

LOW VOLTAGE AUDIO POWER AMPLIFIER

■ GENERAL DESCRIPTION

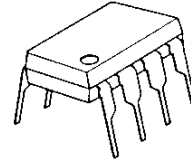
The **NJM2149** is an audio power amplifier designed for telephone applications.

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

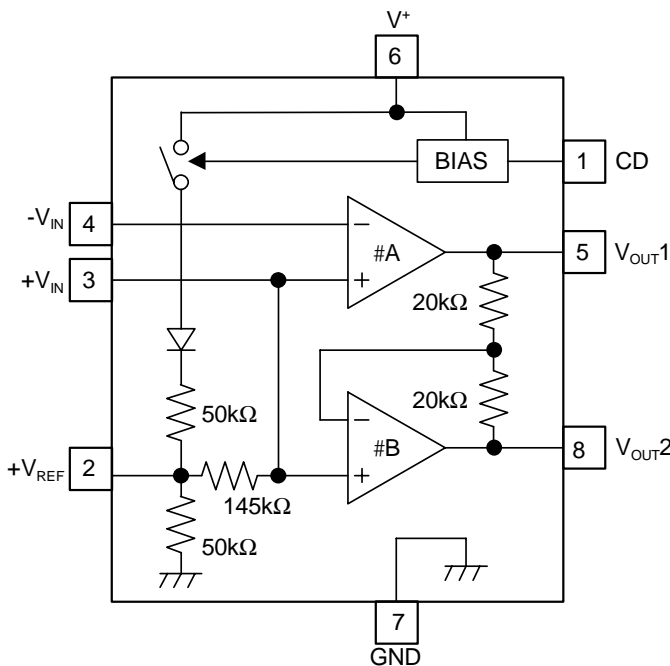


NJM2149RB1

■ FEATURES

- Operating Voltage +2 - +6V
- Operating Current 2.2mA typ., at $V^+=3V$
- Supply Current in Power Down Mode 0.1 μ 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_{REF}
3. +V_{IN}
4. -V_{IN}
5. V_{OUT1}
6. V⁺
7. GND
8. V_{OUT2}

■ ABSOLUTE MAXIMUM RANGE

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	+7	V
Power Dissipation	P _D	(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⁺=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	ΔV _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

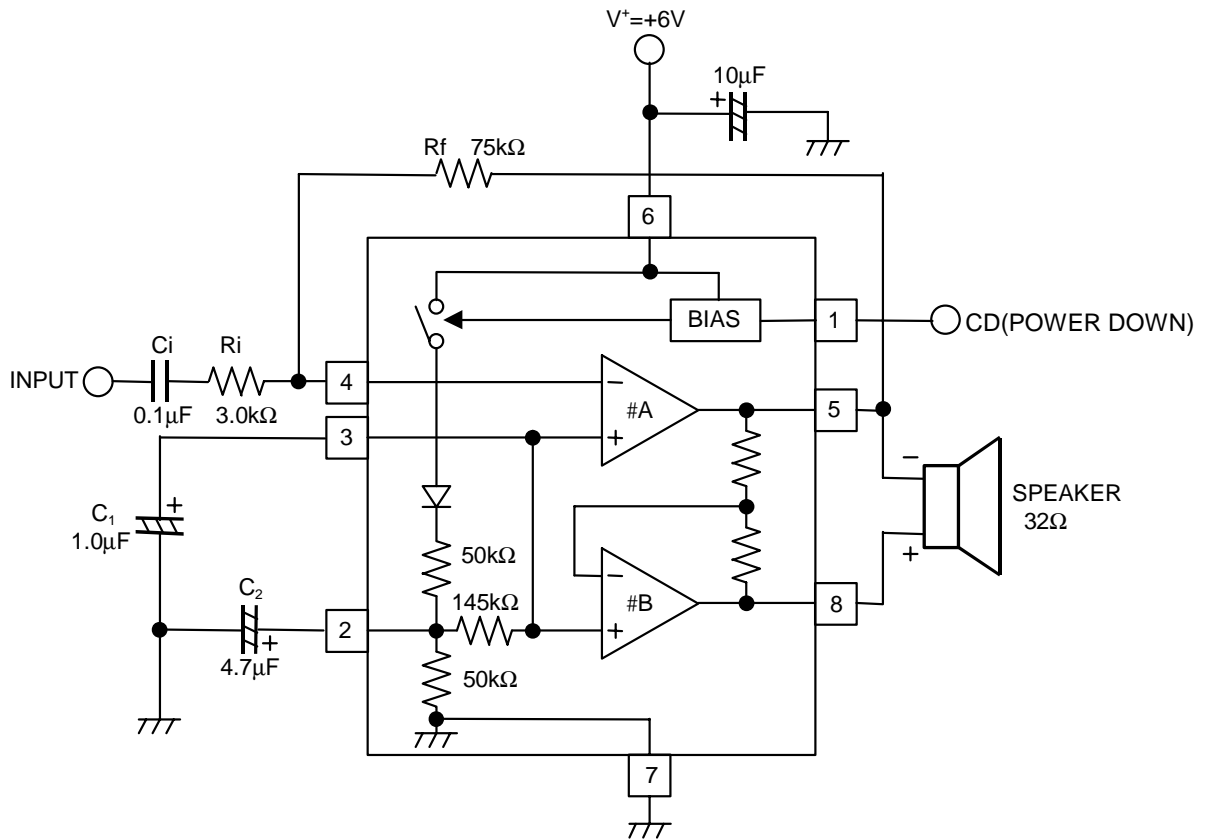
(note2) NJM2149M, NJM2149V, NJM2149R, NJM2149RB1: Mounted on PC Board

