

## HIGH PERFORMANCE LOW-NOISE OPERATIONAL AMPLIFIER

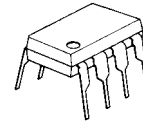
### ■ GENERAL DESCRIPTION

The NJM5534 is a high performance low noise operational amplifier. This amplifier features popular pin-out, superior noise performance, and high output drive capability.

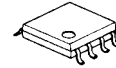
The amplifier also features guaranteed noise performance with substantially higher gain-bandwidth product, power bandwidth, and slew rate which far exceeds that of the NJM741 type amplifiers. The NJM5534 is internally compensated for a gain of three or higher and may be externally compensated for optimizing specific performance requirements of various applications such as unity-gain voltage followers, drivers for capacitive loads or fast setting.

The specially designed low noise input transistors allow the NJM5534 to be used in very low noise signal processing applications such as audio pre-amplifiers and servo error amplifiers.

### ■ PACKAGE OUTLINE



NJM5534D

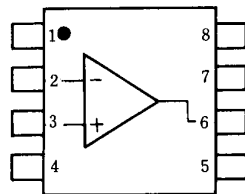


NJM5534M

### ■ FEATURES

- Operating Voltage (  $\pm 3V \sim \pm 22V$  )
- Single Circuit
- With  $V_{IO}$  Trim Terminal
- Low Input Noise Voltage (  $3.3nV/\sqrt{Hz}$  typ. @ 1kHz )
- Power Bandwidth ( 200kHz typ. )
- Slew Rate (  $13V/\mu s$  typ. )
- Package Outline DIP8, DMP8
- Bipolar Technology

### ■ PIN CONFIGURATION

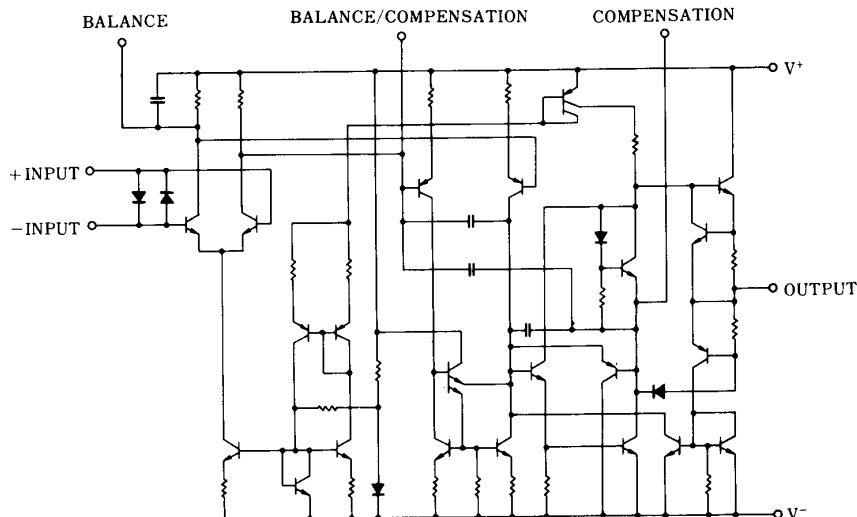


NJM5534D  
NJM5534M

#### PIN FUNCTION

- 1. BALANCE
- 2. -INPUT
- 3. +INPUT
- 4.  $V^-$
- 5. COMPENSATION
- 6. OUTPUT
- 7.  $V^+$
- 8. BALANCE/COMPENSATION

### ■ EQUIVALENT CIRCUIT



# NJM5534

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	(V <sup>+</sup> V <sup>-</sup> )	± 22	V
Differential Input Voltage	V <sub>ID</sub>	± 0.5	V
Input Voltage	V <sub>IC</sub>	V <sup>+</sup> V <sup>-</sup>	V
Power Dissipation	P <sub>D</sub>	(DIP8) 500 (DMP8) 300	mW
Operating Temperature Range	T <sub>opr</sub>	-20~+75	°C
Storage Temperature Range	T <sub>stg</sub>	-40~+125	°C

## ■ ELECTRICAL CHARACTERISTICS

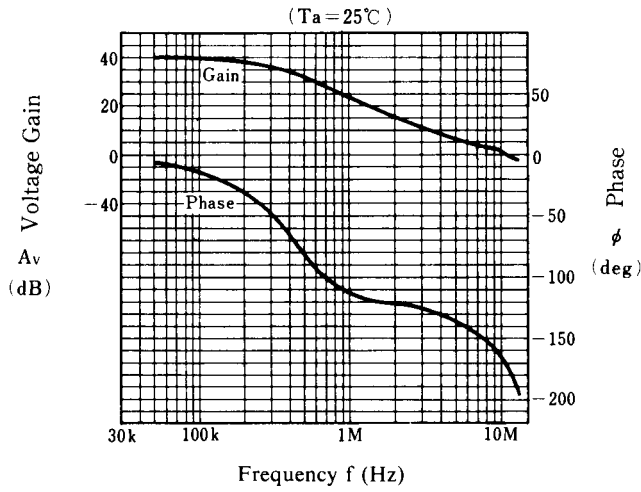
(Ta=25°C, V<sup>+</sup>V<sup>-</sup>=±15V)

