

## Input/Output Full-Swing High Output Current Dual C-MOS Operational Amplifier

### ■GENERAL DESCRIPTION

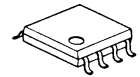
The NJU7043 is a dual C-MOS operational amplifier permitting a full-swing input and output in under high load.

Based on C-MOS technology, there are excellent features such as high output current, low current consumption, and low operating voltage.

### ■PACKAGE OUTLINE



NJU7043D



NJU7043M



NJU7043V



NJU7043RB1

### ■FEATURES

- Operating Voltage
- Input/Output Full-Swing
- High Output Current

$V_{DD}=1.8$  to  $5.0V$

- Input Offset Voltage
- Wide Input Common Mode Voltage Range
- Operating Current
- High Input Impedance
- Low Input Bias Current
- Ground Sensing
- Package

$I_{source}>40mA$  typ.

$I_{sink}<-40mA$  typ.

$V_{IO}=10mV$  max.

$V_{SS}$  to  $V_{DD}$

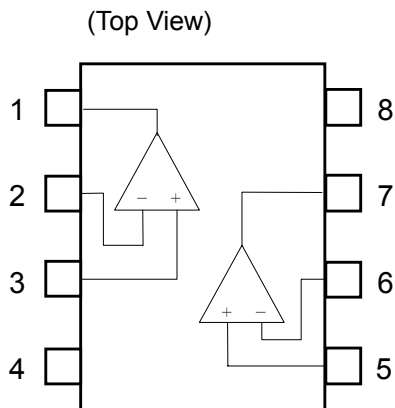
$I_{DD}=300\mu A$  typ. (per Amplifier)

$1T\Omega$  typ.

$I_B=1pA$  typ.

DIP8, DMP8, SSOP8, TVSP8

### ■PIN CONFIGURATION



### PIN FUNCTION

- 1.OUTPUT1
- 2.-INPUT1
- 3.+INPUT1
4. $V_{SS}$
- 5.+INPUT2
- 6.-INPUT2
- 7.OUTPUT2
8. $V_{DD}$

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>DD</sub>	5.5	V
Power Dissipation	P <sub>D</sub>	500 (DIP8) 250 (SSOP8) 300 (DMP8) 320 (TVSP8)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-55 ~ +125	°C

(note1) When supply voltage is less than 5.5.V, the absolute maximum input voltage is equal to the voltage.

(note2) Decoupling capacitor should be connected between V<sub>DD</sub> and V<sub>SS</sub> due to the stabilized operation for the circuit.

## ■ RECOMMENDED OPERATION CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>DD</sub>	1.8 ~ 5.0	V

## ■ ELECTRICAL CHARACTERISTICS

### ● DC CHARACTERISTICS

(V<sub>DD</sub>=3.0V, Ta=25°C)

PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Operating Current	I <sub>DD</sub>	No Signal, Dual Circuits	-	600	1,000	μA
Input Offset Voltage	V <sub>IO</sub>		-	-	10	mV
Input Bias Current	I <sub>B</sub>		-	1	-	pA
Input Offset Current	I <sub>IO</sub>		-	1	-	pA
Voltage Gain	A <sub>V</sub>	R <sub>L</sub> =10kΩ	70	90	-	dB
Common Mode Rejection Ratio	CMR	0 ≤ V <sub>CM</sub> ≤ 1.5V, 1.5 ≤ V <sub>CM</sub> ≤ 3.0V (note3)	42	60	-	dB
Supply Voltage Rejection Ratio	SVR	2.0V ≤ V <sub>DD</sub> ≤ 5.0V, V <sub>CM</sub> =V <sub>DD</sub> /2	61	80	-	dB
H Level Output Voltage 1	V <sub>OH1</sub>	R <sub>L</sub> =10kΩ	2.95	-	-	V
L Level Output Voltage 1	V <sub>OL1</sub>	R <sub>L</sub> =10kΩ	-	-	0.05	V
H Level Output Voltage 2	V <sub>OH2</sub>	R <sub>L</sub> =600Ω	2.90	-	-	V
L Level Output Voltage 2	V <sub>OL2</sub>	R <sub>L</sub> =600Ω	-	-	0.10	V
Input Common Mode Voltage Range	V <sub>ICM</sub>	CMR>45dB	0	-	3	V

(note3) CMR is represented by either CMR+ or CMR- which has lower value.