■ CONTROL TERMINAL EXPLANATION

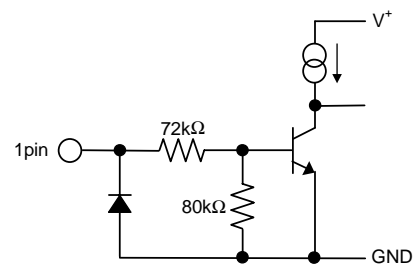
CHIP DISABLE CONTROL (CD PIN)

PARAMETER	CONTROL SIGNAL	STATUS
CD OFF	H(=V _{CDH})	IC is active.
CD ON	L(=V _{CDL})	IC is standby. (with Mute)

APPLICATION CURCUIT



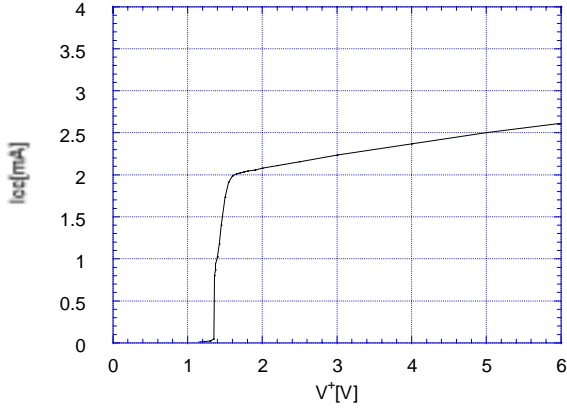
- note:1.The CD terminal(1pin) should connect High level(>2.0V), when NJM2149 is active.
 The standby mode, when the CD terminal is Low level(<0.8V).
 2.To add the C1 and C2 capacitor, the power-supply-rejection-ratio will be improved.
 When C1 is large value, C2 will be unnecessary.
 3.The power-up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



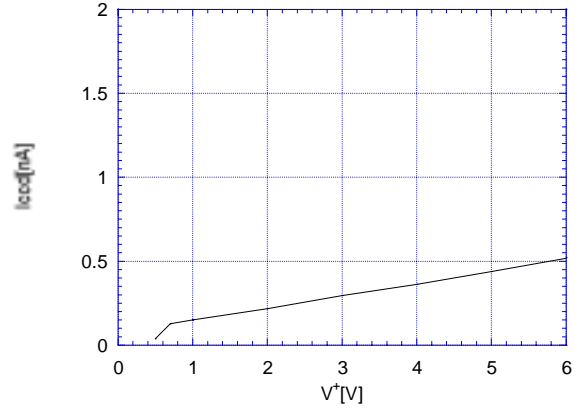
- 5.No connect oscillation-protect RC required.
 To connect oscillation-protect RC, if the NJM2149 oscillate with PC board/stray capacitor/long speaker wire and others condition.