PARAMETER	SYMBOL	TEST CONDITION	NJM5534			UNIT
			MIN.	TYP.	MAX.	
Input Offset Voltage	V <sub>IO</sub>	R <sub>S</sub> ≤10kΩ	-	0.5	4	mV
Input Offset Current	I <sub>IO</sub>		-	20	300	nA
Input Bias Current	I <sub>B</sub>		-	500	1500	nA
Input Resistance	R <sub>IN</sub>		30	100	-	kΩ
Large Signal Voltage Gain	A <sub>v</sub>	R <sub>L</sub> ≥2kΩ, V <sub>O</sub> =±10V	88	100	-	dB
Maximum Output Voltage Swing	V <sub>OM</sub>	R <sub>L</sub> ≥600Ω	± 12	± 13	-	V
Input Common Mode Voltage Range	V <sub>ICM</sub>		± 12	± 13	-	V
Common Mode Rejection Ratio	CMR	R <sub>S</sub> ≤10kΩ	70	100	-	dB
Supply Voltage Rejection Ratio	SVR	R <sub>S</sub> ≤10kΩ	80	100	-	dB
Operating Current	I <sub>CC</sub>	R <sub>L</sub> =∞	-	4	8	mA
Transient Response Rise Time	t <sub>R</sub>	V <sub>IN</sub> =50mV, R <sub>L</sub> =600Ω, C <sub>L</sub> =100pF, C <sub>c</sub> =22pF	-	35	-	nsec
Overshoot		V <sub>IN</sub> =50mV, R <sub>L</sub> =600Ω, C <sub>L</sub> =100pF, C <sub>c</sub> =22pF	-	17	-	%
Slew Rate	SR	C <sub>c</sub> =0	-	13	-	V/μs
Gain Bandwidth Product	GB	C <sub>c</sub> =22pF, C <sub>L</sub> =100pF	-	10	-	MHz
Power Bandwidth	W <sub>PG</sub>	V <sub>O</sub> =20V <sub>P-P</sub> , C <sub>c</sub> =0	-	200	-	kHz
Equivalent Input Noise Voltage	V <sub>NI</sub>	f=20Hz~20kHz	-	1.0	-	μVrms
Equivalent Input Noise Current	I <sub>NI</sub>	f=20Hz~20kHz	-	25	-	pArms
Equivalent Input Noise Voltage 1	e <sub>n1</sub>	f <sub>0</sub> =30Hz	-	5.5	-	nV/√Hz
Equivalent Input Noise Voltage 2	e <sub>n2</sub>	f <sub>0</sub> =1kHz	-	3.3	-	nV/√Hz
Equivalent Input Noise Current 1	i <sub>n1</sub>	f <sub>0</sub> =30Hz	-	1.5	-	pA/√Hz
Equivalent Input Noise Current 2	i <sub>n2</sub>	f <sub>0</sub> =1kHz	-	0.4	-	pA/√Hz
Broadband Noise Figure	NF	f=10Hz~20kHz, R <sub>S</sub> =5kΩ	-	0.9	-	dB

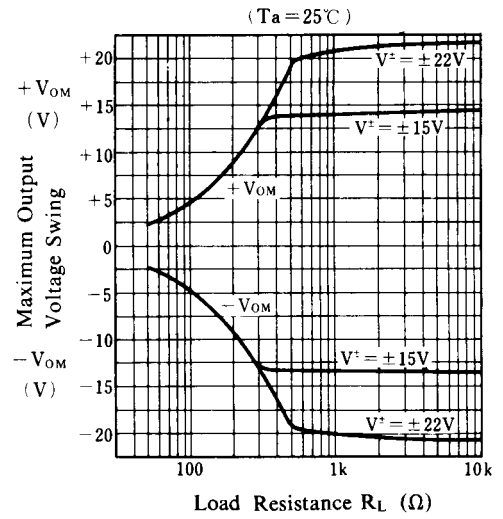
Note: JRC's general selected products D rank are also prepared for the noise standard (R<sub>S</sub>=2.2kΩ, RIAA, V<sub>N</sub>=1.4μV Max.)

