

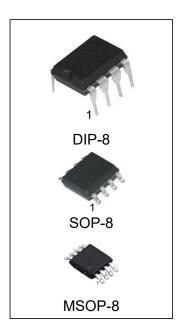
### **DUAL AUDIO OPERATIONAL AMPLIFIER**

#### **General Description**

The NJM4560 is a high-gain, wide-bandwidth, dual operational amplifier capable of driving 20V peak-to-peak into 400- $\Omega$  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 ±2 V to ±18 V
- Low Noise Voltage 1.2 μVrms (Typ)
- Wide GBW 15 MHz (Typ)
- Low THD 0.05% (Typ)
- Slew Rate 5.5V/µsec (Typ)
- Suitable for Applications Such as Audio Preamplifier, Active Filter, Headphone Amplifier, Industrial Measurement Equipment



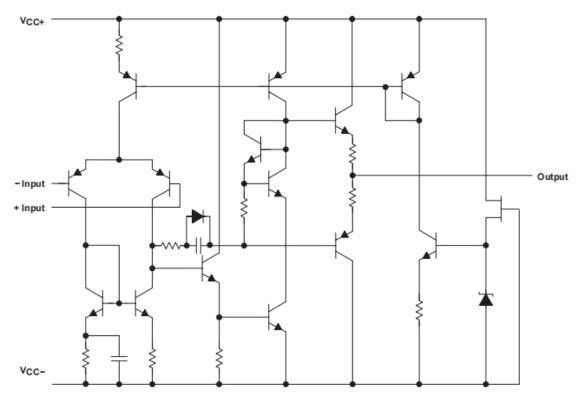
#### **Ordering Information**

DEVICE	Package Type	MARKING	Packing	Packing Qty
NJM4560N	DIP-8	4560	TUBE	2000pcs/Box
NJM4560M/TR	SOP-8	4560	REEL	2500pcs/Reel
NJM4560MM/TR	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	
θЈА	Package thermal impedance(see Notes 1	SOP	-	97	°C/W
	and 2):	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

<sup>†</sup> 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:

<sup>1.</sup> Maximum power dissipation is a function of TJ(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.

<sup>2.</sup> The package thermal impedance is calculated in accordance with JESD 51-7.



## **Recommended Operating Conditions**

Symbol	Parameter	Min	Max	Unit
V <sub>CC+</sub>		2	16	.,,
VCC-	Supply voltage	-2	-16	V
VID	Differential input voltage		±30	V
VICR	Input common mode range	-14	14	V
TA	Operating free-air temperature range	-40	85	°C

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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
VIO	Input offset voltage	RS≤10KΩ		0.5	6	mV
lio	Input offset current			5	200	nA
I <sub>IB</sub>	Input bias current			40	500	nA
AVD	Large-signal differential voltage amplification	RL≥2KΩ,VO=±10V	86	100		dB
rį	Input resistance		0.3	5		МΩ
\/-	Outroto alto a consistent	RL≥2KΩ	±12	±14		
Vo	Output voltage swing	IO=25mA	±10	±12.5		V
VICR	Common-mode input voltage range		±12	±14		V
CMRR	Common-mode rejection ratio	RS≤10KΩ	70	90		dB
ksvR†	Supply-voltage rejection ratio	RS≤10KΩ	76.5	90		dB
ICC	Supply current (all amplifiers)			4.3	5.7	mA

<sup>†</sup> Measured with  $V_{CC_{\pm}}$  differentially varied simultaneously from ± 4 V to  $\pm$  15 V

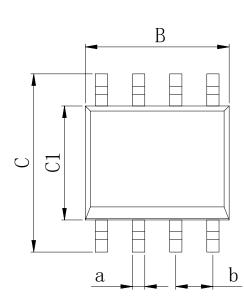
### Operating Characteristics, Vcc± = ±15 V, TA = 25℃ (unless otherwise noted)

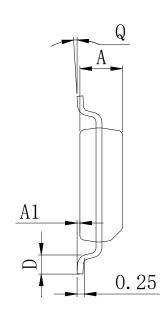
Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
SR	Slew rate at unity gain			5.5		V/µs
GBW	Gain bandwidth product			15		MHz
THD	Total harmonic distortion	VO=5V,RL=2KΩ,f=1KHz, AVD=20dB		0.05		%
Vn	Equivalent input noise voltage	RIAA,RS≤2KΩ,30KHz LPF		1.2		μVrms



# **Physical Dimensions**

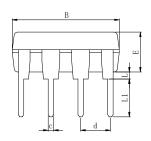
## SOP-8

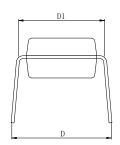


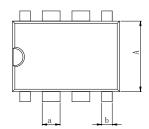


Dimensions In Millimeters(SOP-8)										
Symbol:	Α	A1	В	С	C1	D	Q	а	b	
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1 27 DCC	
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	1.27 BSC	

DIP-8





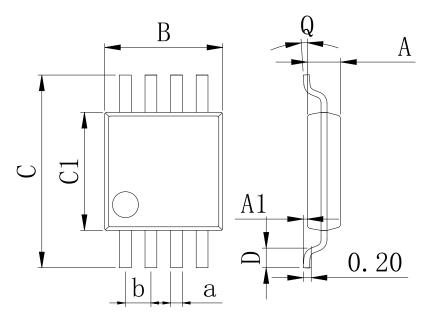


Dimensions In Millimeters(DIP-8)											
Symbol:	Α	В	D	D1	E	L	L1	а	b	С	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	2.04 BSC



# **Physical Dimensions**

MSOP-8



Dimensions In Millimeters(MSOP-8)										
Symbol:	Α	A1	В	С	C1	D	Q	а	b	
Min:	0.80	0.05	2.90	4.75	2.90	0.35	0°	0.25	0.05.000	
Max:	0.90	0.20	3.10	5.05	3.10	0.75	8°	0.35	0.65 BSC	



# **Revision History**

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



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