

## HIGH SPEED SINGLE SUPPLY OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The **NJM2742** is a high speed single supply operational amplifier. The low  $V_{OL}$  enables to treat small output signal on a single supply.

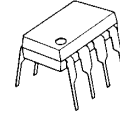
It has wide supply voltage range, +3 to +32 volt and high slew rate.

The **NJM2742** is suitable for power supply and motor driver units.

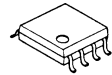
### ■ FEATURES

- Single Supply
- Operating Voltage (3 to 32V)
- Low Saturation Output Voltage ( $V_{OL} = 0.2V$  typ. at  $R_L = 2k\Omega, V^+ = 5V$ )
- High Slew Rate (10V/ $\mu s$  typ.)
- Bipolar Technology
- Package Outline DIP8, DMP8, SSOP8, TVSP8

### ■ PACKAGR OUTLINE



**NJM2742D**



**NJM2742M**

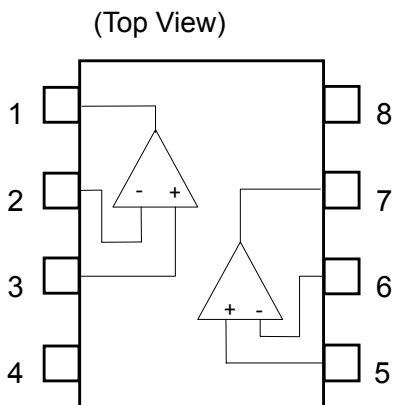


**NJM2742V**



**NJM2742RB1**

### ■ PIN CONFIGURATION



### PIN FUNCTION

- 1.A OUTPUT
- 2.A -INPUT1
- 3.A +INPUT1
- 4.V<sup>-</sup>
- 5.B +INPUT2
- 6.B -INPUT2
- 7.B OUTPUT2
- 8.V<sup>+</sup>

# NJM2742

## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	+36	V
Differential Input Voltage	V <sub>ID</sub>	±36	V
Common Mode Input Voltage	V <sub>IC</sub>	-0.3 to +36	V
Power Dissipation	P <sub>D</sub>	500 (DIP8) 300 (DMP8) 250 (SSOP8) 320 (TVSP8)	mW
Operating Temperature Range	Topr	-40 to +85	°C
Storage Temperature Range	Tstg	-40 to +150	°C

## ■ RECOMMENDED OPERATING CONDITION (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Voltage Range	V <sup>+</sup>		3.0	-	32	V

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

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Current	I <sub>CC</sub>	No Signal	-	4.3	5.5	mA
Input Offset Voltage	V <sub>IO</sub>		-	1.0	12	mV
Input Bias Current	I <sub>B</sub>		-	80	400	nA
Input Offset Current	I <sub>IO</sub>		-	5	75	nA
Open Loop Voltage Gain	A <sub>v</sub>	R <sub>L</sub> >2kΩ	80	110	-	dB
Common Mode Rejection	CMR	-15V < V <sub>IC</sub> < 12.5V	55	75	-	dB
Supply Voltage Rejection	SVR	3V < V <sup>+</sup> < 32V	70	90	-	dB
Maximum Output Voltage 1	V <sub>OM1</sub>	R <sub>L</sub> >10kΩ	+13.7 /-13.7	+14 /-14.8	-	V
Maximum Output Voltage 2	V <sub>OM2</sub>	R <sub>L</sub> >2kΩ	+13.5 /-13.5	-	-	V
Source Output Current	I <sub>SOURCE</sub>	V <sub>IN+</sub> =1V, V <sub>IN-</sub> =0V, V <sub>O</sub> =0V	10	30	-	mA
Sink Output Current	I <sub>SINK</sub>	V <sub>IN+</sub> =0V, V <sub>IN-</sub> =1V, V <sub>O</sub> =0V	10	30	-	mA
Input Common Mode Voltage Range	V <sub>ICM</sub>	CMR > 55dB	-15	-	12.5	V

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

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Gain Bandwidth product	GB	f=10kHz	-	2	-	MHz
Equivalent Input Noise Voltage	V <sub>NI</sub>	f=1kHz	-	40	-	nV/ √Hz
Capacitive Load Tolerance	CL		-	1000	-	pF

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

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Slew Rate	SR		-	10	-	V/μs

## ■ DC CHARACTERISTICS

(  $V^+=+5V$ ,  $T_a=25^\circ C$  )

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Current	$I_{CC}$	No Signal	-	3.3	4.5	mA
Input Offset Voltage	$V_{IO}$		-	1.0	12	mV
Input Bias Current	$I_B$		-	80	400	nA
Input Offset Current	$I_{IO}$		-	5	75	nA
Open Loop Voltage Gain	$A_v$	$R_L > 2k\Omega$	80	110	-	dB
Common Mode Rejection	CMR	$0V < V_{IC} < 2.8V$	50	60	-	dB
Supply Voltage Rejection	SVR	$3V < V^+ < 32V$	70	90	-	dB
Maximum Output Voltage	$V_{OH}$	$R_L = 2k\Omega$	3.7	4.0	-	V
	$V_{OL}$	$R_L = 2k\Omega$	-	0.1	0.2	
Source Output Current	$I_{SOURCE}$	$V_{IN+} = 1V, V_{IN-} = 0V, V_O = 2.5V$	10	30	-	mA
Sink Output Current	$I_{SINK}$	$V_{IN+} = 0V, V_{IN-} = 1V, V_O = 2.5V$	10	30	-	mA
Input Common Mode Voltage Range	$V_{ICM}$	CMR > 50dB	0	-	2.8	V