■ TYPICAL CHARACTERISTICS

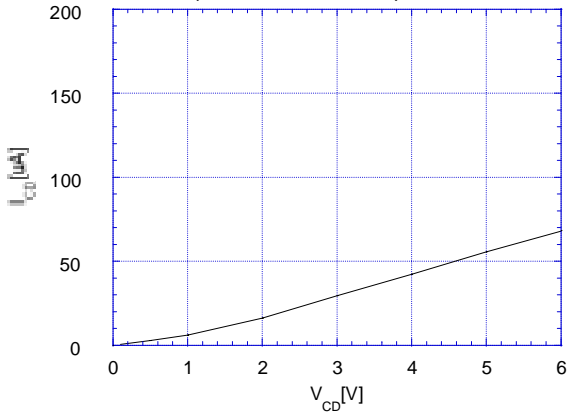
Operating Current vs. Operating Voltage
($V_{CD}=V^+$, $T_a=25^\circ\text{C}$)



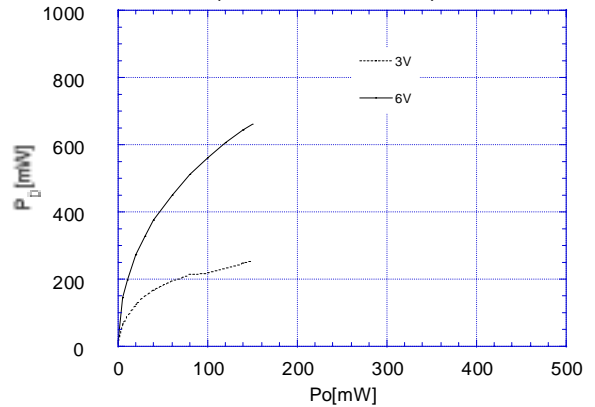
Standby Current vs. Operating Voltage
($V_{CD}=\text{GND}$, $T_a=25^\circ\text{C}$)



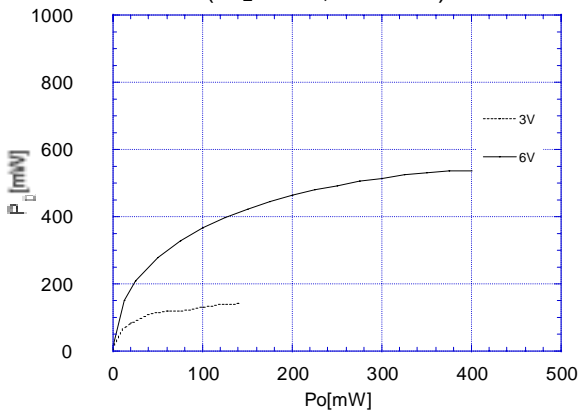
CD Sink Current vs. CD Voltage
($V^+=6\text{V}$, $T_a=25^\circ\text{C}$)



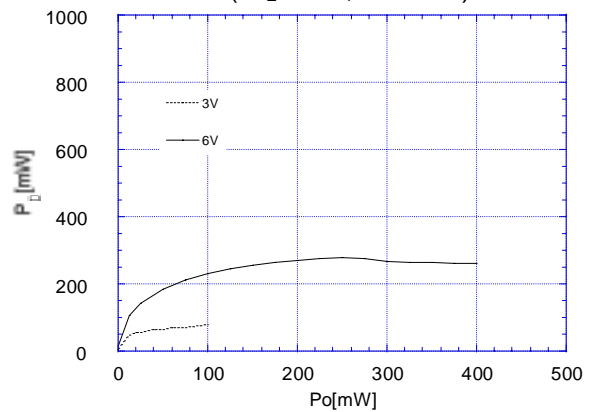
Power Dissipation vs. Output Power
($R_L=8\Omega$, $T_a=25^\circ\text{C}$)



