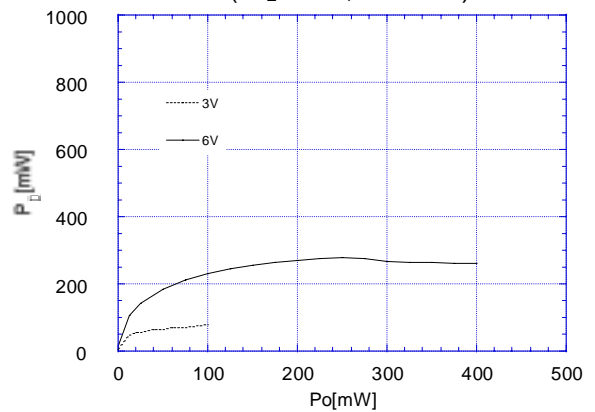
Power Dissipation vs. Output Power  
( $R_L=8\Omega$ ,  $T_a=25^\circ\text{C}$ )



Power Dissipation vs. Output Power  
( $R_L=16\Omega$ ,  $T_a=25^\circ\text{C}$ )

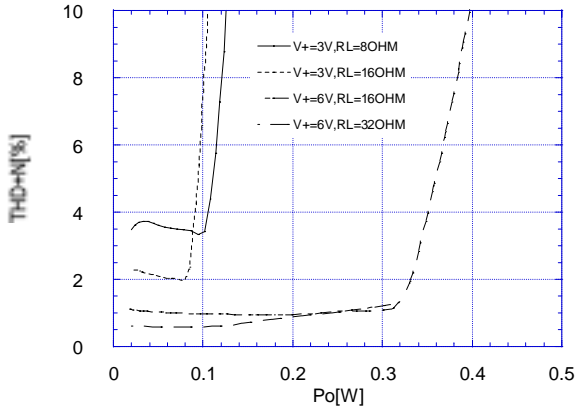


Power Dissipation vs. Output Power  
( $R_L=32\Omega$ ,  $T_a=25^\circ\text{C}$ )

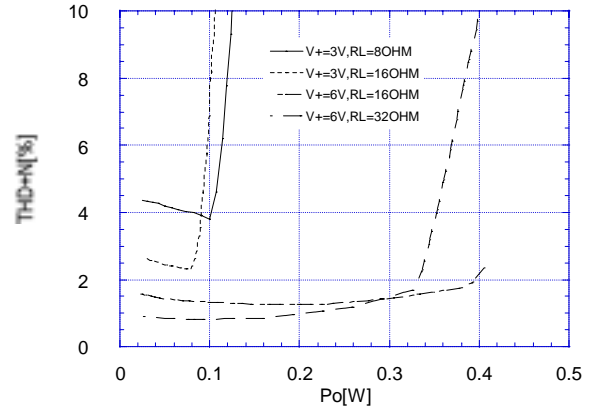


## TYPICAL CHARACTERISTICS

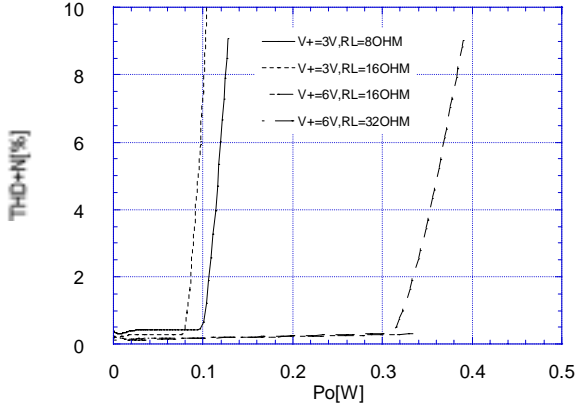
Total Harmonic Distortion vs. Output Power  
( $f=1\text{kHz}$ ,  $G_{VD}=34\text{dB}$ ,  $T_a=25^\circ\text{C}$ )



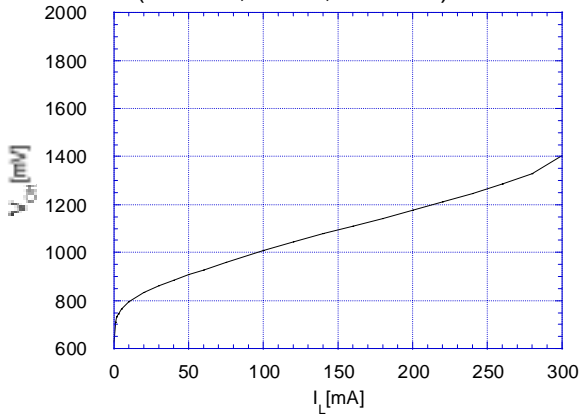
Total Harmonic Distortion vs. Output Power  
( $f=3\text{kHz}$ ,  $G_{VD}=34\text{dB}$ ,  $T_a=25^\circ\text{C}$ )