## ■ AC CHARACTERISTICS

(  $V^+=+5V$ ,  $T_a=25^\circ C$  )

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Gain Bandwidth product	GB	$f = 10kHz$	-	2	-	MHz
Equivalent Input Noise Voltage	$V_{NI}$	$f = 1kHz$	-	40	-	nV/ $\sqrt{Hz}$
Capacitive Load Tolerance	CL		-	1000	-	pF

## ■ TRANSIENT CHARACTERISTICS

(  $V^+=+5V$ ,  $T_a=25^\circ C$  )

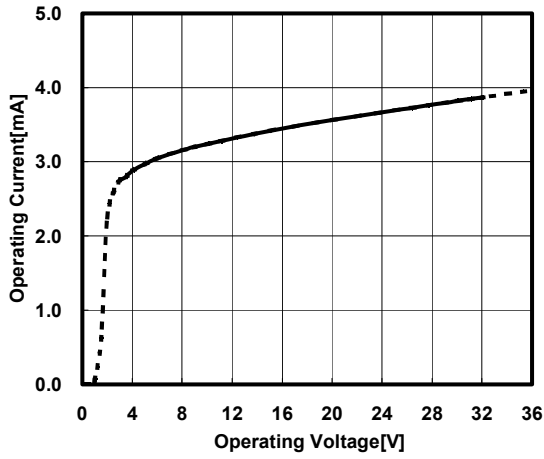
PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Slew Rate	SR		-	7	-	V/ $\mu s$

Note: The common mode input voltage range of NJM2742 is shifted toward the V- for single supply use. At the low operating voltage, the center potential of the V+ and V- may be out of the common mode voltage range. In this case, shift the common mode input voltage toward the V-.

