

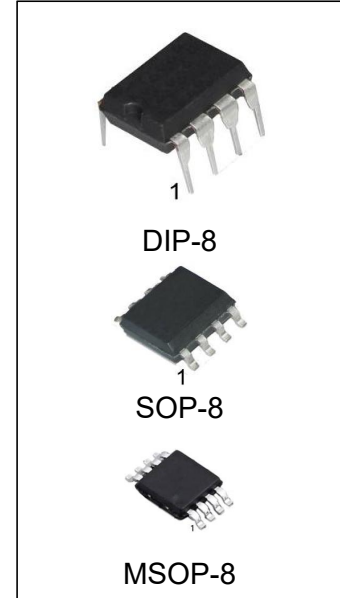
## DUAL AUDIO OPERATIONAL AMPLIFIER

### General Description

The NJM4560 is a high-gain, wide-bandwidth, dual operational amplifier capable of driving 20V peak-to-peak into 400-Ω loads. The NJM4560 combines many of the features of the NJM4558, but with wider bandwidth and higher slew rate, making this device ideal for active filters, data and telecommunications, and many instrumentation applications.

### Features

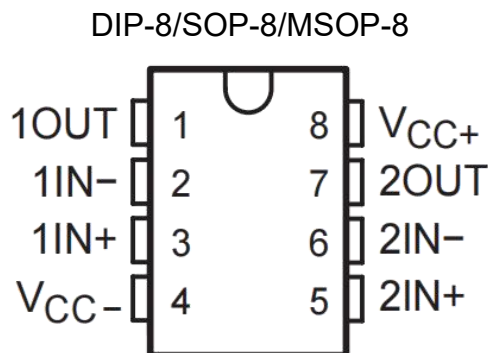
- Operating Voltage  $\pm 2$  V to  $\pm 18$  V
- Low Noise Voltage 1.2  $\mu\text{Vrms}$  (Typ)
- Wide GBW 15 MHz (Typ)
- Low THD 0.05% (Typ)
- Slew Rate 5.5V/ $\mu\text{sec}$  (Typ)
- Suitable for Applications Such as Audio Preamplifier, Active Filter, Headphone Amplifier, Industrial Measurement Equipment



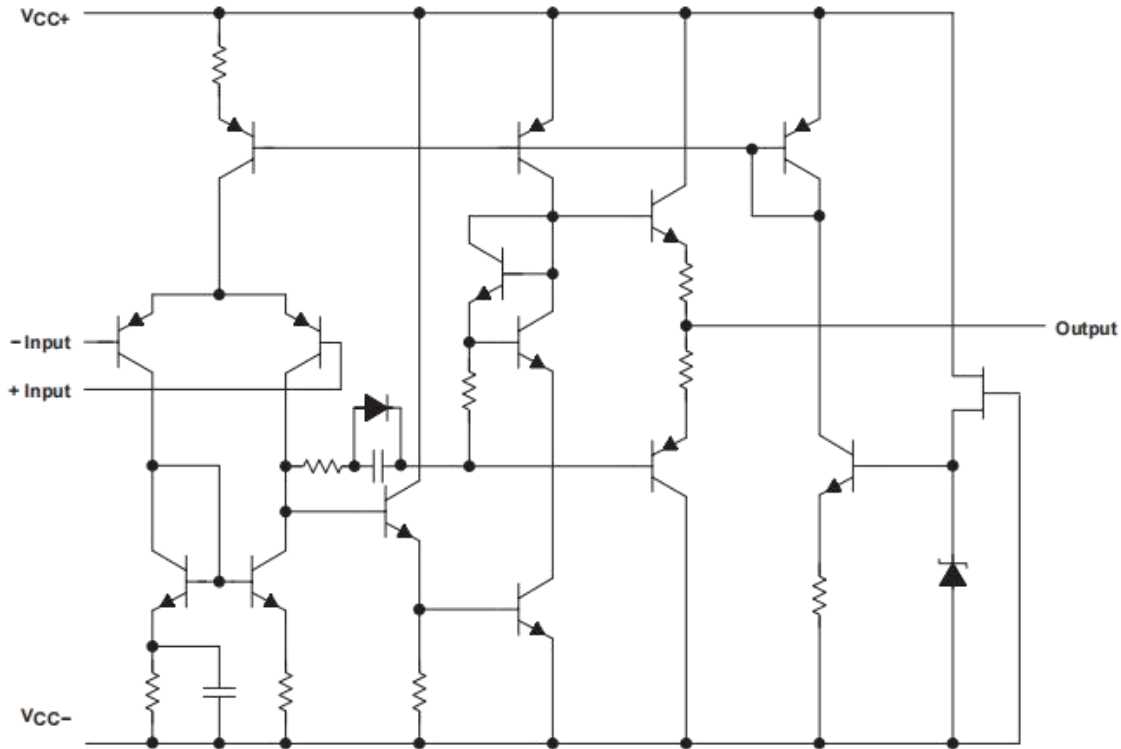
### Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
NJM4560PG	DIP-8	4560	TUBE	2000pcs/Box
NJM4560DRG	SOP-8	4560	REEL	2500pcs/Reel
NJM4560DGKRG	MSOP-8	4560	REEL	3000pcs/Reel