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

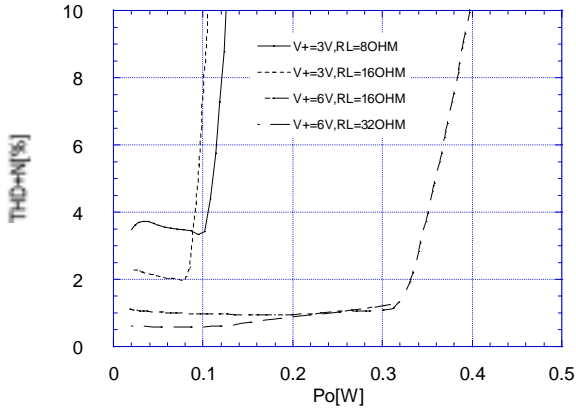


Power Dissipation vs. Output Power
($R_L=32\Omega$, $T_a=25^\circ\text{C}$)

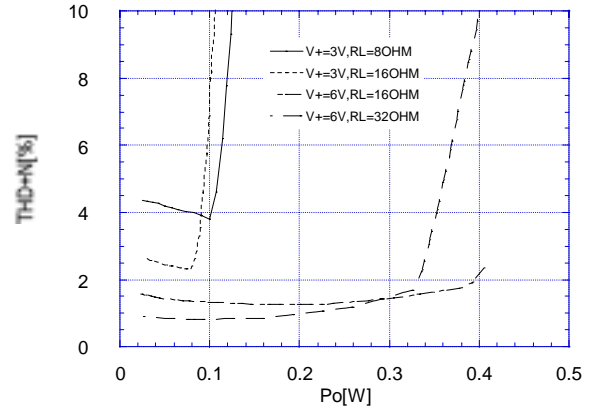


TYPICAL CHARACTERISTICS

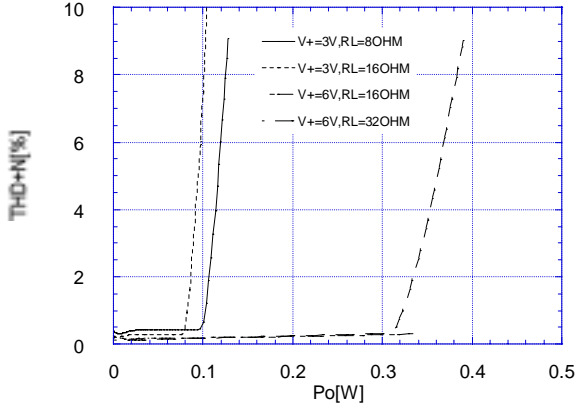
Total Harmonic Distortion vs. Output Power
($f=1\text{kHz}$, $G_{VD}=34\text{dB}$, $T_a=25^\circ\text{C}$)



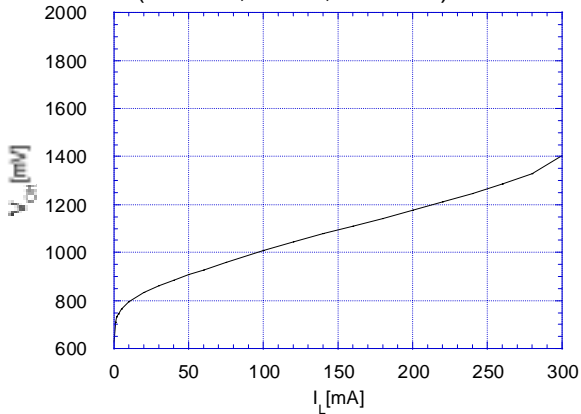
Total Harmonic Distortion vs. Output Power
($f=3\text{kHz}$, $G_{VD}=34\text{dB}$, $T_a=25^\circ\text{C}$)



