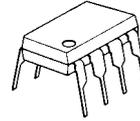


## MICRO-POWER OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The NJM4250 is extremely versatile programmable monolithic operational amplifiers. A single external master bias current setting resistor programs the input bias current, input offset current, quiescent power consumption, slew rate, input noise, and the gain-bandwidth product. The device is a truly general purpose operational amplifier.

### ■ PACKAGE OUTLINE



NJM4250D



NJM4250M

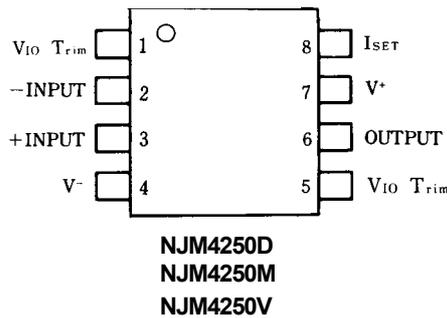


NJM4250V

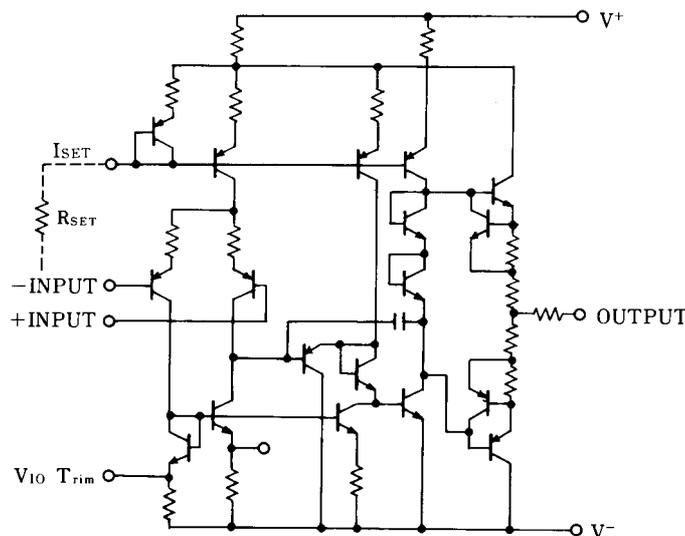
### ■ FEATURES

- Operating Voltage (±1V~±18V)
- Low Operating Current (0.1mA max.)
- Programmable monolithic OP-Amp
- Very Low Power Consumption
- Package Outline DIP8,DMP8,SSOP8
- Bipolar Technology

### ■ PIN CONFIGURATION



### ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup> /V <sup>-</sup>	± 18	V
Differential Input Voltage	V <sub>ID</sub>	± 30	V
Input Voltage	V <sub>IC</sub>	± 15 (note)	V
Power Dissipation	P <sub>D</sub>	(DIP8) 500 (DMP8) 300 (SSOP8) 250	mW
I <sub>SET</sub> Current	I <sub>SET</sub>	150	μA
Operating Temperature Range	T <sub>opr</sub>	-20~+75	°C
Storage Temperature Range	T <sub>stg</sub>	-40~+125	°C

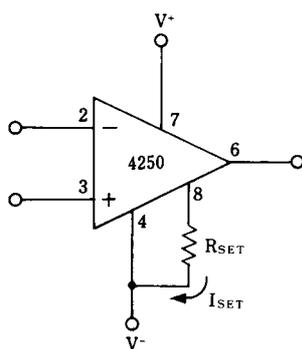
(note) For supply voltage less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

## ■ ELECTRICAL CHARACTERISTICS

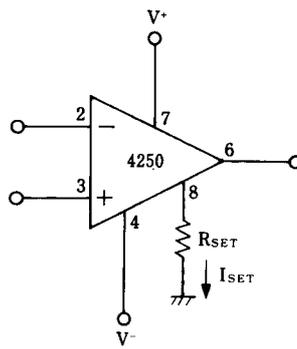
(Ta=25°C, V<sup>+</sup>/V<sup>-</sup>=±15V)

