

## DUAL HIGH SPEED SINGLE SUPPLY OPERATIONAL AMPLIFIER

### ■FEATURES

- High Slew Rate 10V/ $\mu$ s
- High Bandwidth 3MHz
- High Unity Gain Frequency 3.6MHz
- Input Offset Voltage 5.5mV max.
- Single Supply 3V~36V
- Operating Temperature Range -40°C~+125°C
- Low input voltage around GND level
- Unity-Gain Stable
- Operating Current (All amplifiers) 4mA
- No Phase Reversal
- High EMI Immunity
- Output Short-Circuit Protection
- Package
  - NJM3472 SOP8, SSOP8, VSP8

### ■GENERAL DESCRIPTION

The NJM3472 is a dual high speed single supply operational amplifier with operation voltage range from 3V to 36V and operation temperature range from -40 to 125°C.

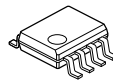
10V/ $\mu$ s slew rate and 3MHz gain bandwidth is suitable for inverter and active filter.

Compared with the TL3472, the characteristics of low-power are improved.

### ■APPLICATIONS

- Current Sensor
- Buffer Application Amplifier
- Active filter
- Battery Application

### ■PACKAGE OUTLINE



**NJM3472G  
(SOP8)**

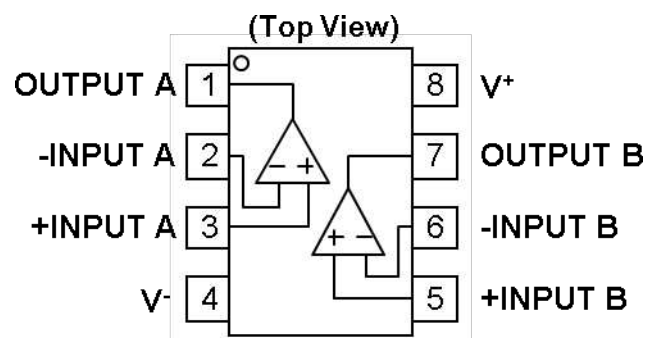


**NJM3472V  
(SSOP8)**



**NJM3472R  
(VSP8)**

### ■PIN CONFIGURATION



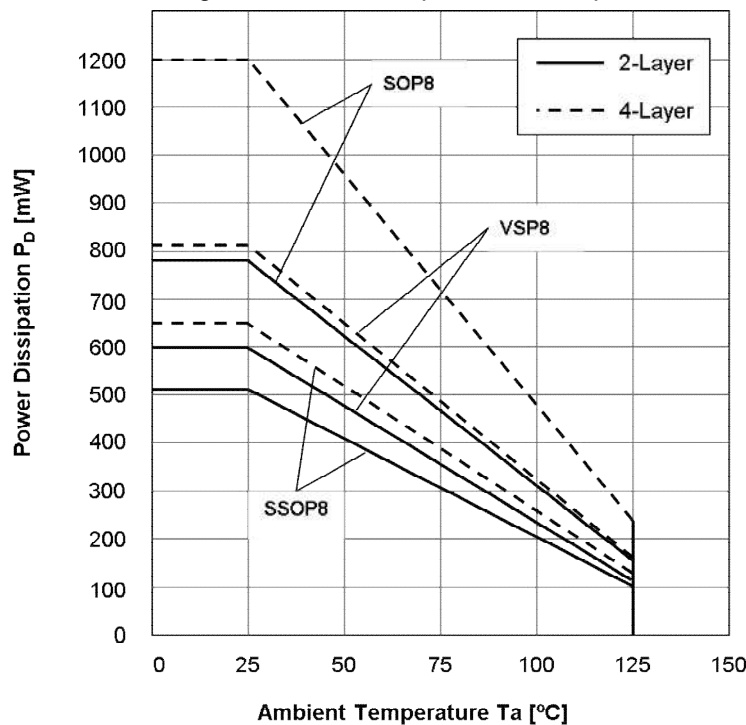
**NJM3472G  
NJM3472V  
NJM3472R**

■ **ABSOLUTE MAXIMUM RATINGS** (Ta=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V^+ - V^-$	40 <sup>(5)</sup>	V
Differential Input Voltage <sup>(1)</sup>	$V_{ID}$	$\pm 40$ <sup>(2)</sup>	V
Input Voltage <sup>(2)</sup>	$V_{IN}$	$V^- - 0.3$ to $V^+ + 40$	V
Output Terminal Input Voltage	$V_O$	$V^- - 0.3$ to $V^+ + 0.3V$	V
Power Dissipation <sup>(3)</sup>	$P_D$	(2-layer / 4-layer)	mW
SOP8		780 / 1200	
SSOP8		510 / 650	
VSP8		600 / 810	
Output Short-Circuit Duration <sup>(4)</sup>		infinite	
Operating Temperature Range	$T_{opr}$	-40 to +125	°C
Storage Temperature Range	$T_{stg}$	-55 to +150	°C

- (1) Differential voltage is the voltage difference between +INPUT and -INPUT.
- (2) Input voltage should be allowed to apply to the input terminal independent of the magnitude of  $V^+$ . The normal operation will establish when any input is within the Common Mode Voltage Range of electrical characteristics.
- (3) Power dissipation is the power that can be consumed by the IC at Ta=25°C, and is the typical measured value based on JEDEC condition. When using the IC over Ta=25°C subtract the value [mW/°C]=PD/(Tstg(MAX)-25) per temperature.  
 2-layer: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layers, FR-4) mounting  
 4-layer: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 4layers, FR-4) mounting
- (4) Temperature and/or supply voltages must be limited to ensure the maximum dissipation rating is not exceeded.
- (5) Supply Voltage is the voltage difference between  $V^+$  and  $V^-$ .

Figure1. Power Dissipation vs. Temperature



■ **RECOMMENDED OPERATING CONDITIONS** (Ta=25°C)