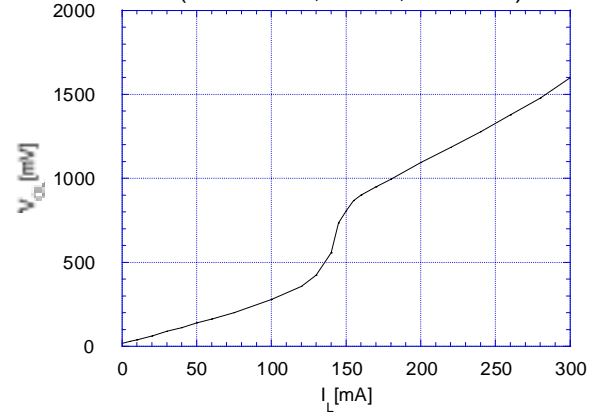
Total Harmonic Distortion vs. Output Power
($f=1.3\text{kHz}$, $G_{VD}=12\text{dB}$, $T_a=25^\circ\text{C}$)



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

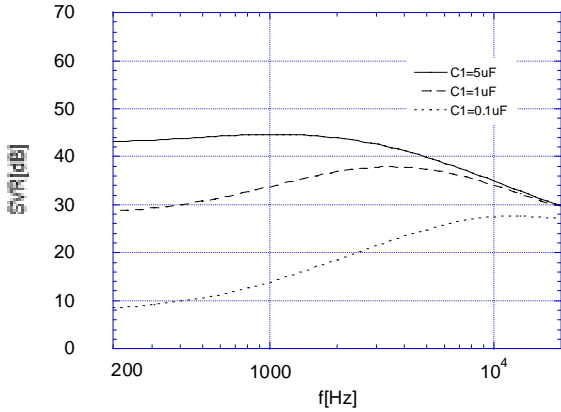


Maximum Output Swing vs. Load Current
(GND Side, $V^+=6\text{V}$, $T_a=25^\circ\text{C}$)

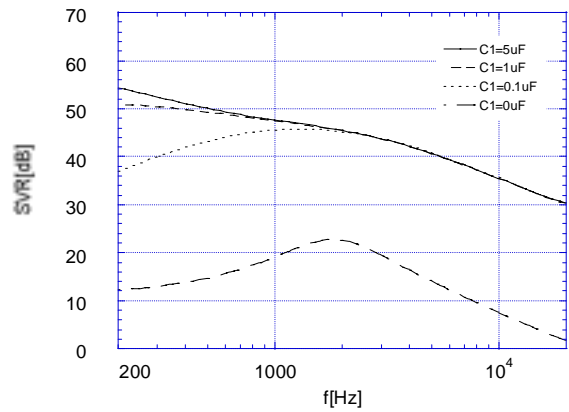


■ TYPICAL CHARACTERISTICS

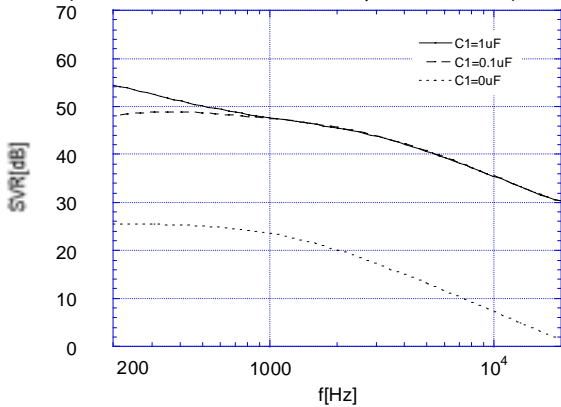
Supply Voltage Rejection Ratio vs. Frequency
($V^+=6V, G_{VD}=34dB, C_2=0\mu F, T_a=25^\circ C$)



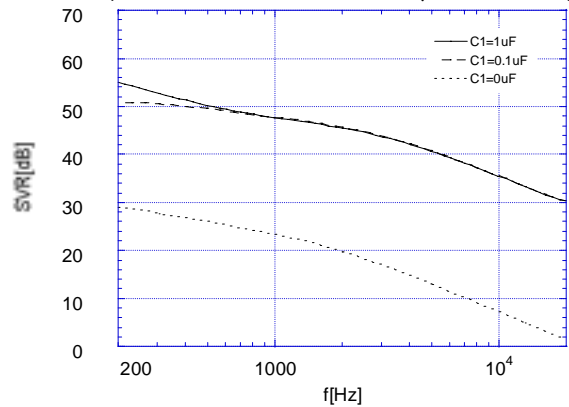
Supply Voltage Rejection Ratio vs. Frequency
($V^+=6V, G_{VD}=34dB, C_2=1\mu F, T_a=25^\circ C$)