## ■ TYPICAL CHARACTERISTICS

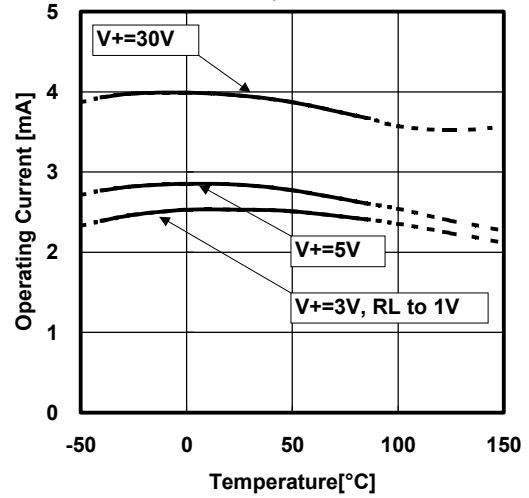
Operating Current vs. Operating Voltage

$V_{in}=0V, T_a=25^\circ C$



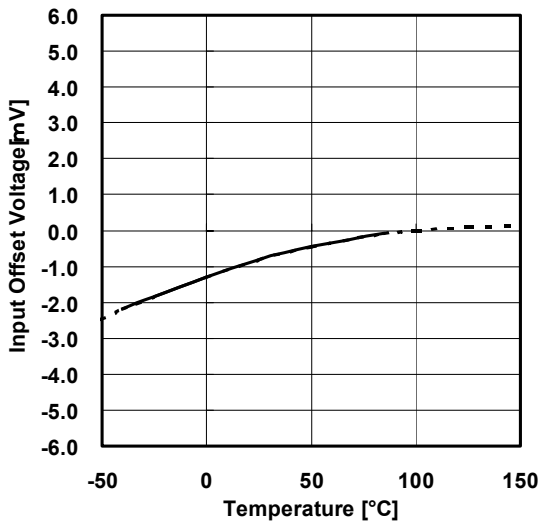
Operating Current vs. Temperature

$V_{in}=0V$



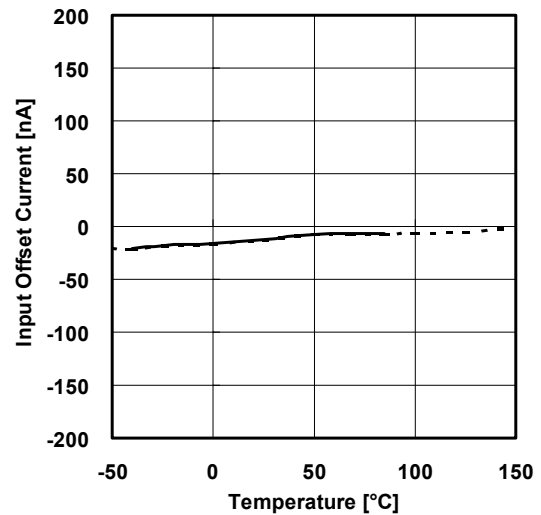
Input Offset Voltage vs. Temperature

$V+=5V$



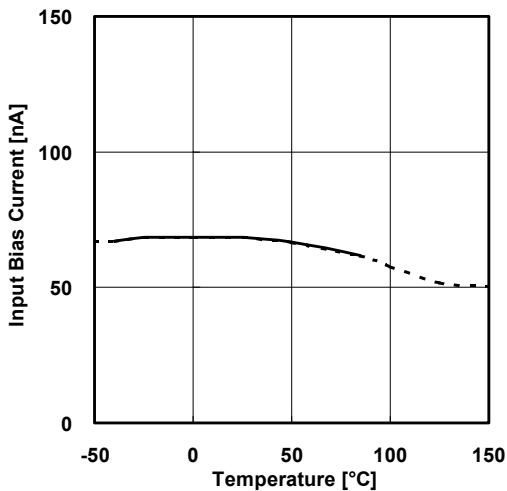
Input Offset Current vs. Temperature

$V+=5V$



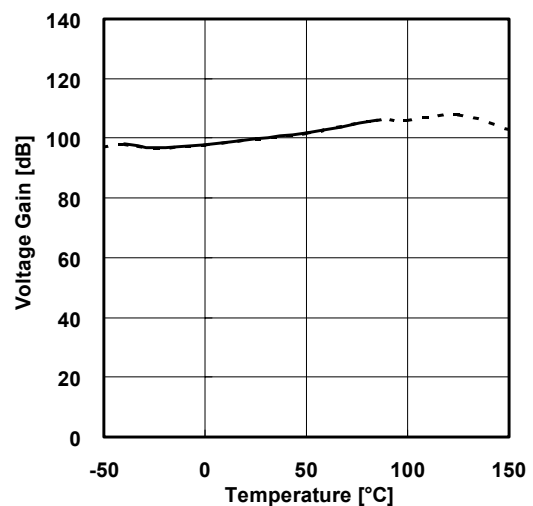
Input Bias Current vs. Temperature

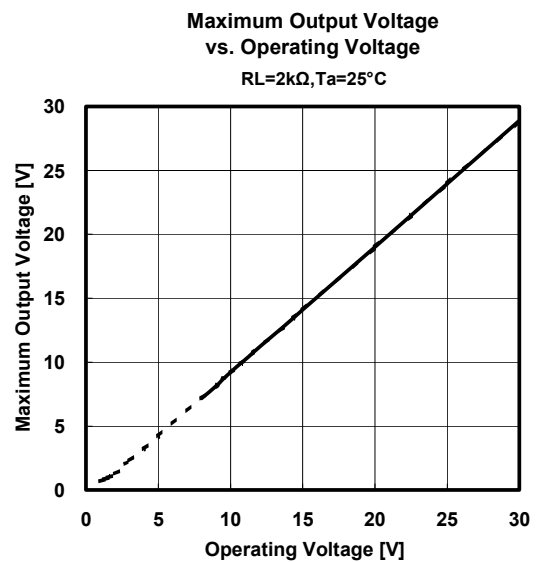
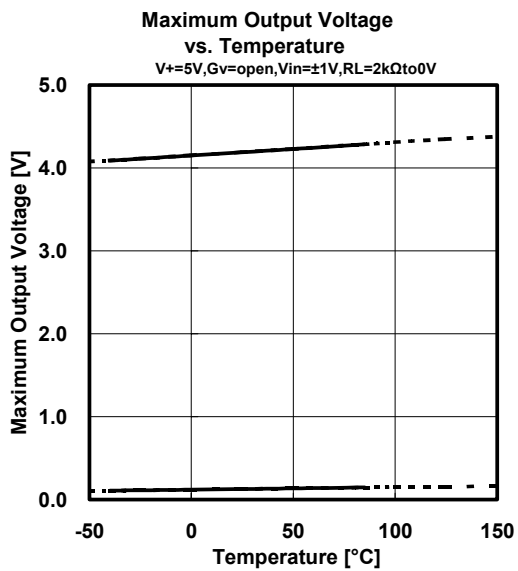
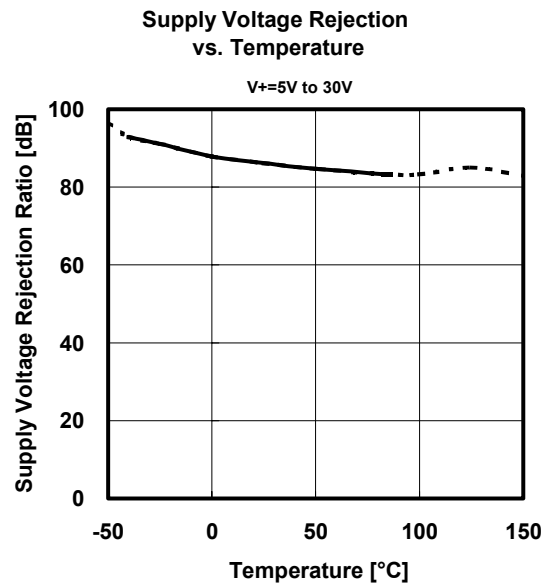
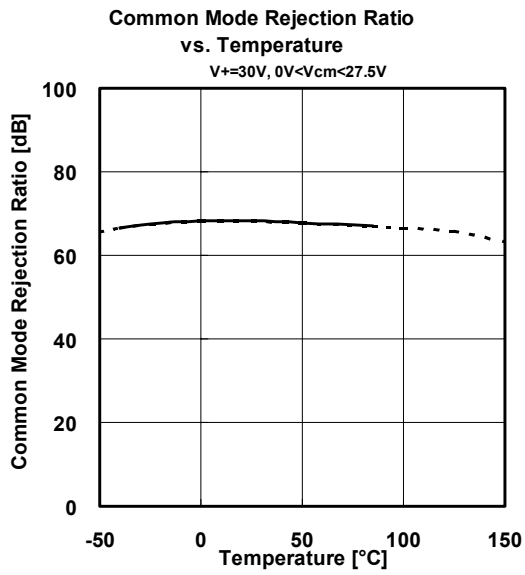
$V+=5V$