PARAMETER	Supply Voltage	UNIT
Supply Voltage	+3 to +36 (±1.5 to ±18)	V

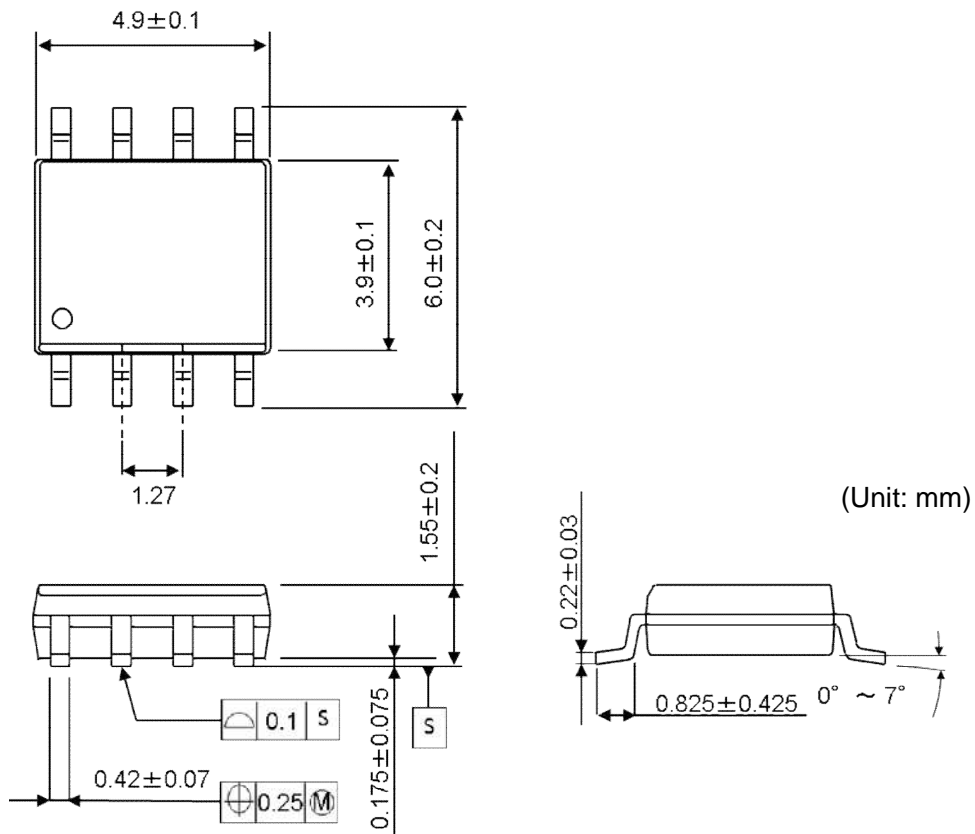
## ■ELECTRICAL CHARACTERISTICS ( $V^+=+15V$ , $V^-=-15V$ , $V_{CM}=0V$ , $T_a=25^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>INPUT CHARACTERISTICS</b>						
Input Offset Voltage	$V_{IO}$	$R_S=50\Omega$ , $V_{CM}=0V$	-	1	5.5	mV
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$	$T_a=-40^\circ C \sim +125^\circ C$	-	10	-	$\mu V/^\circ C$
Input Bias Current	$I_B$		-	80	150	nA
Input Offset Current	$I_{IO}$		-	5	75	nA
Open-Loop Voltage Gain	$A_V$	$V_O=\pm 10V$ , $R_L=2k\Omega$ to $0V$	80	95	-	dB
Common Mode Rejection Ratio	CMR	$V_{ICM}=-15V$ to $13.0V$	60	100	-	dB
Common Mode Input Voltage Range	$V_{ICM}$	CMR $\geq 60$ dB	$V^-$	-	$V^+-2.0$	V
<b>OUTPUT CHARACTERISTICS</b>						
High-level Output Voltage	$V_{OH}$	$R_L=10k\Omega$ to $0V$	13.7	14	-	V
		$R_L=2k\Omega$ to $0V$	13.5	13.8	-	
Low-level Output Voltage	$V_{OL}$	$R_L=10k\Omega$ to $0V$	-	-14.8	-14.3	V
		$R_L=2k\Omega$ to $0V$	-	-13.8	-13.5	
Output Source Current	$I_{SOURCE}$	$V_O=0V$ , +Input= $+1V$ , -Input= $0V$	10	35	-	mA
Output Sink Current	$I_{SINK}$	$V_O=0V$ , +Input= $0V$ , -Input= $+1V$	20	60	-	mA
<b>POWER SUPPLY</b>						
