

## DUAL OPERATIONAL AMPLIFIER

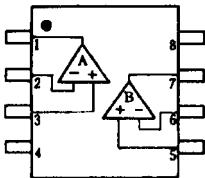
### ■ GENERAL DESCRIPTION

The NJM4565 is a high-gain, wide-bandwidth, dual low noise operational amplifier capable of driving 20V peak-to-peak into 400Ω loads. The NJM4565 is good characteristics compared to the NJM4560.

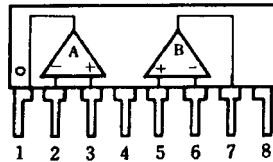
### ■ FEATURES

- Operating Voltage (±4V~±18V)
- Wide Gain Bandwidth Product (4MHz typ.)
- Slew Rate (4V/μs typ.)
- Package Outline DIP8, DMP8, EMP8, SSOP8, SIP8
- Bipolar Technology

### ■ PIN CONFIGURATION



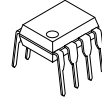
NJM4565D  
NJM4565M  
NJM4565E  
NJM4565V



NJM4565L

- PIN FUNCTION**
- 1.A OUTPUT
  - 2.A -INPUT
  - 3.A +INPUT
  - 4.V<sup>-</sup>
  - 5.B +INPUT
  - 6.B -INPUT
  - 7.B OUTPUT
  - 8.V<sup>+</sup>

### ■ PACKAGE OUTLINE



NJM4565D



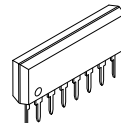
NJM4565M



NJM4565E

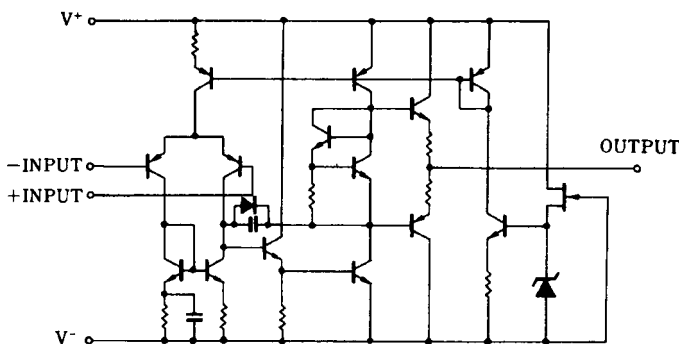


NJM4565V



NJM4565L

### ■ EQUIVALENT CIRCUIT ( 1/2 Shown )



# NJM4565

## ■ ABSOLUTE MAXIMUM RATINGS

( Ta=25°C )

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+ / V^-$	± 18	V
Differential Input Voltage	$V_{ID}$	± 30	V
Input Voltage	$V_{IC}$	± 15 ( note )	V
Power Dissipation	$P_D$	( DIP8 ) 500 ( DMP8 ) 300 ( EMP8 ) 300 ( SSOP8 ) 250 ( SIP8 ) 800	mW
Operating Temperature Range	$T_{opr}$	-40~+85	°C
Storage Temperature Range	$T_{stg}$	-40~+125	°C

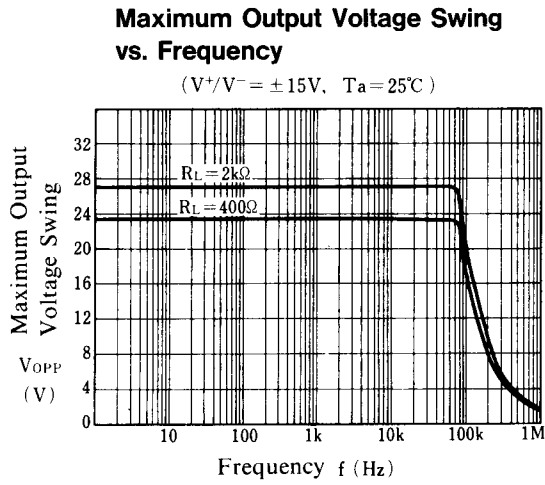
( note ) For supply voltage less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

## ■ ELECTRICAL CHARACTERISTICS

( Ta=25°C,  $V^+ / V^- = \pm 15V$  )