## ■ TYPICAL CHARACTERISTICS

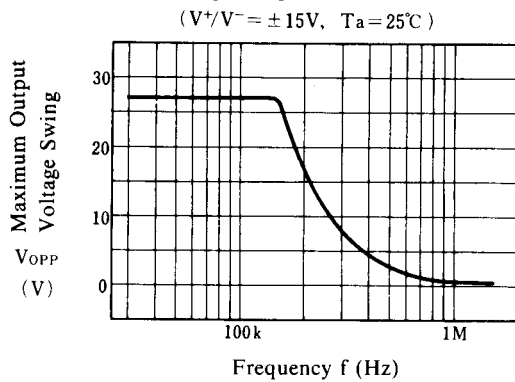
**Voltage Gain, Phase vs. Frequency**



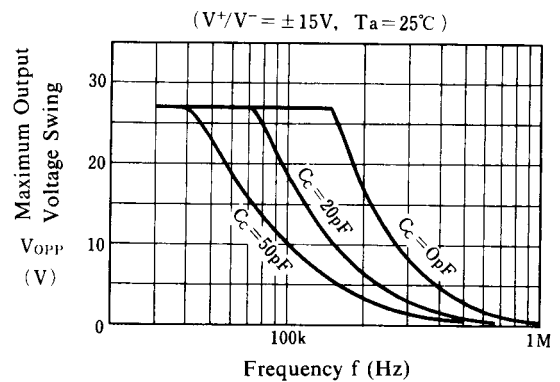
**Maximum Output Voltage Swing vs. Load Resistance**



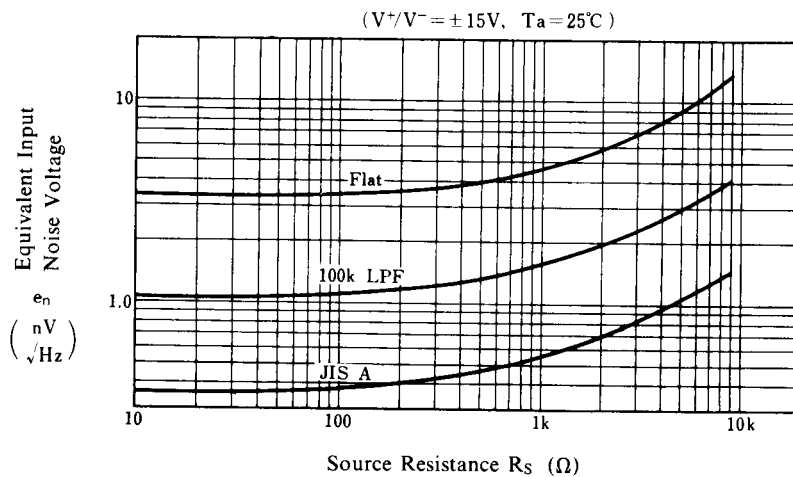
**Maximum Output Voltage Swing vs. Frequency**