Supply Current (All amplifiers)	$I_{SUPPLY}$	No Signal, $R_L=\infty$	-	4	5	mA
Supply Voltage Rejection Ratio	SVR	$V^+/V^-=\pm 2V$ to $\pm 18V$ , $V_{ICM}=0V$	60	95	-	dB
<b>AC CHARACTERISTICS</b>						
Gain Bandwidth Product	GBW	$R_L=2k\Omega$ to $0V$ , $f=100kHz$	-	3	-	MHz
Unity Gain Frequency	$f_T$	$R_L=2k\Omega$ to $0V$	-	3.6	-	MHz
Slew Rate	SR	$G_V=0dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $V_{in}=-10V$ to $+10V$	7.5	10	-	V/ $\mu s$
Full Power Bandwidth	FPBW	$G_V=0dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $V_O=20V_{pp}$ , THD=5.0%	-	190	-	kHz
Settling Time	$t_s$	$G_V=0dB$ , 10V step To 0.1%	-	1.8	-	$\mu s$
		$G_V=0dB$ , 10V step To 0.01%	-	12	-	
Phase Margin	$\phi_M$	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	78	-	deg
		$R_L=2k\Omega$ to $0V$ , $C_L=220pF$	-	68	-	
Gain Margin	GM	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	12	-	dB
		$R_L=2k\Omega$ to $0V$ , $C_L=220pF$	-	6	-	
<b>NOISE, THD</b>						
Equivalent Input Noise Voltage	$e_n$	$f=1kHz$	-	48	-	$nV/\sqrt{Hz}$
Total Harmonic Distortion + Noise	THD+N	$G_V=20dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $f=10kHz$ , $V_O=20V_{pp}$	-	0.02	-	%
Channel Separation	CS	$f=1kHz$ , Equivalent Input value	-	120	-	dB