Voltage Gain vs. Temperature

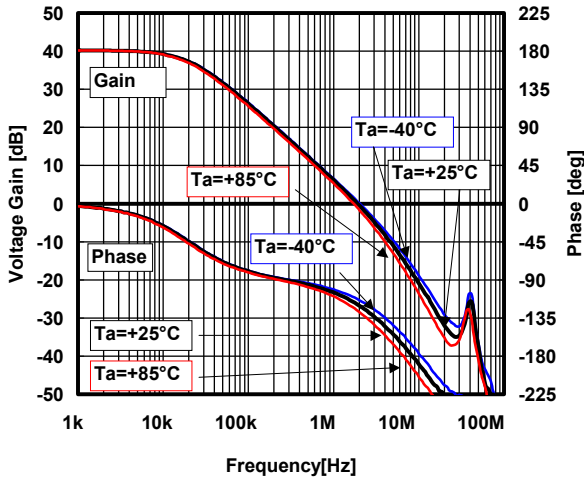
$V+=5V$





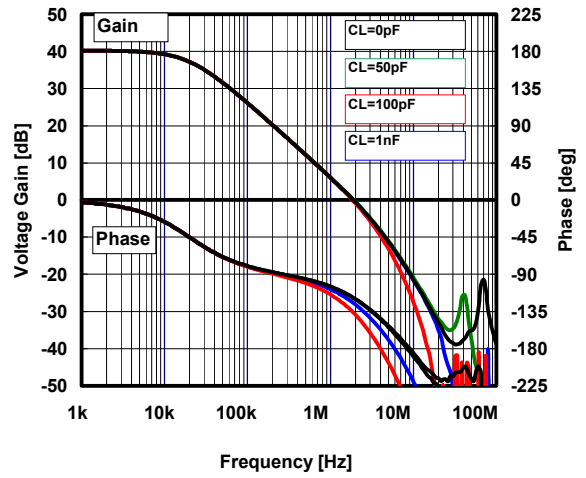
## Voltage Gain & Phase vs. Frequency

V+=5V, VIN=0.02Vpp, GV=40dB, RT=50Ω, RF=1.98kΩ, RG=20Ω, CF=0, RL=2kΩ, CL=50pF



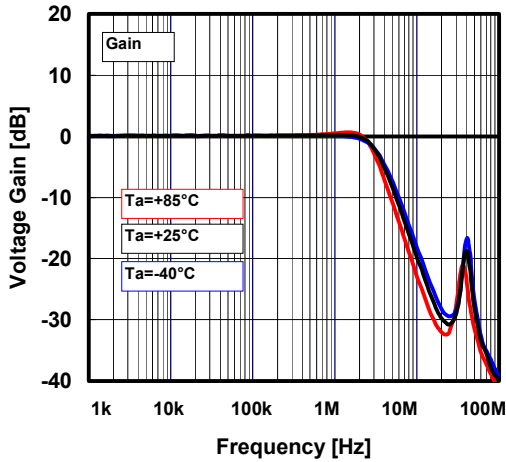
## Voltage Gain & Phase vs. Frequency

V+=5V, VIN=0.01Vpp, GV=40dB, RT=50Ω, RF=1.98kΩ, RG=20Ω, RL=10kΩ, Ta=+25°C



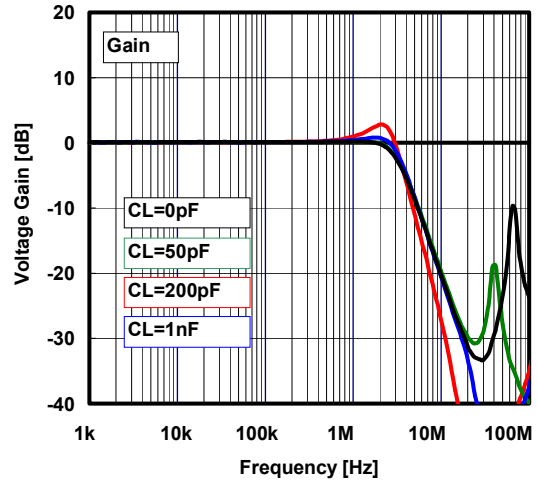
## Peak Gain of Voltage Follower

V+=5V, VIN=0.02Vpp, GV=0dB, RT=50Ω, RF=0Ω, RG=open, CL=50pF, RL=1kΩ



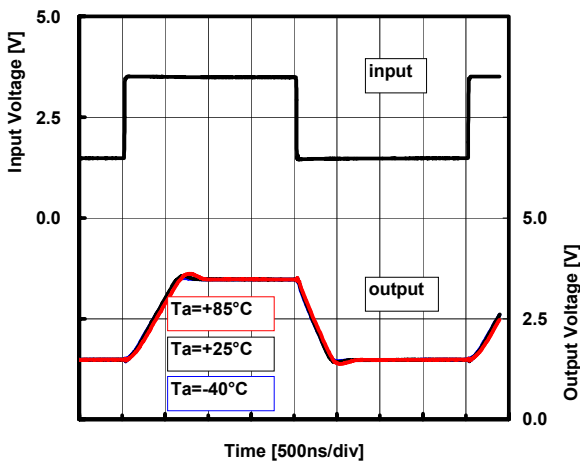