CMR+ is measured with 1.5V ≤ V<sub>CM</sub> ≤ 3V and CMR- is measured with 0V ≤ V<sub>CM</sub> ≤ 1.5V.

### ● AC CHARACTERISTICS

(V<sub>DD</sub>=3.0V, Ta=25°C)

PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Unity Gain Bandwidth	GB	R <sub>L</sub> =10kΩ	-	0.8	-	MHz
Total Harmonic Distortion	THD	f=1kHz, Vin=1Vpp, Av=0dB	-	0.05	-	%
Equivalent Input Noise Voltage	e <sub>n</sub>	f=1kHz	-	40	-	nV/ √Hz

### ● TRANSIENT CHARACTERISTICS

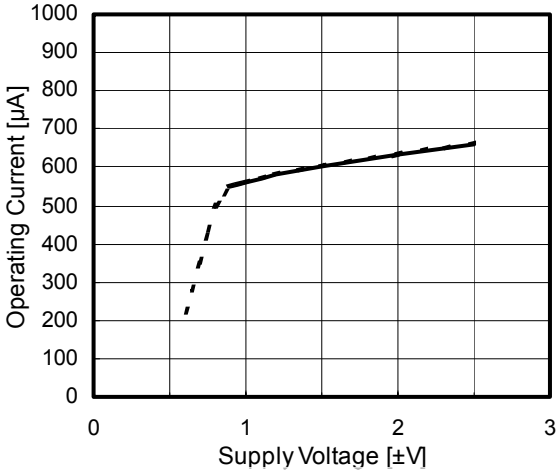
(V<sub>DD</sub>=3.0V, Ta=25°C)

PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Slew Rate	SR	R <sub>L</sub> =10kΩ	-	0.7	-	V/μs

■ TYPICAL CHARACTERISTICS

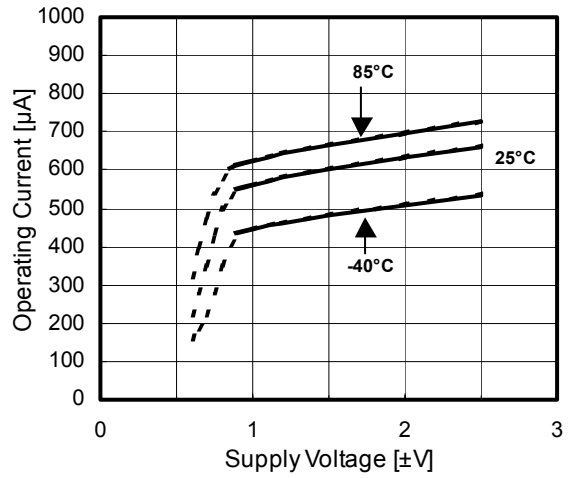
Operating Current vs. Supply Voltage

$G_v=0\text{dB}, T_a=25^\circ\text{C}$



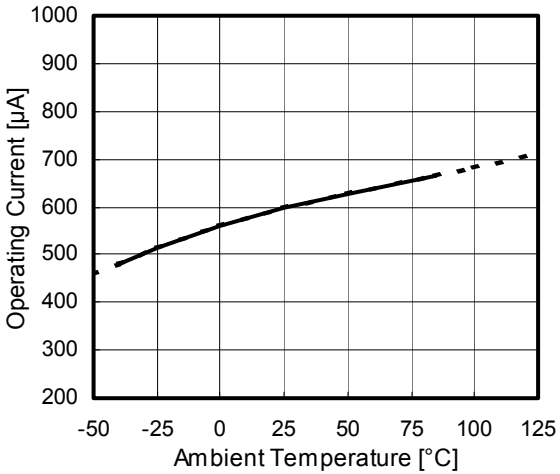
Operating Current vs. Supply Voltage (TEMP.)