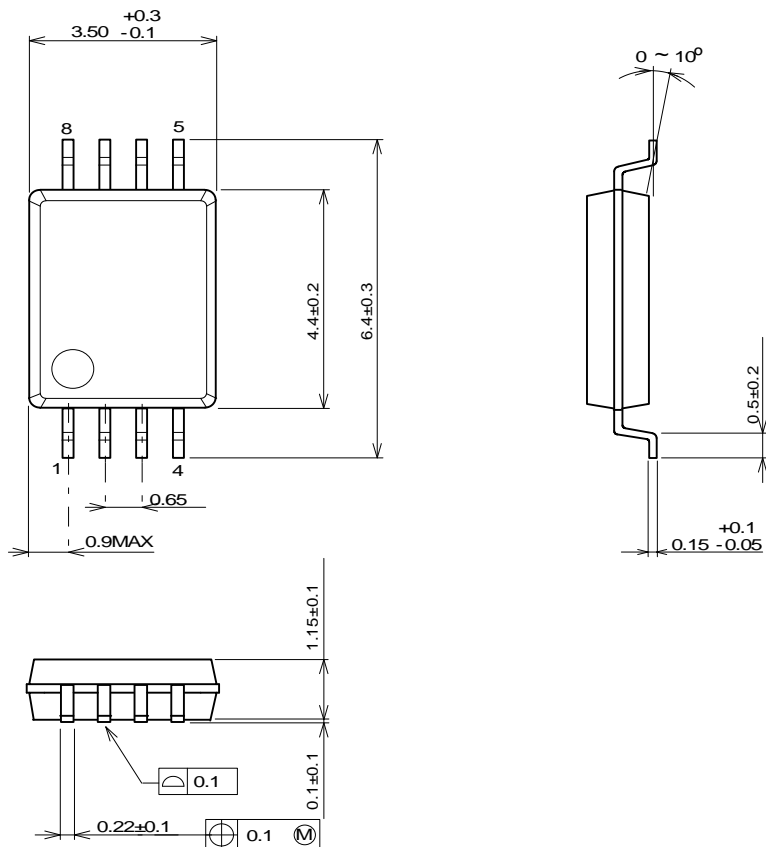
**■ELECTRICAL CHARACTERISTICS** ( $V^+=+5V$ ,  $V^-=0V$ ,  $V_{CM}=2.5V$ ,  $T_a=25^\circ C$  unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>INPUT CHARACTERISTICS</b>						
Input Offset Voltage	$V_{IO}$	$R_S=50\Omega$ , $V_{CM}=0V$ , $V_o=V^+/2$	-	1	5.5	mV
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$	$T_a=-40^\circ C \sim +125^\circ C$	-	10	-	$\mu V/^\circ C$
Input Bias Current	$I_B$	$V_{CM}=V^+/2$ , $V_o=V^+/2$	-	80	150	nA
Input Offset Current	$I_{IO}$	$V_{CM}=V^+/2$ , $V_o=V^+/2$	-	5	75	nA
Open-Loop Voltage Gain	$A_v$	$V_o=1.5V$ to $3.5V$ , $R_L=2k\Omega$ to $V^+/2$	80	95	-	dB
Common Mode Rejection Ratio	CMR	$V_{CM}=0V$ to $3V$	60	90	-	dB
Common Mode Input Voltage Range	$V_{ICM}$	CMR $\geq 60$ dB	$V^-$	-	$V^+-2.0$	V
<b>OUTPUT CHARACTERISTICS</b>						
High-level Output Voltage	$V_{OH}$	$R_L=2k\Omega$ to $0V$	3.7	4	-	V
Low-level Output Voltage	$V_{OL}$	$R_L=2k\Omega$ to $0V$	-	0.1	0.3	V
Output Source Current	$I_{SOURCE}$	$V_o=0V$	10	28	-	mA
Output Sink Current	$I_{SINK}$	$V_o=5V$	20	60	-	mA
<b>POWER SUPPLY</b>						
Supply Current (All amplifier)	$I_{SUPPLY}$	No Signal, $R_L=\infty$	-	3.3	4.5	mA
<b>AC CHARACTERISTICS</b>						
Gain Bandwidth Product	GBW	$R_L=2k\Omega$ to $0V$ , $f=100kHz$	-	3	-	MHz
Unity Gain Frequency	$f_T$	$R_L=2k\Omega$ to $0V$	-	3.2	-	MHz
Slew Rate	SR	$G_v=0dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $V_{in}=+2V$ to $+3V$	5	7	-	V/ $\mu s$
Phase Margin	$\phi_M$	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	64	-	deg
Gain Margin	GM	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	13	-	dB
<b>NOISE, THD</b>						
Equivalent Input Noise Voltage	$e_n$	$f=1kHz$	-	48	-	$nV/\sqrt{Hz}$
Total Harmonic Distortion + Noise	THD+N	$G_v=6dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $f=1kHz$ , $V_o=2V_{pp}$	-	0.01	-	%
Channel Separation	CS	$f=1kHz$ , Equivalent Input value	-	120	-	dB

