

## DUAL HIGH SPEED SINGLE SUPPLY OPERATIONAL AMPLIFIER

### ■FEATURES

- Low Input Offset Voltage                    3.5mV max.
- Low Input Offset Voltage Drift            3.5 $\mu$ V/ $^{\circ}$ C
- High Slew Rate                                8.5V/ $\mu$ s
- High Unity Gain Frequency                3.5MHz
- Single Supply                                 3V~36V
- Operating Temperature Range            -40 $^{\circ}$ C~+125 $^{\circ}$ C
- Low input voltage around GND level
- Unity-Gain Stable ( $C_L=1000$ pF)
- Operating Current (All amplifiers)      4.3mA
- No Phase Reversal
- High EMI Immunity
- Output Short-Circuit Protection
- Package

NJM842                                SOP8, SSOP8, VSP8

### ■GENERAL DESCRIPTION

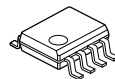
The NJM842 is a high slew rate, single supply Dual operational amplifier.

The NJM842 is suitable for active filter, buffer, and current control/detect circuits of inverter and motor driver.

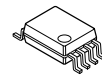
### ■APPLICATIONS

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

### ■PACKAGE OUTLINE



**NJM842G**  
(SOP8)

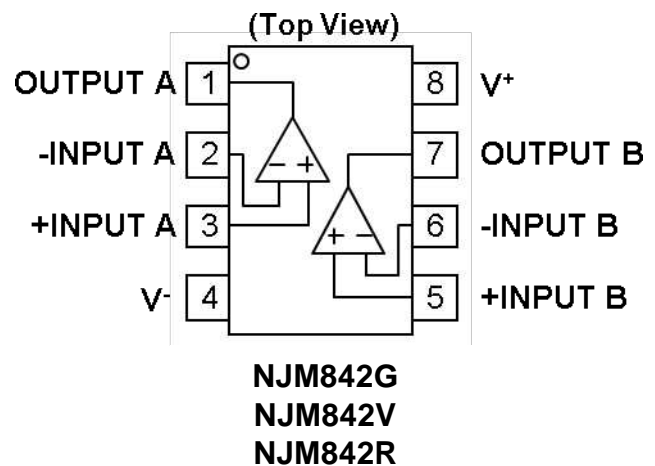


**NJ842V**  
(SSOP8)



**NJM842R**  
(VSP8)

### ■PIN CONFIGURATION



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

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V^+ - V^-$	38 <sup>(5)</sup>	V
Differential Input Voltage <sup>(1)</sup>	$V_{ID}$	$\pm 36$ <sup>(2)</sup>	V
Input Voltage <sup>(2)</sup>	$V_{IN}$	$V^- - 0.3$ to $V^+ + 36$	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  $T_a=25^\circ\text{C}$ , and is the typical measured value based on JEDEC condition. When using the IC over  $T_a=25^\circ\text{C}$  subtract the value  $[\text{mW}/^\circ\text{C}] = P_D / (T_{stg}(\text{MAX}) - 25)$  per temperature.

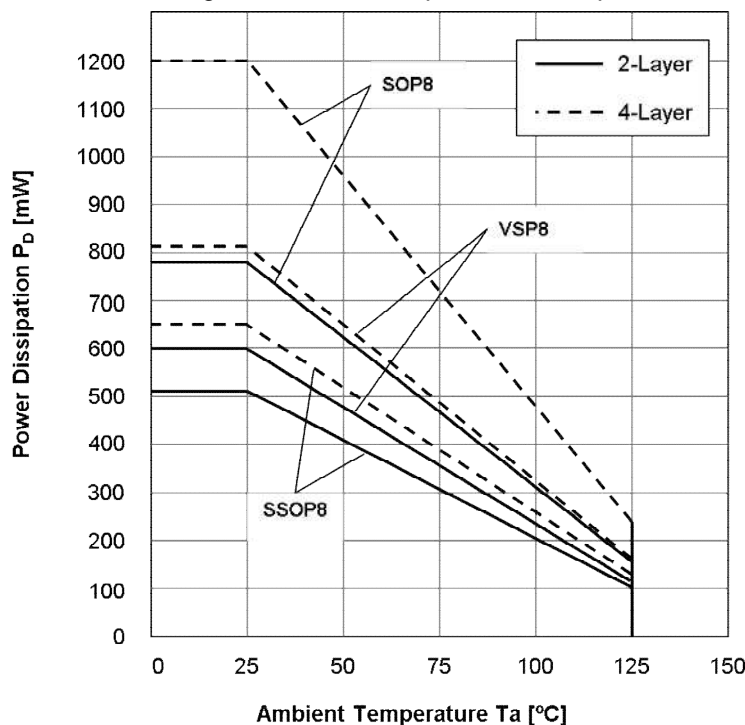
2-layer: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layers, FR-4) mounting