$G_v = 0\text{dB}$



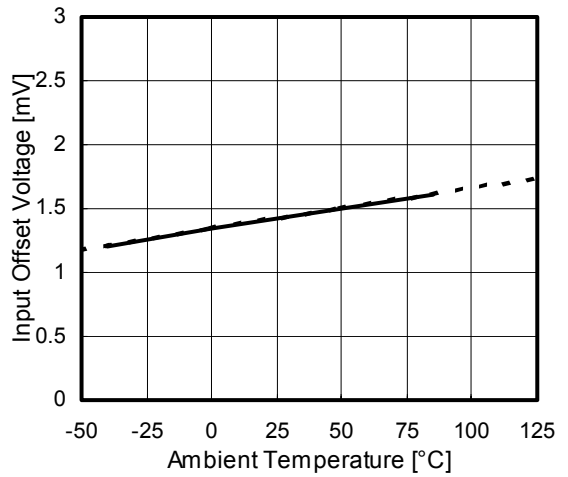
Operating Current vs. Temperature

$V^+/V^-=\pm 1.5\text{V}, G_v = 0\text{dB}$



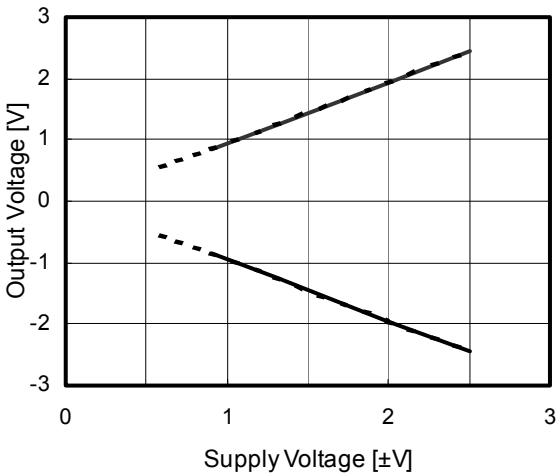
Input Offset Voltage vs. Temperature

$V^+/V^-=\pm 1.5\text{V}$



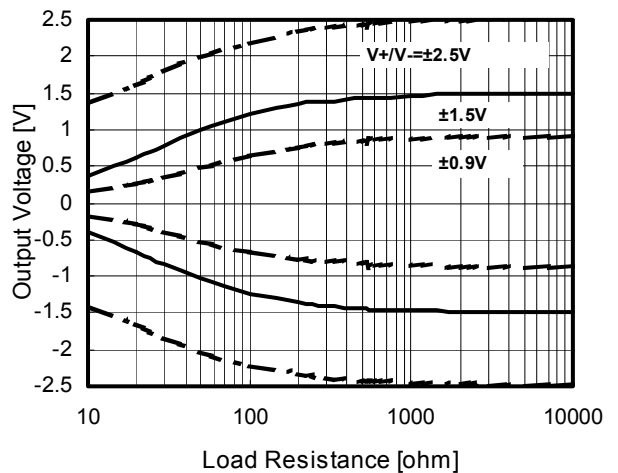
Output Voltage vs. Supply Voltage

$R_L=600\text{ohm}, T_a=25^\circ\text{C}$



Output Voltage vs. Load Resistance

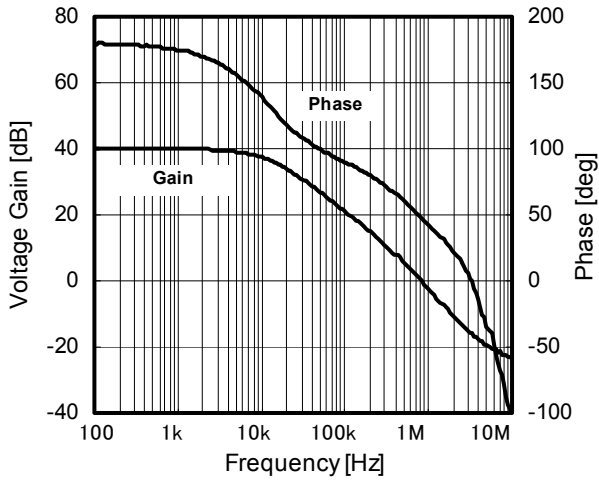
$T_a=25^\circ\text{C}$



## ■ TYPICAL CHARACTERISTICS

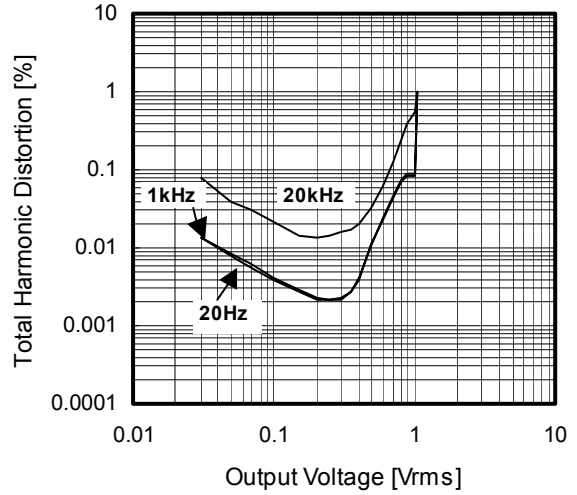