PARAMETER	SYMBOL	TEST CONDITION	I <sub>SET</sub> =1μA		I <sub>SET</sub> =10μA		UNIT
			MIN.	MAX.	MIN.	MAX.	
Input Offset Voltage 1	V <sub>IO1</sub>	R <sub>S</sub> ≤100kΩ	-	5	-	6	mV
Input Offset Voltage 2	V <sub>IO2</sub>	V <sup>+</sup> /V <sup>-</sup> =±1.5V, R <sub>S</sub> ≤100kΩ	-	5	-	6	mV
Input Offset Current	I <sub>IO</sub>		-	6	-	20	nA
Input Bias Current 1	I <sub>B1</sub>		-	10	-	75	nA
Input Bias Current 2	I <sub>B2</sub>	V <sup>+</sup> /V <sup>-</sup> =±1.5V	-	10	-	75	nA
Large Signal Voltage Gain 1	A <sub>V1</sub>	V <sub>O</sub> =± 10V, R <sub>L</sub> ≥100kΩ	96	-	-	-	dB
Large Signal Voltage Gain 2	A <sub>V2</sub>	V <sub>O</sub> =± 10V, R <sub>L</sub> ≥10kΩ	-	-	96	-	dB
Operating Current 1	I <sub>CC1</sub>		-	11	-	100	μA
Operating Current 2	I <sub>CC2</sub>	V <sup>+</sup> /V <sup>-</sup> =±1.5V	-	8	-	90	μA
Input Common Mode Voltage Range 1	V <sub>ICM1</sub>		± 13.5	-	± 13.5	-	V
Input Common Mode Voltage Range 2	V <sub>ICM2</sub>	V <sup>+</sup> /V <sup>-</sup> =±1.5V	± 0.6	-	± 0.6	-	V
Maximum Output Voltage Swing 1	V <sub>OM1</sub>	R <sub>L</sub> ≥100kΩ	± 12	-	-	-	V
Maximum Output Voltage Swing 2	V <sub>OM2</sub>	V <sup>+</sup> /V <sup>-</sup> =±1.5V, R <sub>L</sub> ≥100kΩ	± 0.6	-	-	-	V
Maximum Output Voltage Swing 3	V <sub>OM3</sub>	R <sub>L</sub> ≥10kΩ	-	-	± 12	-	V
Maximum Output Voltage Swing 4	V <sub>OM4</sub>	V <sup>+</sup> /V <sup>-</sup> =±1.5V, R <sub>L</sub> ≥10kΩ	-	-	± 0.6	-	V
Common Mode Rejection Ratio	CMR	R <sub>S</sub> ≤10kΩ	70	-	70	-	dB
Supply Voltage Rejection Ratio	SVR	R <sub>S</sub> ≤10kΩ	74	-	74	-	dB

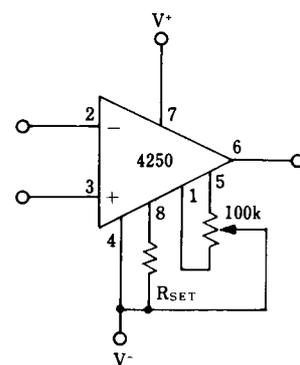
## ■ TYPICAL APPLICATION (I<sub>SET</sub>, V<sub>IO</sub> Adjustment)