## Peak Gain of Voltage Follower

V+=5V, VIN=0.02Vpp, GV=0dB, RT=50Ω, RF=0Ω, RG=open, RL=1kΩ, Ta=+25°C



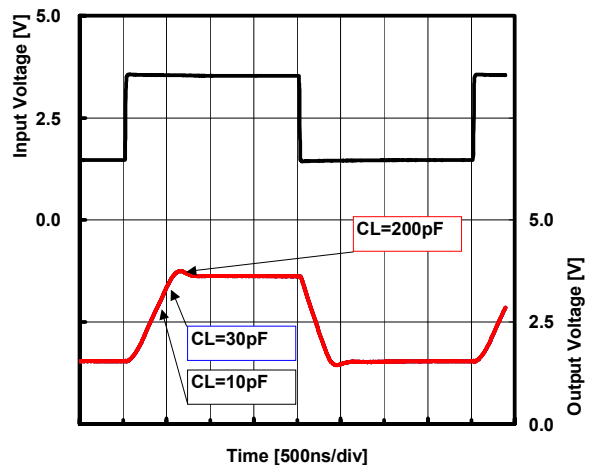
## Pulse Response

V+=5V, f=250kHz, VO=4VPP, GV=0dB, RT=50Ω, RF=0Ω, CL=10pF, RG=open, RL=10kΩ, Ta=25°C

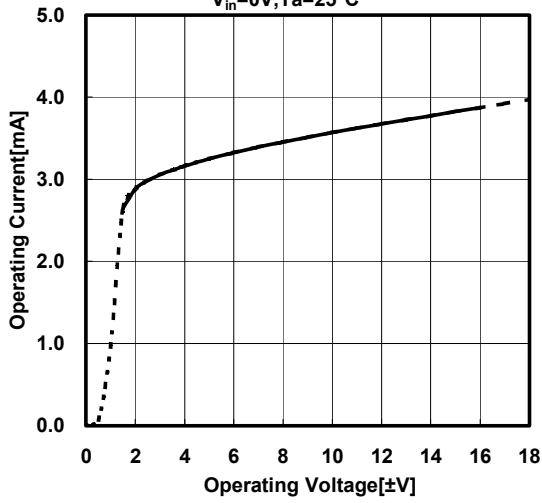


## Pulse Response

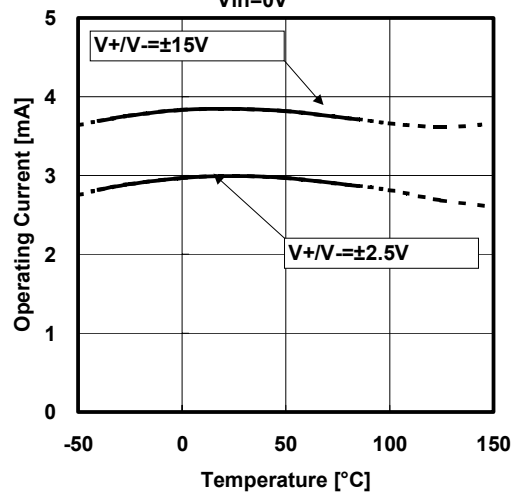
V+=5V, f=250kHz, VO=4VPP, GV=0dB, RT=50Ω, RF=0Ω, CF=0, RG=open, RL=2kΩ, Ta=25°C



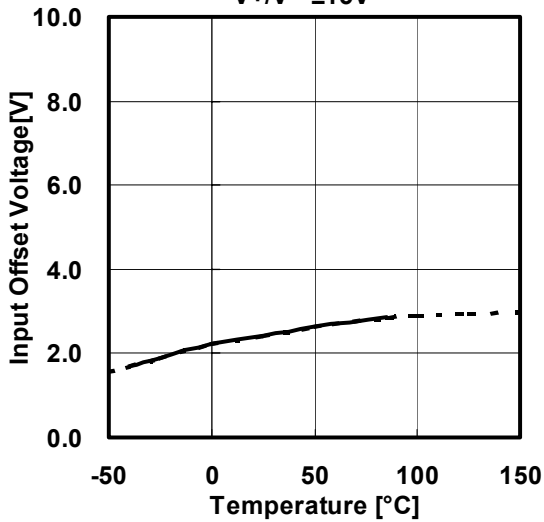
**Operating Current vs. Operating Voltage**  
 $V_{in}=0V, T_a=25^{\circ}C$