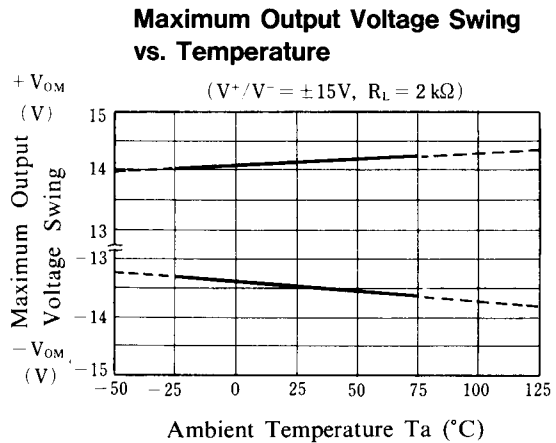
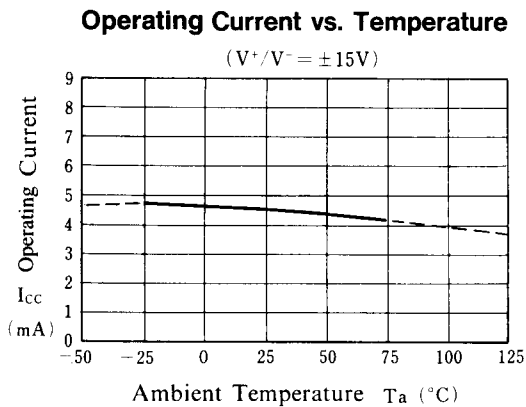
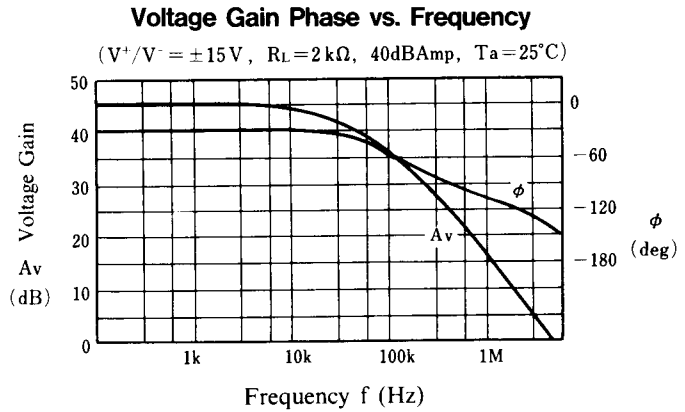
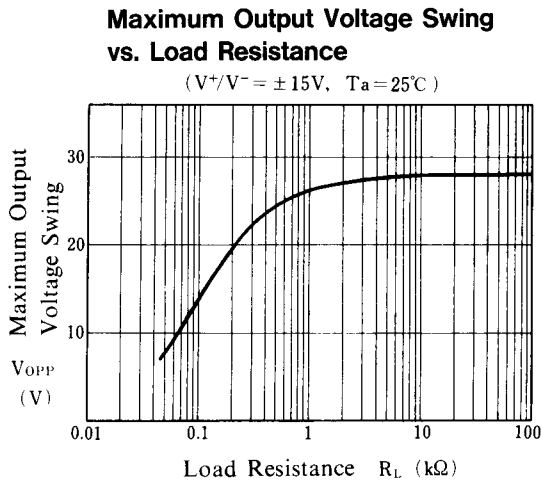
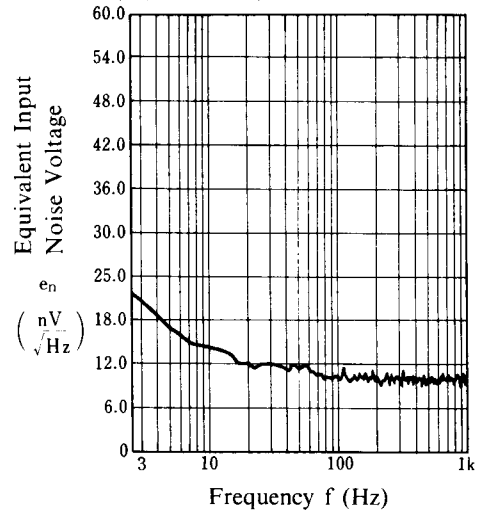
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	$V_{IO}$	$R_S \leq 10k\Omega$	-	0.5	3.0	mV
Input Offset Current	$I_{IO}$		-	2	50	nA
Input Bias Current	$I_B$		-	50	200	nA
Input Resistance	$R_{IN}$		0.3	5	-	MΩ
Large Signal Voltage Gain	$A_V$	$R_L \geq 2k\Omega, V_O = \pm 10V$	86	100	-	dB
Maximum Output Voltage Swing 1	$V_{OM1}$	$R_L \geq 2k\Omega$	± 12	± 14	-	V
Maximum Output Voltage Swing 2	$V_{OM2}$	$I_O = 25mA$	± 10	± 11.5	-	V
Input Common Mode Voltage Range	$V_{ICM}$		± 12	± 14	-	V
Common Mode Rejection Ratio	CMR	$R_S \leq 10k\Omega$	70	90	-	dB
Supply Voltage Rejection Ratio	SVR	$R_S \leq 10k\Omega$	76.5	90	-	dB
Operating Current	$I_{CC}$		-	4.5	7	mA
Slew Rate	SR		-	4	-	V/μs
Gain Bandwidth Product	GB		-	10	-	MHz
Equivalent Input Noise Voltage	$V_{NI}$	RIAA, $R_S = 2.2k\Omega$ , 30kHz LPF	-	1.2	-	μVrms