$$I_{SET} = \frac{V^+ + |V^-| - 0.5}{R_{SET}}$$



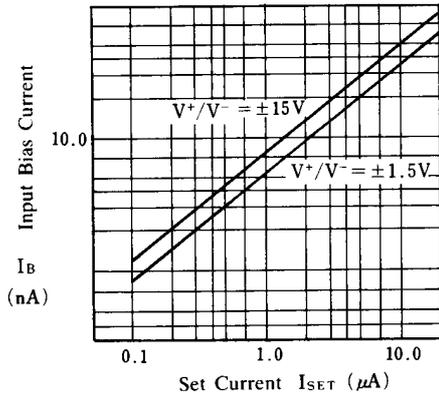
$$I_{SET} = \frac{V^+ - 0.5}{R_{SET}}$$



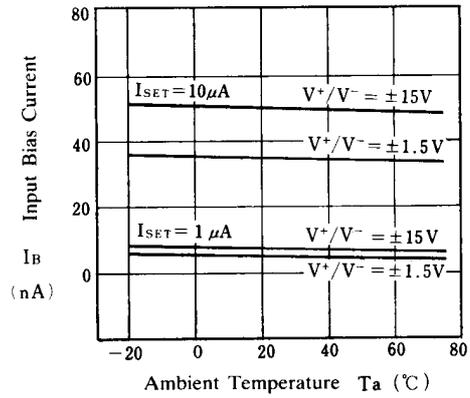
Offset Adjustment

## ■ TYPICAL CHARACTERISTICS

**Input Bias Current vs. Set Current**  
( $T_a = 25^\circ\text{C}$ )

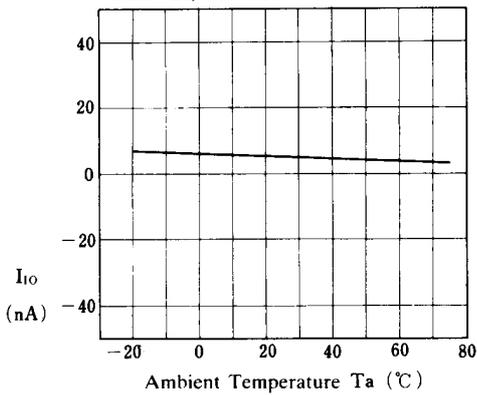


**Input Bias Current vs. Temperature**



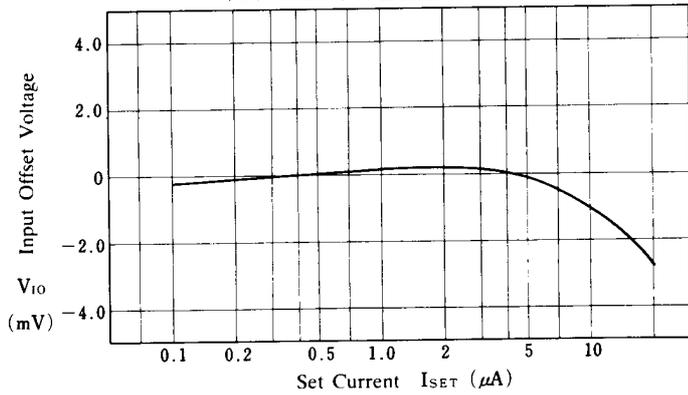
**Input Offset Current vs. Ambient Temperature**

( $I_{SET} = 10\mu\text{A}$ ,  $\pm 1.5\text{V} \leq V^+/V^- \leq \pm 15\text{V}$ )



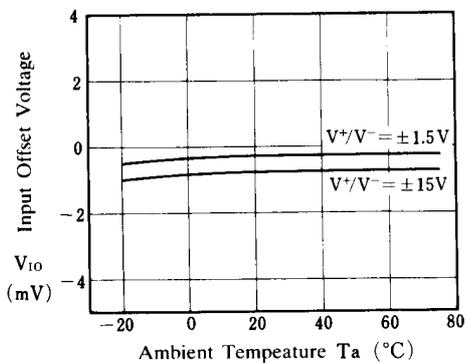
**Input Offset Voltage vs. Set Current**

( $\pm 1.5\text{V} \leq V^+/V^- \leq \pm 15\text{V}$ ,  $T_a = 25^\circ\text{C}$ )



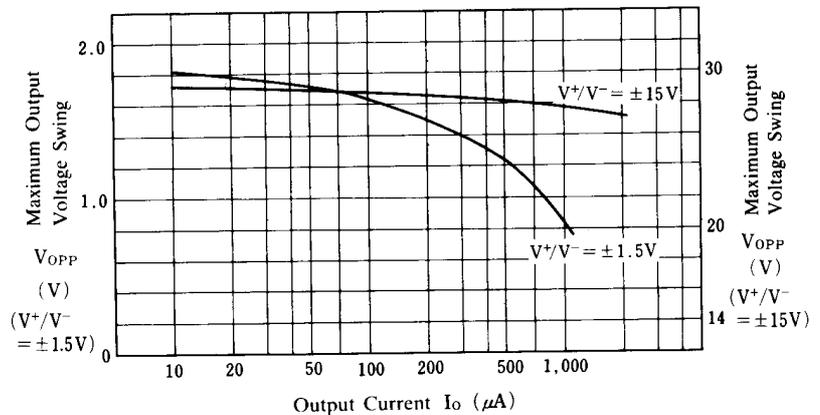
**Input Offset Voltage vs. Ambient Temperature**