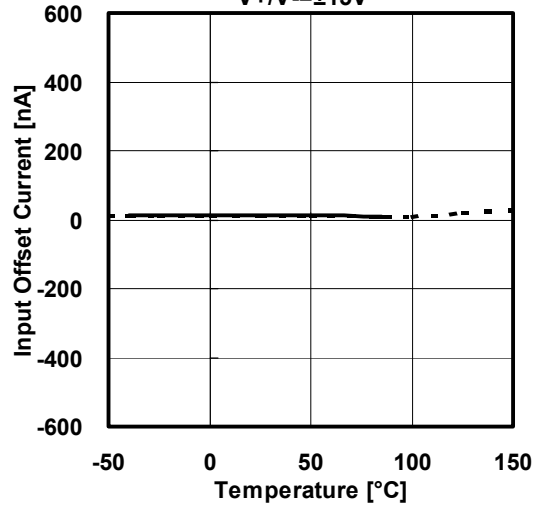
**Operating Current vs. Temperature**  
 $V_{in}=0V$



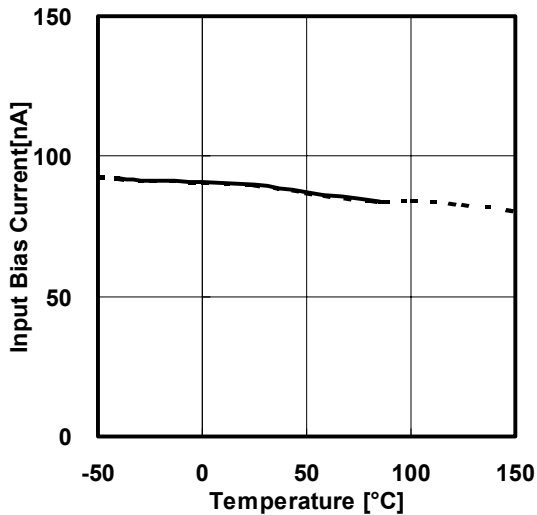
**Input Offset Voltage vs. Temperature**  
 $V+/V- = \pm 15V$



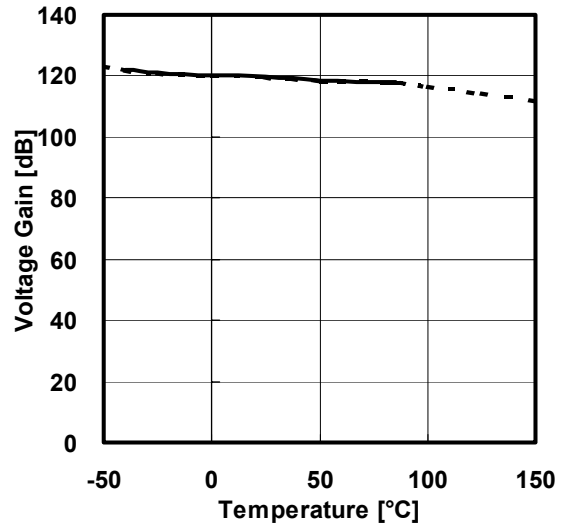
**Input Offset Current vs. Temperature**  
 $V+/V- = \pm 15V$



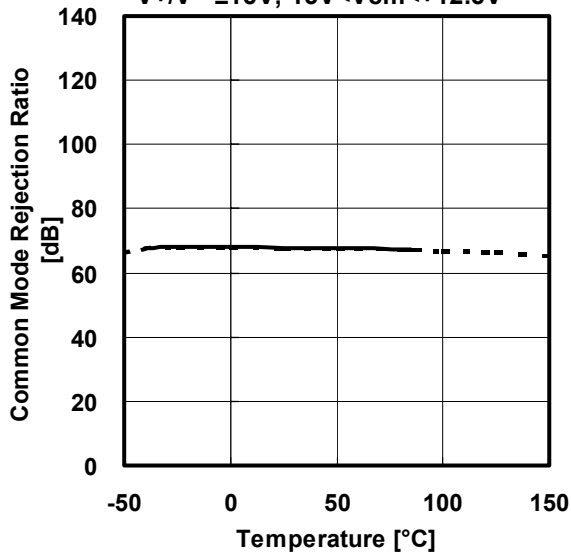
**Input Bias Current vs. Temperature**  
 $V+/V- = \pm 15V$



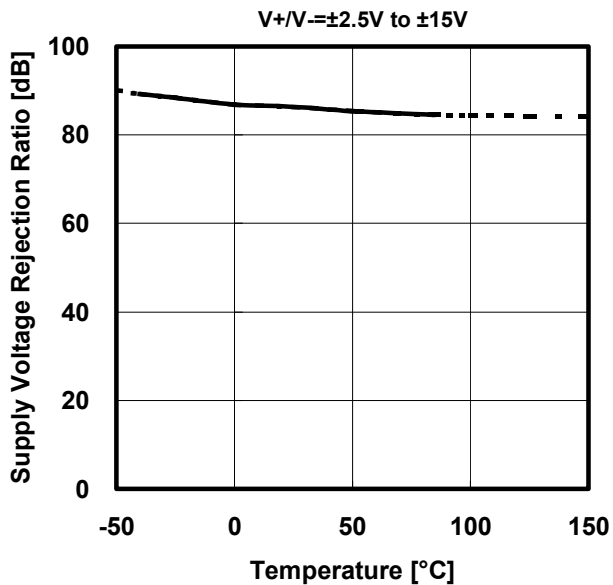
**Voltage Gain vs. Temperature**  
 $V+/V- = \pm 15V, R_L = 2k\Omega$