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 ( $\pm 1.5$ to $\pm 18$ )	V

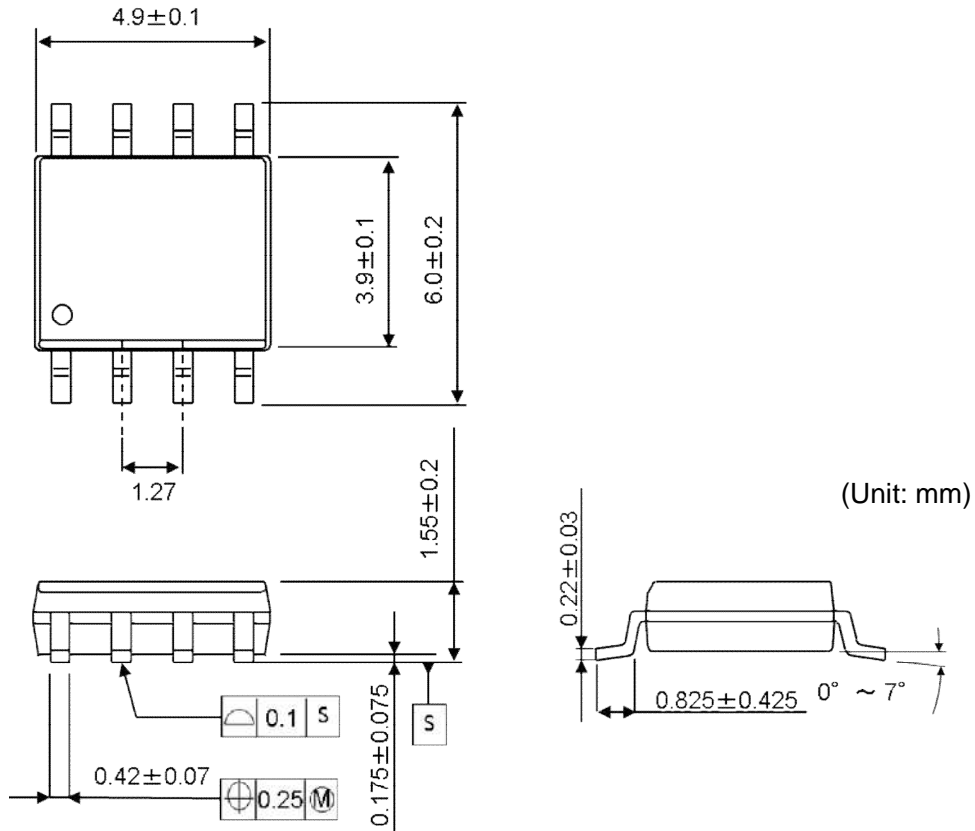
**■ELECTRICAL CHARACTERISTICS** ( $V^+=+15V$ ,  $V^-=-15V$ ,  $V_{CM}=0V$ ,  $T_a=25^\circ C$  unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>INPUT CHARACTERISTICS</b>						
Input Offset Voltage	$V_{IO}$	$R_S=50\Omega$ , $V_{CM}=0V$	-	0.8	3.5	mV
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$	$T_a=-40^\circ C \sim +125^\circ C$	-	3.5	-	$\mu V/^\circ C$
Input Bias Current	$I_B$		-	120	500	nA
Input Offset Current	$I_{IO}$		-	6	75	nA
Open-Loop Voltage Gain	$A_V$	$V_O=\pm 10V$ , $R_L=2k\Omega$ to $0V$	88	110	-	dB
Common Mode Rejection Ratio	CMR	$V_{ICM}=-15V$ to $13.2V$	70	86	-	dB
Common Mode Input Voltage Range	$V_{ICM}$	CMR $\geq 70$ dB	$V^-$	-	$V^+-1.8$	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	14	-	
Low-level Output Voltage	$V_{OL}$	$R_L=10k\Omega$ to $0V$	-	-14.3	-13.7	V
		$R_L=2k\Omega$ to $0V$	-	-13.8	-13.5	
Output Source Current	$I_{SOURCE}$	$V_O=0V$ , +Input= $+1V$ , -Input= $0V$	10	40	-	mA
Output Sink Current	$I_{SINK}$	$V_O=0V$ , +Input= $0V$ , -Input= $+1V$	10	45	-	mA
<b>POWER SUPPLY</b>						
Supply Current (All amplifiers)	$I_{SUPPLY}$	No Signal, $R_L=\infty$	-	4.3	5.5	mA
Supply Voltage Rejection Ratio	SVR	$V^+/V^-=\pm 1.5V$ to $\pm 18V$ , $V_{ICM}=0V$	70	93	-	dB
<b>AC CHARACTERISTICS</b>						
Gain Bandwidth Product	GBW	$R_L=2k\Omega$ to $0V$ , $f=100kHz$	-	3.5	-	MHz
Slew Rate	SR	$G_V=0dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $V_{in}=-10V$ to $+10V$	-	8.5	-	V/ $\mu s$
Phase Margin	$\phi_M$	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	90	-	deg
		$R_L=2k\Omega$ to $0V$ , $C_L=330pF$	-	70	-	
Gain Margin	GM	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	9	-	dB
		$R_L=2k\Omega$ to $0V$ , $C_L=330pF$	-	8	-	
<b>NOISE, THD</b>						
Equivalent Input Noise Voltage	$e_n$	$f=1kHz$	-	32	-	$nV/\sqrt{Hz}$
Total Harmonic Distortion + Noise	THD+N	$G_V=20dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $f=1kHz$ , $V_O=15V_{PP}$	-	0.003	-	%
Channel Separation	CS	$f=10kHz$ , Equivalent Input value	-	120	-	dB