**Maximum Output Voltage Swing vs. Frequency**

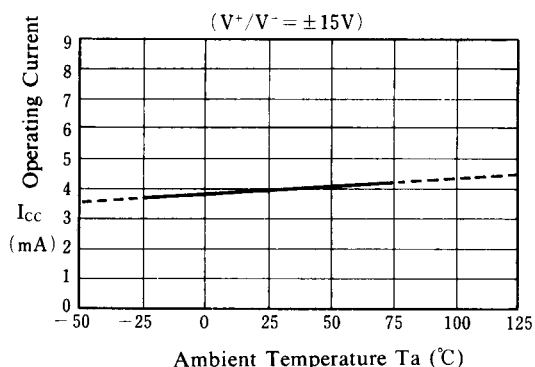


**Equivalent Input Noise Voltage vs.  $R_s$**

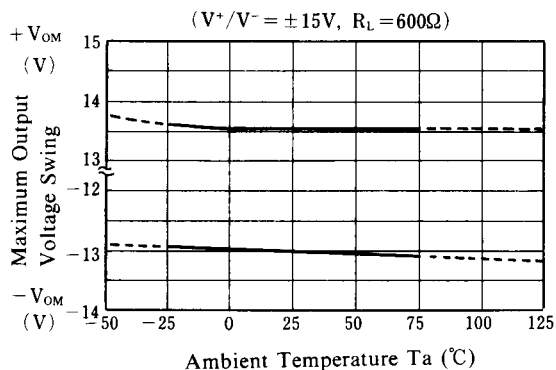


## ■ TYPICAL CHARACTERISTICS

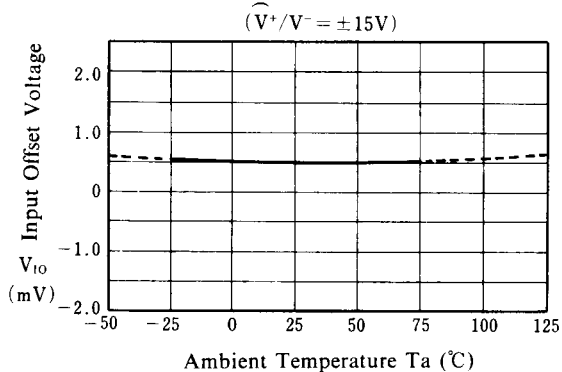
### Operating Current vs. Temperature



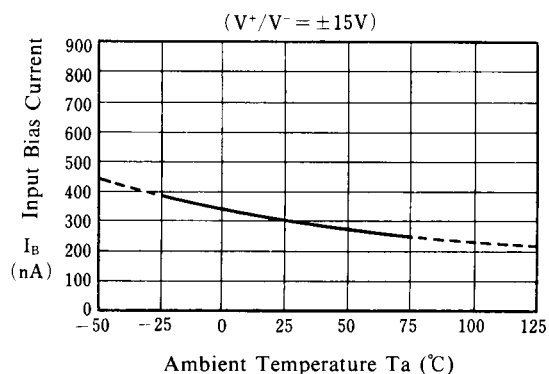
### Maximum Output Voltage Swing vs. Temperature



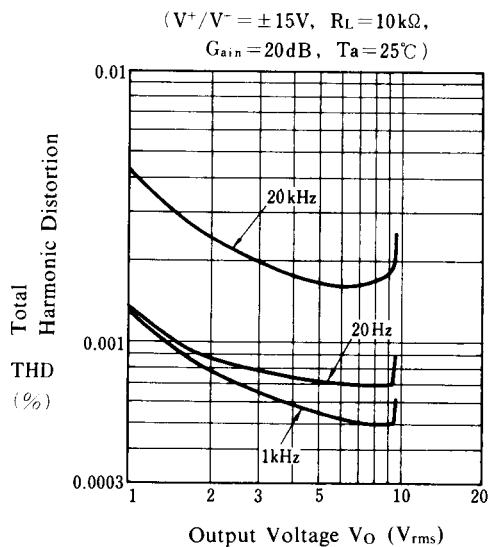
### Input Offset Voltage vs. Temperature



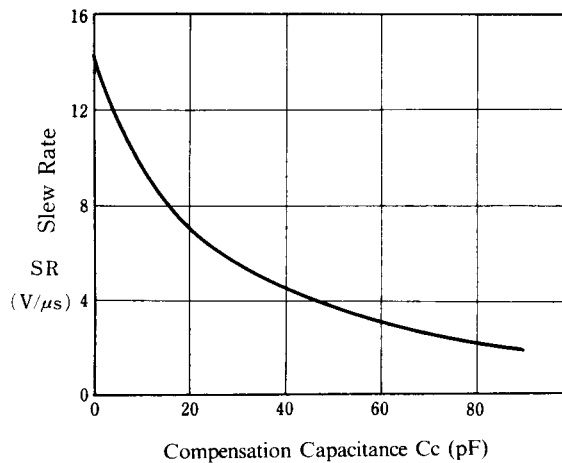
### Input Bias Current vs. Temperature



### Total Harmonic Distortion vs. Output Voltage

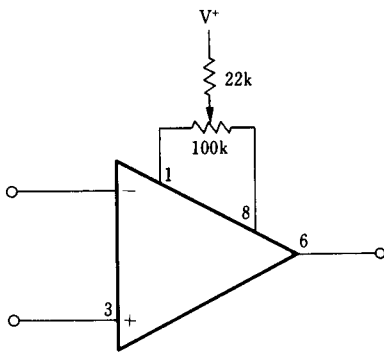


### Slew Rate

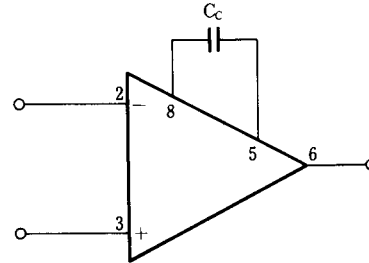


## ■ ADJUSTMENT METHOD

### Offset Adjustment



### Frequency Compensation



## ■ NOTICE

When used in voltage follower circuit, put a current limit resistor into non-inverting input terminal in order to avoid inside input diode destruction when the power supply is turned on. ( ref.Fig.1 )

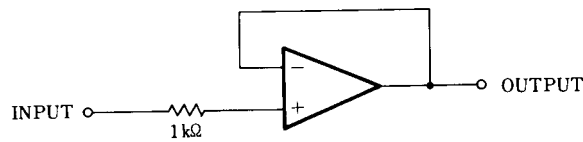


Fig.1

**[CAUTION]**

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