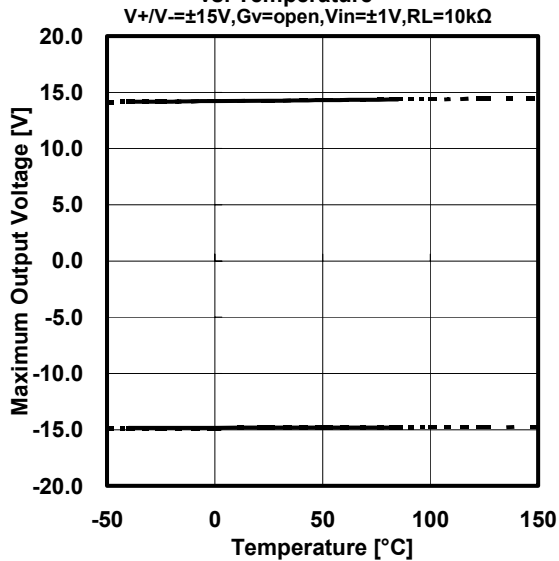
**Common Mode Rejection Ratio vs. Temperature**  
 $V_+/V_- = \pm 15V, -15V < V_{cm} < +12.5V$



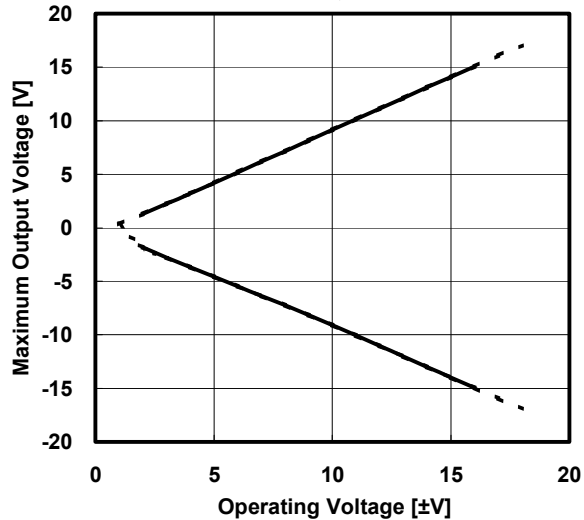
**Supply Voltage Rejection Ratio vs. Temperature**



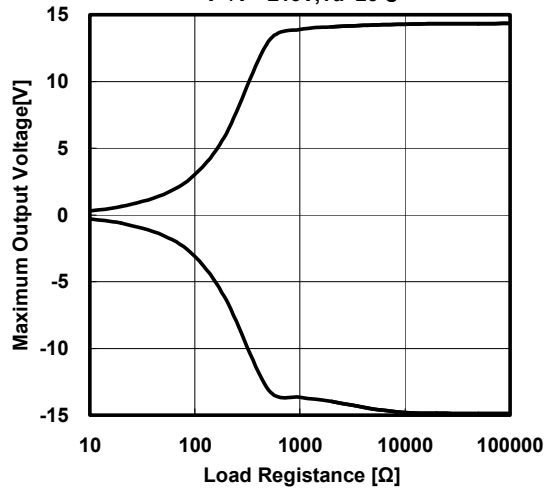
**Maximum Output Voltage vs. Temperature**



**Maximum Output Voltage vs. Operating Voltage**



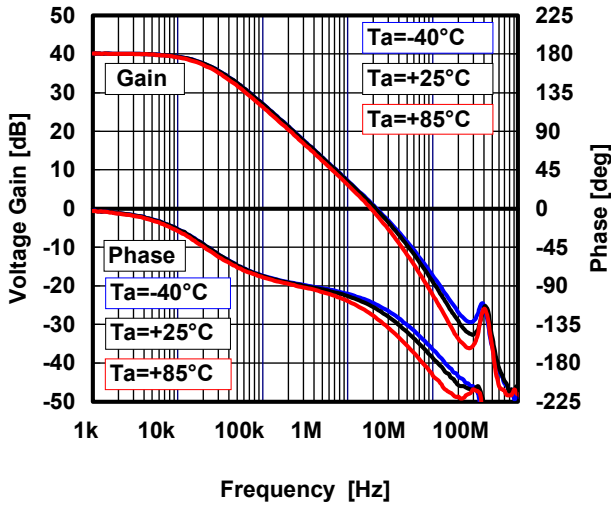
**Maximum Output Voltage vs. Operating Current**