### Pin Connection



## Equivalent Circuit



### Absolute Maximum Ratings Over Operating Free-Air Temperature Range (Unless Otherwise Noted)†

Symbol	Condition	Min	Max	Unit	
VCC±	Supply voltage	-18	+18	V	
VCC±	Input voltage(any input)	-15	+15	V	
ISC	Output current	-15	+15	mA	
θJA	Package thermal impedance(see Notes 1 and 2):	SOP	-	97	°C/W
		MSOP	-	172	°C/W
		DIP	-	85	°C/W
TJ	Operating virtual junction temoerature	-	150	°C	
TL	Lead Temperature (Soldering, 10 seconds)	-	245	°C	
Tstg	Storage temperature range	-60	+125	°C	

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum -rated conditions for extended periods may affect device reliability.

#### NOTES:

1. Maximum power dissipation is a function of  $T_J(\max)$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(\max) - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can affect reliability.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

## Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
$V_{CC+}$	Supply voltage	2	16	V
$V_{CC-}$		-2	-16	
$V_{ID}$	Differential input voltage		$\pm 30$	V
$V_{ICR}$	Input common mode range	-14	14	V
$T_A$	Operating free-air temperature range	-40	85	$^{\circ}\text{C}$

## Electrical Characteristics, $V_{CC\pm} = \pm 15\text{ V}$ , $T_A = 25^{\circ}\text{C}$ (unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{IO}$	Input offset voltage	$R_S \leq 10\text{K}\Omega$		0.5	6	mV
$I_{IO}$	Input offset current			5	200	nA
$I_{IB}$	Input bias current			40	500	nA
AVD	Large-signal differential voltage amplification	$R_L \geq 2\text{K}\Omega, V_O = \pm 10\text{V}$	86	100		dB
$r_i$	Input resistance		0.3	5		$\text{M}\Omega$
$V_O$	Output voltage swing	$R_L \geq 2\text{K}\Omega$	$\pm 12$	$\pm 14$		V
		$I_O = 25\text{mA}$	$\pm 10$	$\pm 12.5$		
$V_{ICR}$	Common-mode input voltage range		$\pm 12$	$\pm 14$		V
CMRR	Common-mode rejection ratio	$R_S \leq 10\text{K}\Omega$	70	90		dB
$k_{SVR}^{\dagger}$	Supply-voltage rejection ratio	$R_S \leq 10\text{K}\Omega$	76.5	90		dB
$I_{CC}$	Supply current (all amplifiers)			4.3	5.7	mA

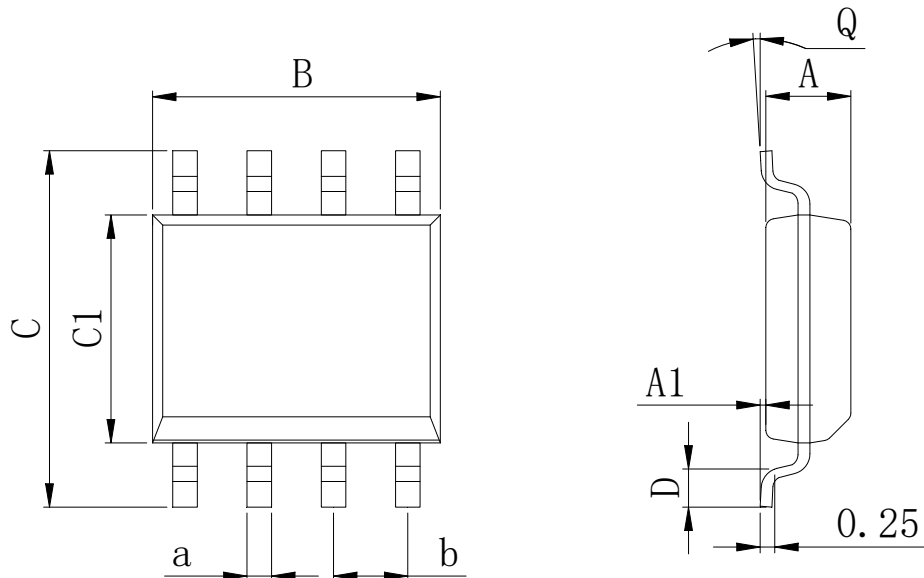
† Measured with  $V_{CC\pm}$  differentially varied simultaneously from  $\pm 4\text{ V}$  to  $\pm 15\text{ V}$