**Voltage Gain, Phase vs. Frequency**

$V+/V- = \pm 1.5V$ ,  $G_v = 40dB$ ,  $R_f = 100k$ ,  $R_g = 1k$ ,  $C_L = 0$



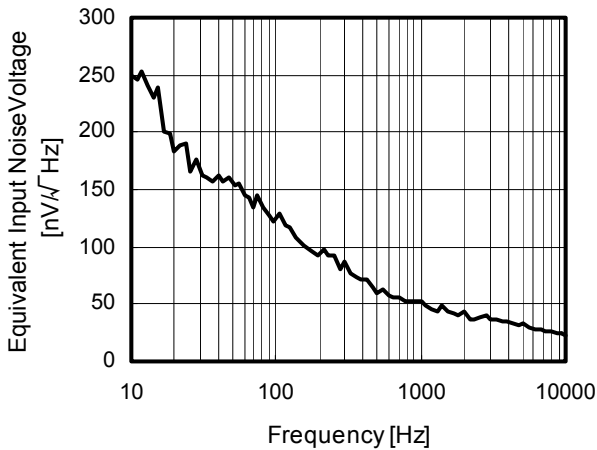
**THD vs. Output Voltage**

$V+/V- = \pm 1.5V$ ,  $G_v = 0dB$ ,  $R_f = 10k$ ,  $T_a = 25^\circ C$



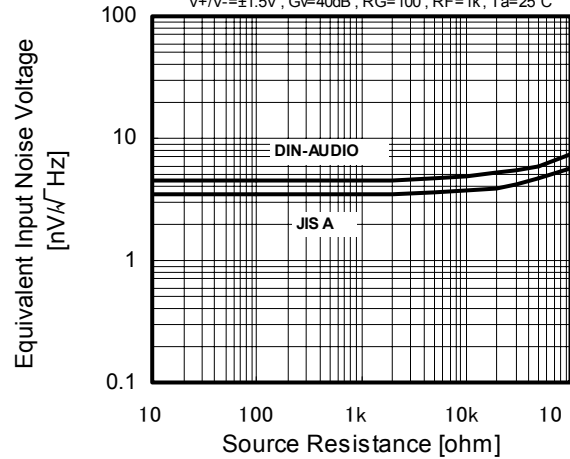
**Equivalent Input Noise Voltage vs. Frequency**

$V+/V- = \pm 1.5V$ ,  $G_v = 40dB$ ,  $R_s = 600$ ,  $R_G = 100$ ,  $R_F = 10k$ ,  $T_a = 25^\circ C$



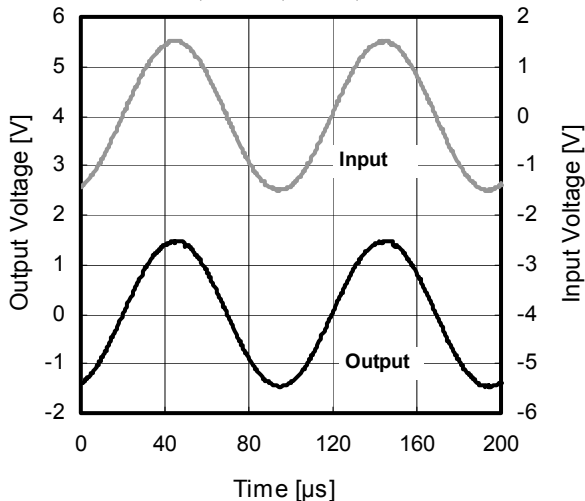
**Equivalent Input Noise Voltage vs. Source Resistance**

$V+/V- = \pm 1.5V$ ,  $G_v = 40dB$ ,  $R_G = 100$ ,  $R_F = 1k$ ,  $T_a = 25^\circ C$