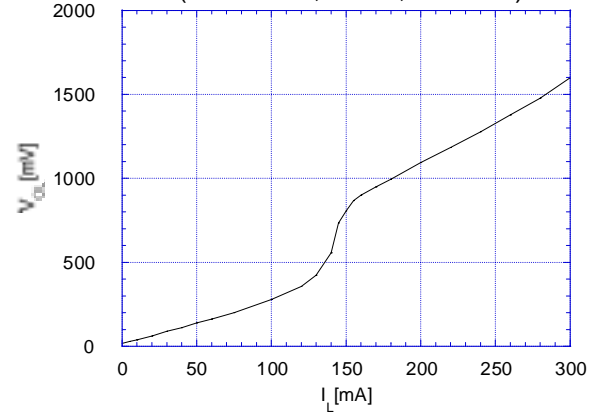
Total Harmonic Distortion vs. Output Power  
( $f=1.3\text{kHz}$ ,  $G_{VD}=12\text{dB}$ ,  $T_a=25^\circ\text{C}$ )



Maximum Output Swing vs. Load Current  
( $V^+$  Side,  $V^+=6\text{V}$ ,  $T_a=25^\circ\text{C}$ )

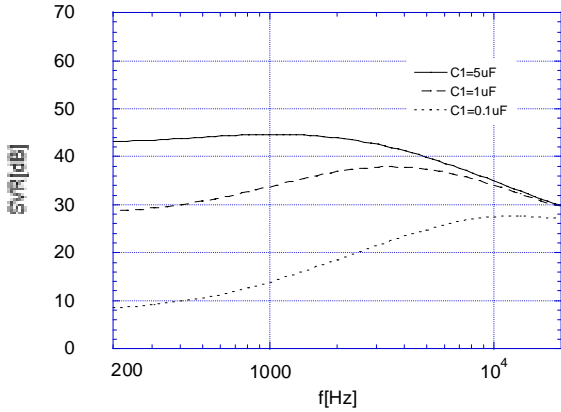


Maximum Output Swing vs. Load Current  
(GND Side,  $V^+=6\text{V}$ ,  $T_a=25^\circ\text{C}$ )

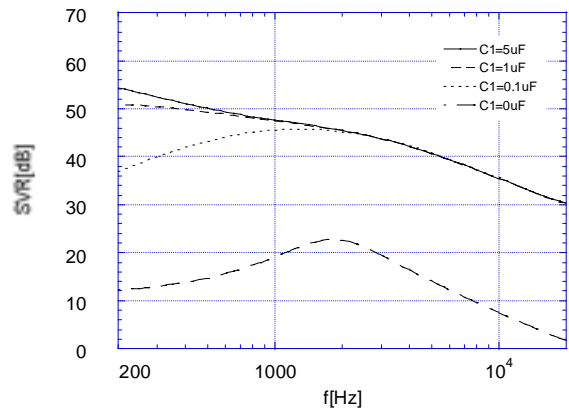


■ TYPICAL CHARACTERISTICS

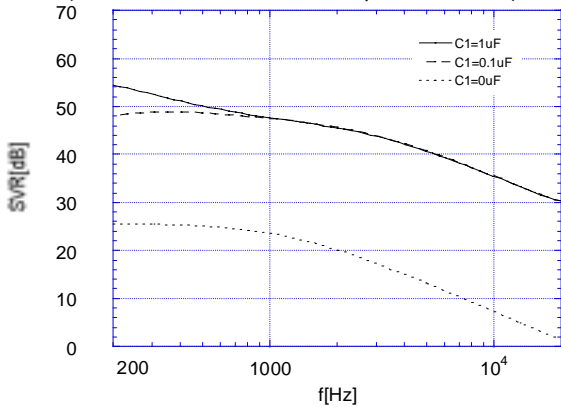
Supply Voltage Rejection Ratio vs. Frequency  
( $V^+=6V, G_{VD}=34dB, C_2=0\mu F, T_a=25^\circ C$ )