## Operating Characteristics, $V_{CC\pm} = \pm 15\text{ V}$ , $T_A = 25^{\circ}\text{C}$ (unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
SR	Slew rate at unity gain			5.5		$\text{V}/\mu\text{s}$
GBW	Gain bandwidth product			15		MHz
THD	Total harmonic distortion	$V_O = 5\text{V}, R_L = 2\text{K}\Omega, f = 1\text{KHz}, \text{AVD} = 20\text{dB}$		0.05		%
$V_n$	Equivalent input noise voltage	RIAA, $R_S \leq 2\text{K}\Omega, 30\text{KHz LPF}$		1.2		$\mu\text{Vrms}$

## Physical Dimensions

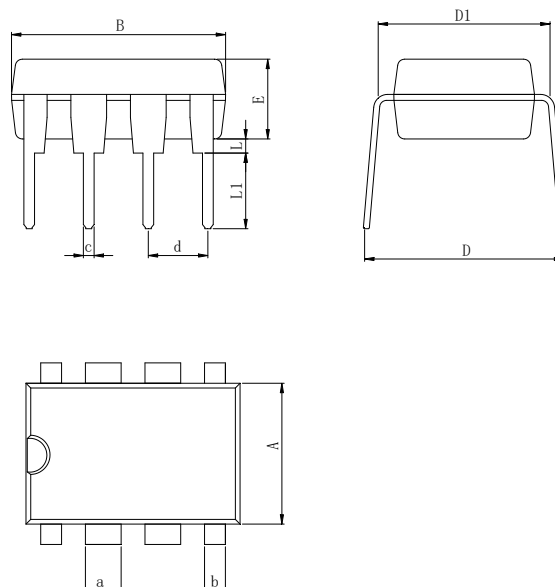
### SOP-8



**Dimensions In Millimeters(SOP-8)**

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

### DIP-8

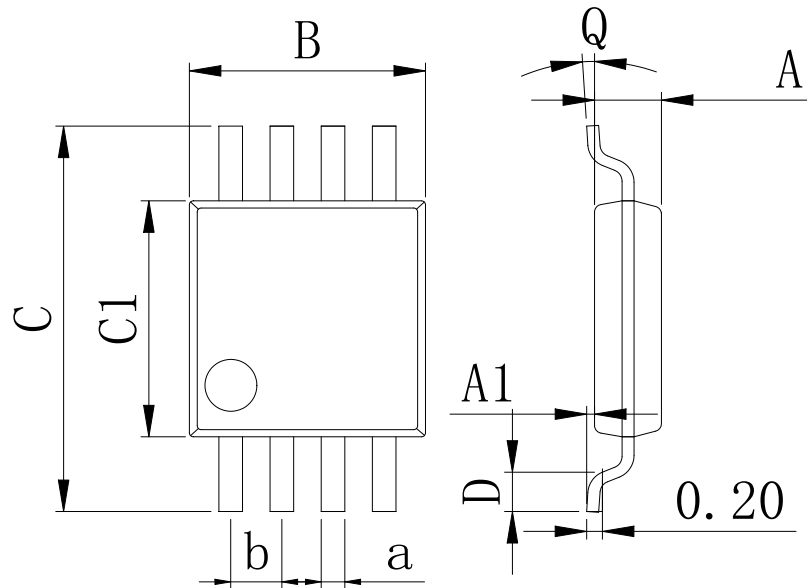


**Dimensions In Millimeters(DIP-8)**

Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

**Physical Dimensions**

MSOP-8


**Dimensions In Millimeters(MSOP-8)**

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.80	0.05	2.90	4.75	2.90	0.35	0°	0.25	0.65 BSC
Max:	0.90	0.20	3.10	5.05	3.10	0.75	8°	0.35	

## Revision History

DATE	REVISION	PAGE
2020-3-5	New	1-7
2024-8-20	Document reformatting	1-7

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