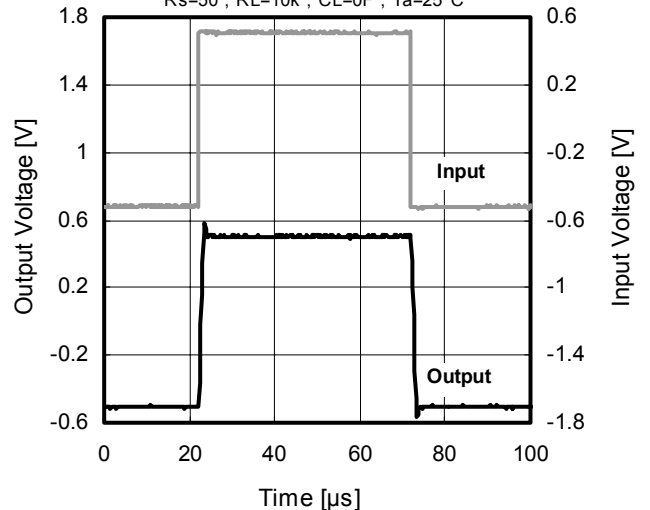
**Sin Wave Response**

$V+/V- = \pm 1.5V$ ,  $V_{in} = 3Vp-p$ ,  $f = 10kHz$ ,  $G_v = 0dB$ ,  $R_s = 50$ ,  $R_L = 10k$ ,  $C_L = 0F$ ,  $T_a = 25^\circ C$



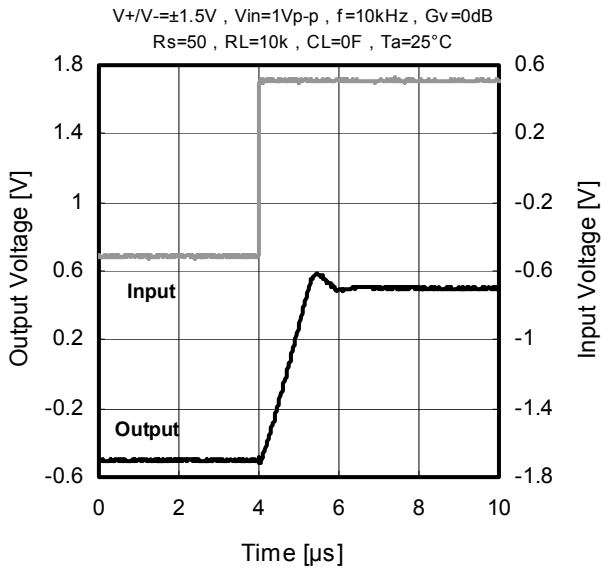
**Pulse Response**

$V+/V- = \pm 1.5V$ ,  $V_{in} = 1Vp-p$ ,  $f = 10kHz$ ,  $G_v = 0dB$ ,  $R_s = 50$ ,  $R_L = 10k$ ,  $C_L = 0F$ ,  $T_a = 25^\circ C$