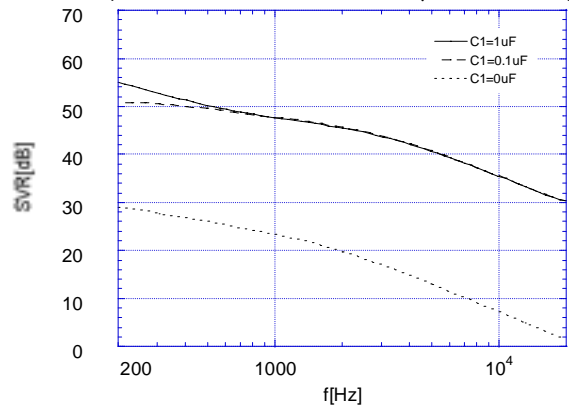
Supply Voltage Rejection Ratio vs. Frequency  
( $V^+=6V, G_{VD}=34dB, C_2=1\mu F, T_a=25^\circ C$ )



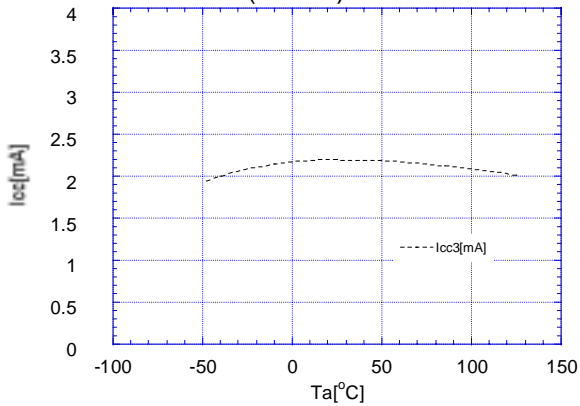
Supply Voltage Rejection Ratio vs. Frequency  
( $V^+=6V, G_{VD}=34dB, C_2=5\mu F, T_a=25^\circ C$ )



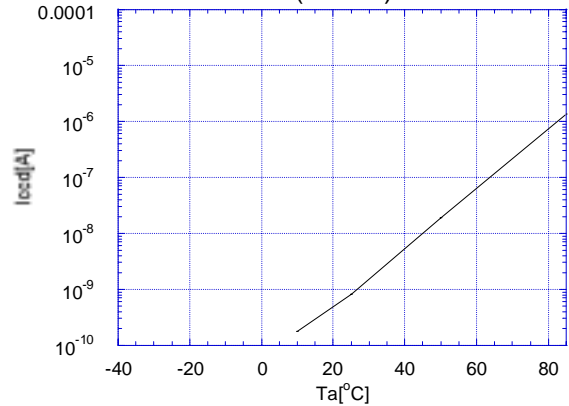
Supply Voltage Rejection Ratio vs. Frequency  
( $V^+=6V, G_{VD}=34dB, C_2=10\mu F, T_a=25^\circ C$ )



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

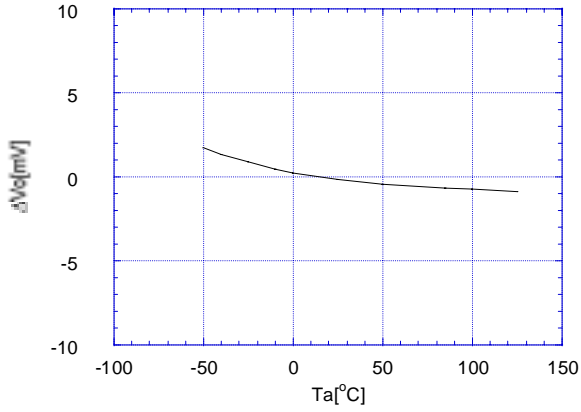


Standby Current vs. Temperature  
( $V^+=6V$ )

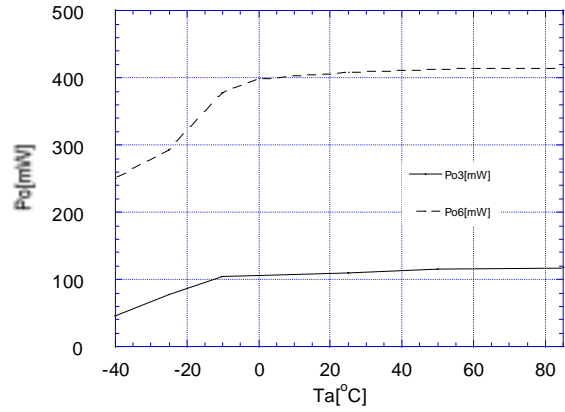


■ TYPICAL CHARACTERISTICS

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



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



MEMO

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