## ■ TYPICAL CHARACTERISTICS



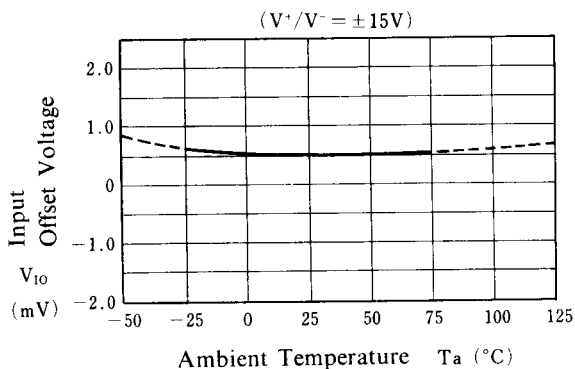
**Equivalent Input Noise Voltage vs. Frequency**

( $V^+/V^- = \pm 15V$ ,  $R_s = 1k\Omega$ ,  $T_a = 25^\circ C$ )

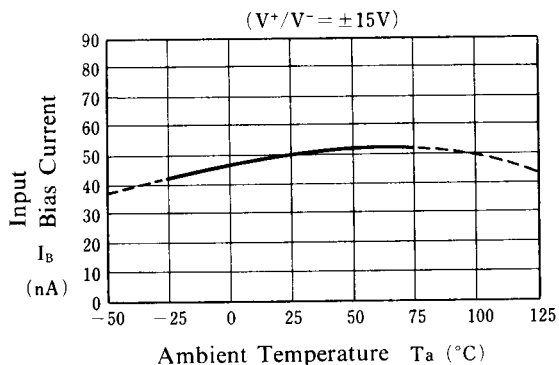


## ■ TYPICAL CHARACTERISTICS

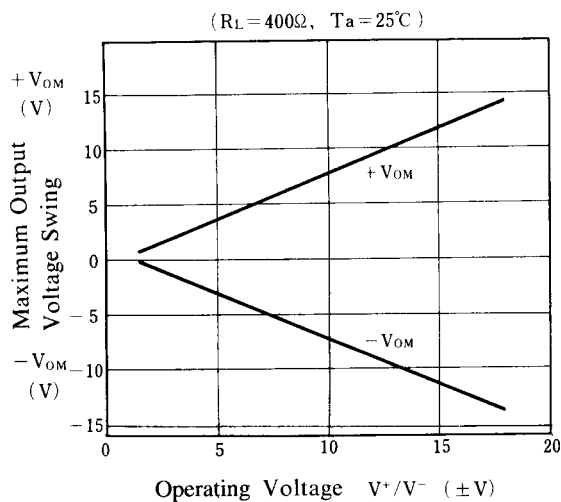
**Input Offset Voltage vs. Temperature**



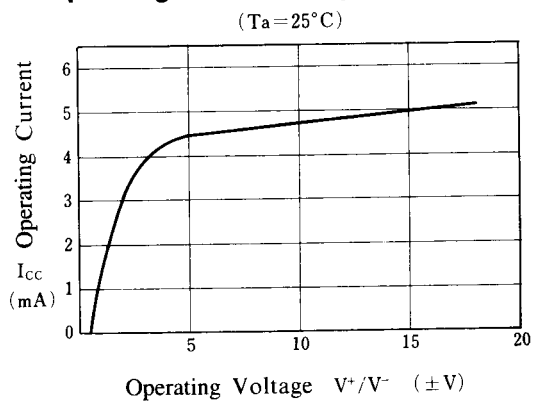
**Input Bias Current vs. Temperature**



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



**Operating Current vs. Operating Voltage**





**[CAUTION]**

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