( $I_{SET} = 10\mu\text{A}$ )



**Maximum Output Voltage Swing vs. Output Current**

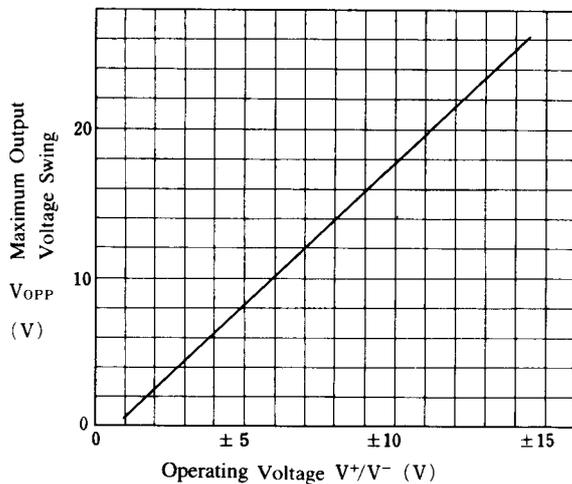
( $I_{SET} = 10\mu\text{A}$ ,  $T_a = 25^\circ\text{C}$ )



## ■ TYPICAL CHARACTERISTICS

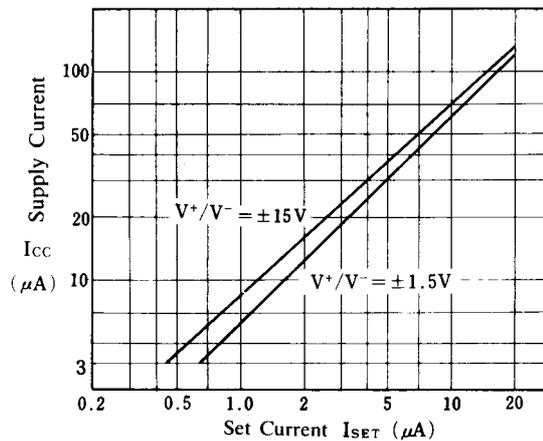
**Maximum Output Voltage Swing  
vs.  
Operating Voltage**

( $1\mu\text{A} \leq I_{\text{SET}} \leq 10\mu\text{A}$ ,  $R_L = 10\text{k}\Omega$ ,  $T_a = 25^\circ\text{C}$ )

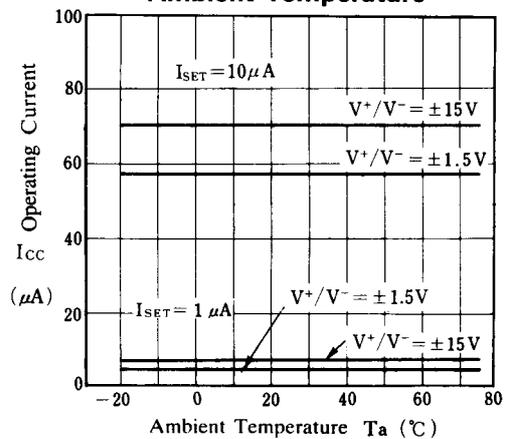


**Operating Current  
vs.  
Set Current**

( $T_a = 25^\circ\text{C}$ )