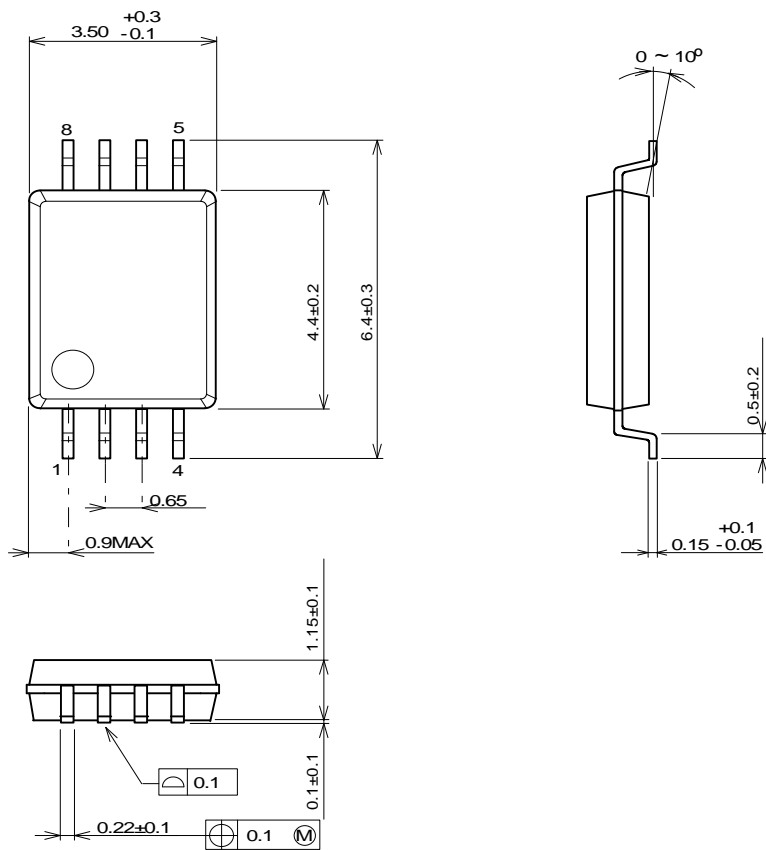
**■ ELECTRICAL CHARACTERISTICS** ( $V^+=+5V$ ,  $V^-=0V$ ,  $V_{CM}=2.5V$ ,  $T_a=25^\circ C$  unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>INPUT CHARACTERISTICS</b>						
Input Offset Voltage	$V_{IO}$	$R_S=50\Omega$ , $V_{CM}=V^+/2$ , $V_O=V^+/2$	-	0.5	3.5	mV
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$	$T_a=-40^\circ C \sim +125^\circ C$	-	2.5	-	$\mu V/^\circ C$
Input Bias Current	$I_B$	$V_{CM}=V^+/2$ , $V_O=V^+/2$	-	140	500	nA
Input Offset Current	$I_{IO}$	$V_{CM}=V^+/2$ , $V_O=V^+/2$	-	6	75	nA
Open-Loop Voltage Gain	$A_v$	$V_O=1.5V$ to $3.5V$ , $R_L=2k\Omega$ to $0V$	88	110	-	dB
Common Mode Rejection Ratio	CMR	$V_{CM}=0V$ to $3.2V$	70	80	-	dB
Common Mode Input Voltage Range	$V_{ICM}$	CMR $\geq 70$ dB	$V^-$	-	$V^+-1.8$	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	0	V
Output Source Current	$I_{SOURCE}$	$V_O=0V$ , +Input= $+1V$ , -Input= $0V$	10	30	-	mA
Output Sink Current	$I_{SINK}$	$V_O=5V$ , +Input= $0V$ , -Input= $+1V$	10	30	-	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 $0V$ , $f=100kHz$	-	3.5	-	MHz
Slew Rate	SR	$G_v=0dB$ , $R_L=2k\Omega$ to $0V$ , $C_L=20pF$ , $V_{in}=+0.5V$ to $+3V$	-	7	-	V/ $\mu s$
Phase Margin	$\phi_M$	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	80	-	deg
		$R_L=2k\Omega$ to $0V$ , $C_L=330pF$	-	55	-	
Gain Margin	GM	$R_L=2k\Omega$ to $0V$ , $C_L=20pF$	-	9	-	dB
		$R_L=2k\Omega$ to $0V$ , $C_L=330pF$	-	7	-	
<b>NOISE, THD</b>						
Equivalent Input Noise Voltage	$e_n$	$f=1kHz$	-	30	-	nV/ $\sqrt{Hz}$