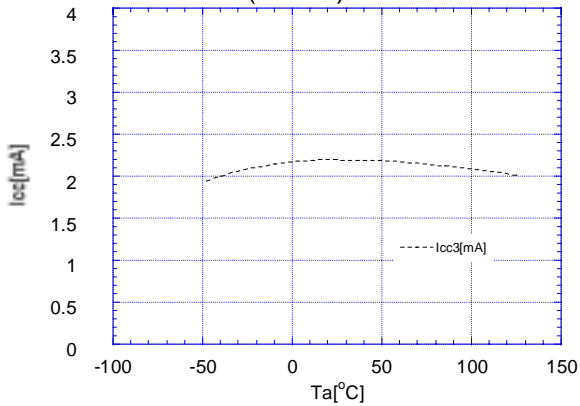
Supply Voltage Rejection Ratio vs. Frequency
($V^+=6V, G_{VD}=34dB, C_2=5\mu F, T_a=25^\circ C$)



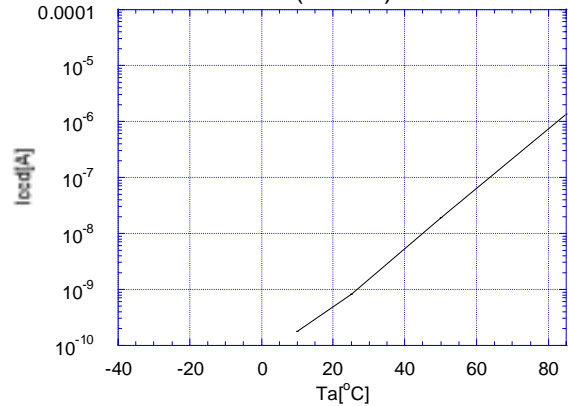
Supply Voltage Rejection Ratio vs. Frequency
($V^+=6V, G_{VD}=34dB, C_2=10\mu F, T_a=25^\circ C$)



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

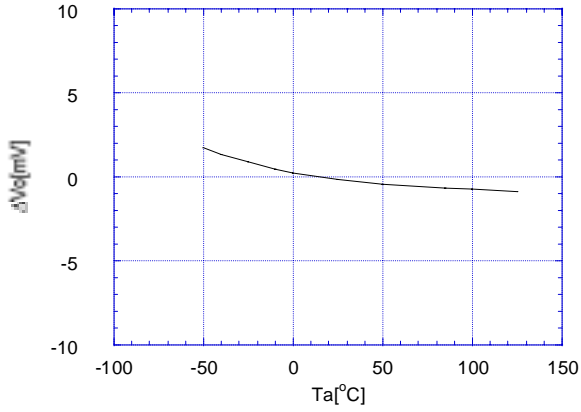


Standby Current vs. Temperature
($V^+=6V$)

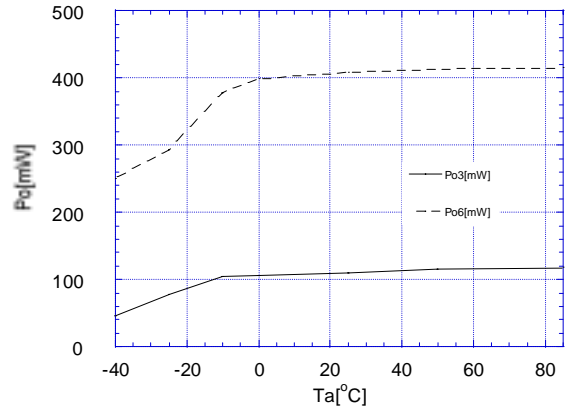


■ TYPICAL CHARACTERISTICS

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



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



MEMO

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