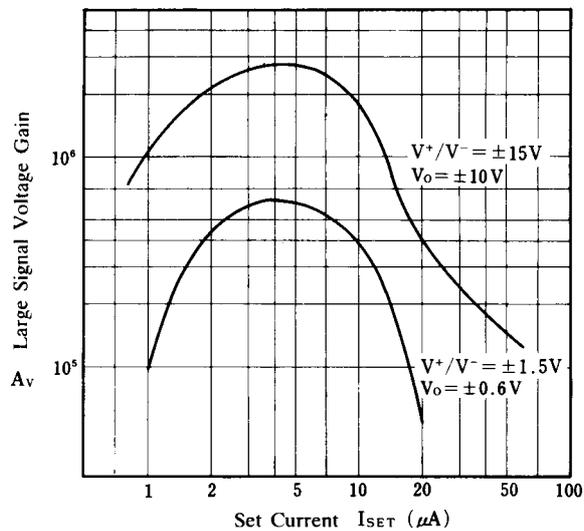


**Operating Current  
vs.  
Ambient Temperature**



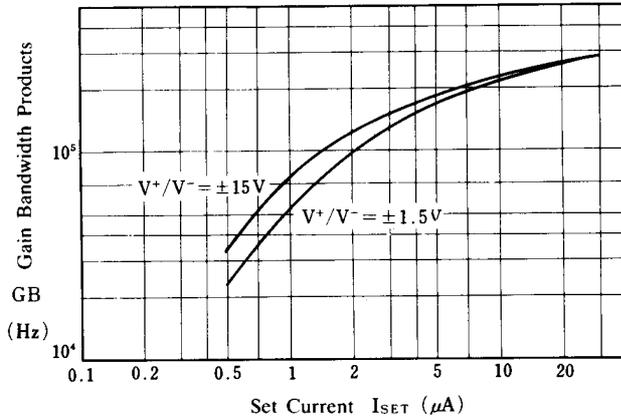
**Open Loop Voltage Gain  
vs.  
Set Current**

( $R_L = 10\text{k}\Omega$ ,  $T_a = 25^\circ\text{C}$ )

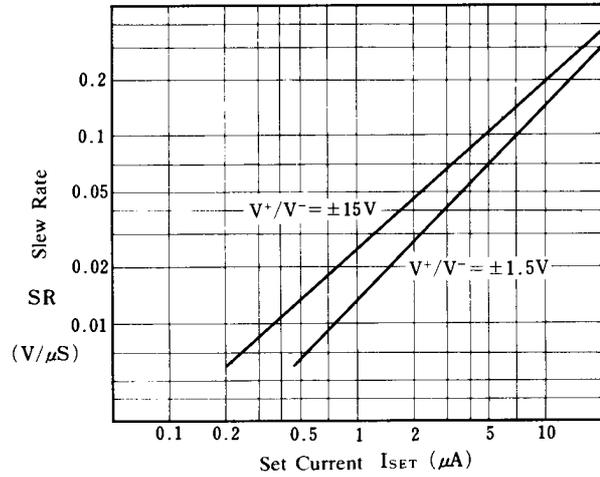


## ■ TYPICAL CHARACTERISTICS

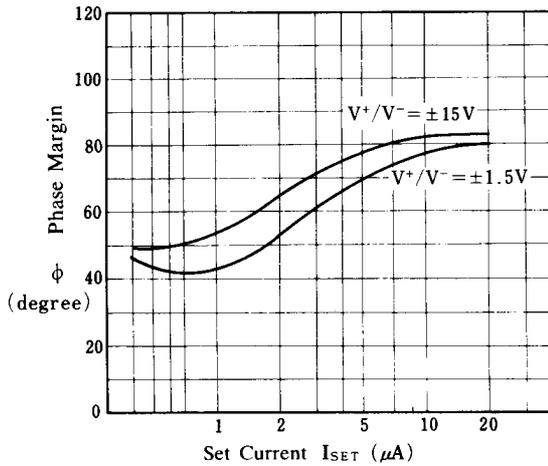
**Gain Bandwidth Product vs. Set Current**  
( $T_a = 25^\circ\text{C}$ )



**Slew Rate vs. Set Current**  
( $R_L = 10\text{k}\Omega$ ,  $T_a = 25^\circ\text{C}$ )

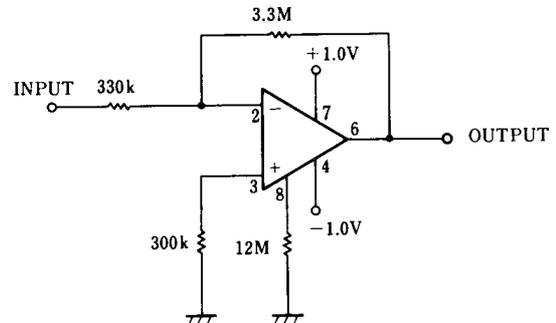


**Phase Margin vs. Set Current**



## ■ TYPICAL APPLICATIONS

500nW 10times Inverting Amplifier



**[CAUTION]**

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