■ PACKAGE DIMENSIONS

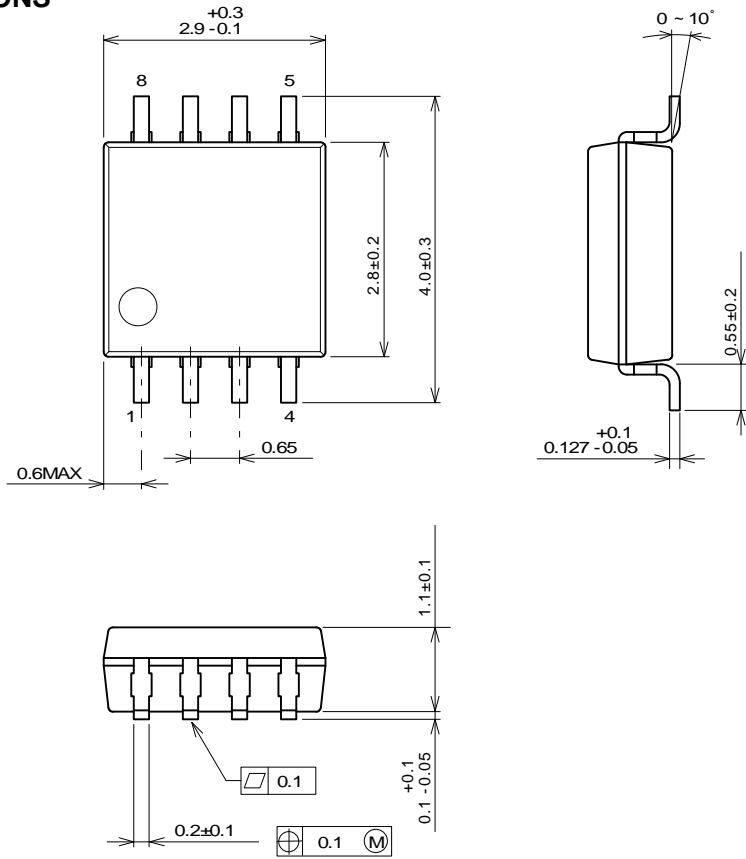


SOP8 Package



SSOP8 Package

## ■ PACKAGE DIMENSIONS



(Unit: mm)

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

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