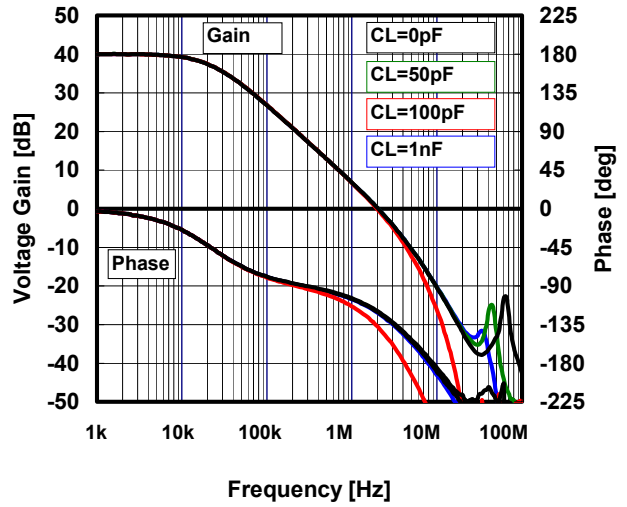
**Voltage Gain & Phase vs. Frequency**

V+/V- = ±15V, VIN = 0.02Vpp, GV = 40dB, RT = 50Ω, RF = 1.98kΩ, RG = 20Ω, CF = 0, RL = 2kΩ, CL = 50pF



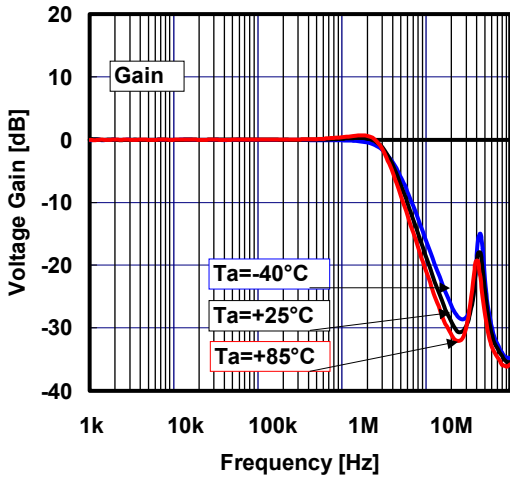
**Voltage Gain & Phase vs. Frequency**

V+/V- = ±15V, VIN = 0.01Vpp, GV = 40dB, RT = 50Ω, RF = 1.98kΩ, RG = 20Ω, RL = 10kΩ, Ta = +25°C



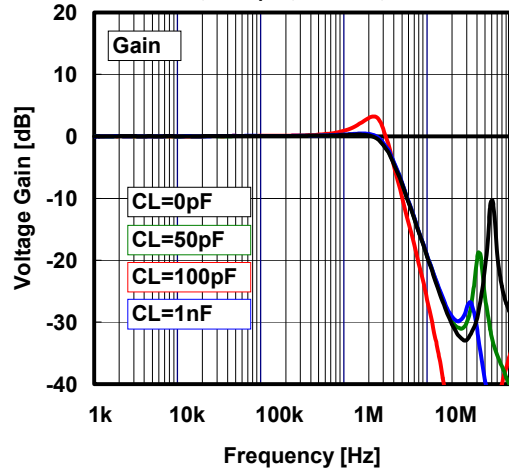
**Peak Gain of Voltage Follower**

V+/V- = ±15V, VIN = 0.02Vpp, GV = 0dB, RT = 50Ω, RF = 0Ω, RG = open, CF = 0, RL = 2kΩ, CL = 50pF



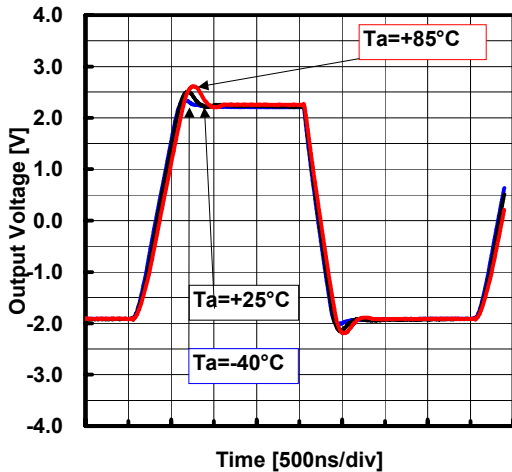
**Peak Gain of Voltage Follower**

V+/V- = ±15V, VIN = 0.02Vpp, GV = 0dB, RT = 50Ω, RF = 0Ω, RG = open, RL = 10kΩ, Ta = +25°C



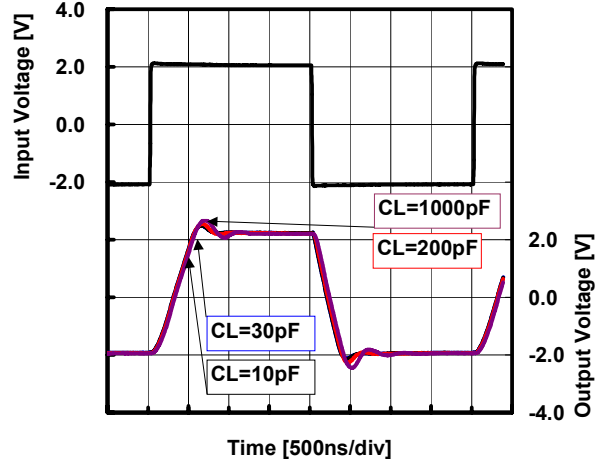
**Pulse Response**

V+/V- = ±15V, f = 250kHz, VO = 4VPP, GV = 0dB, RT = 50Ω, RF = 0Ω, CF = 0, RG = open, CL = 50pF, RL = 10kΩ



**Pulse Response**

V+/V- = ±15V, f = 250kHz, VO = 4VPP, GV = 0dB, RT = 50Ω, RF = 0Ω, CF = 0, RG = open, RL = 10kΩ, Ta = 25°C



**[CAUTION]**

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