■ PACKAGE DIMENSIONS

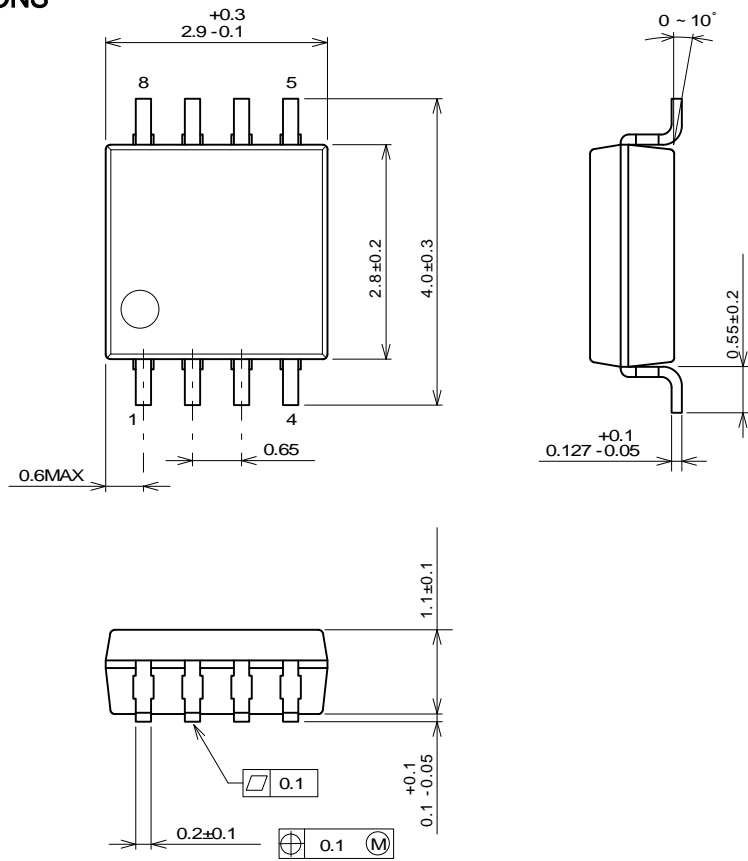


SOP8 Package



SSOP8 Package

■ PACKAGE DIMENSIONS



(Unit: mm)

MSOP8 (TVSP8) JEDEC MO-187-DA / thin type Package

[CAUTION]  
 The specifications on this data book are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this data book are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[NJR:](#)

[NJM3472R-TE1](#) [NJM3472V-TE1](#) [NJM3472G-TE2](#)

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9