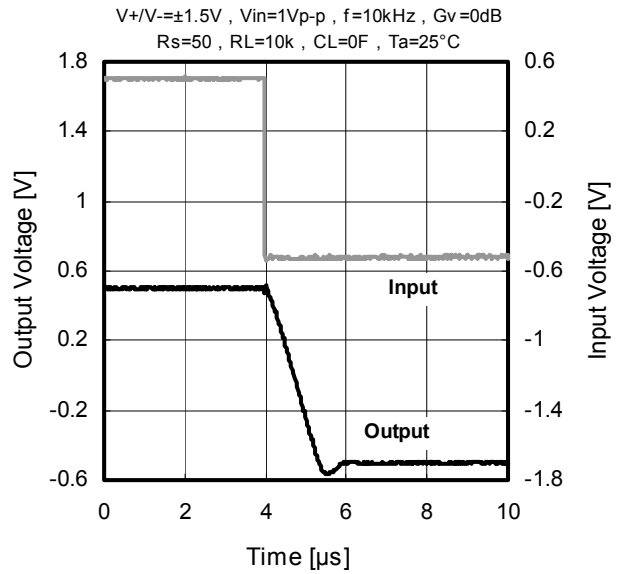


## ■ TYPICAL CHARACTERISTICS

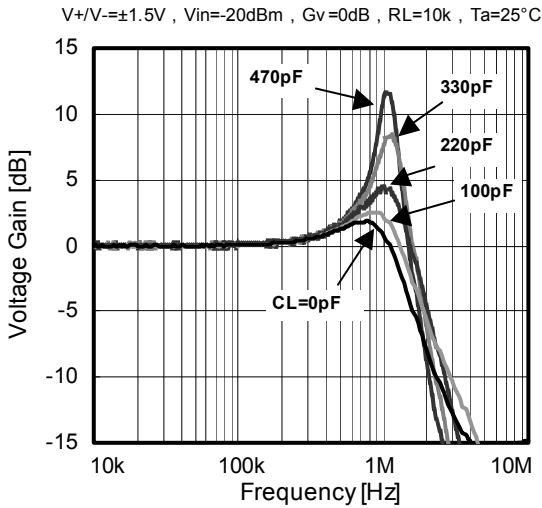
### Pulse Response(Rise)



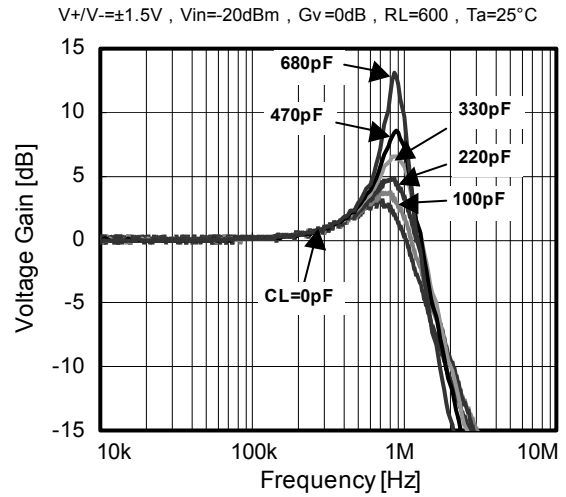
### Pulse Response(Fall)



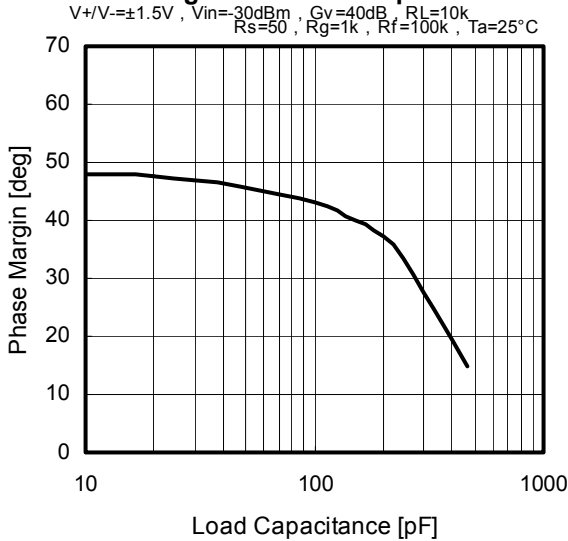
### Voltage Gain vs. Frequency(Load C.)



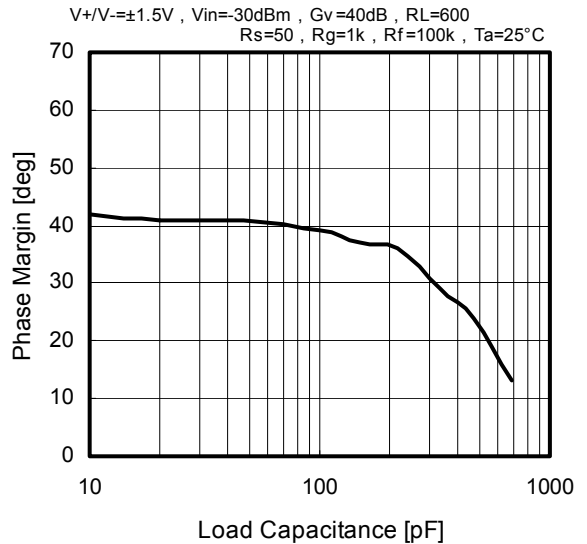
### Voltage Gain vs. Frequency(Load C.)



### Phase Margine vs. Load Capacitance



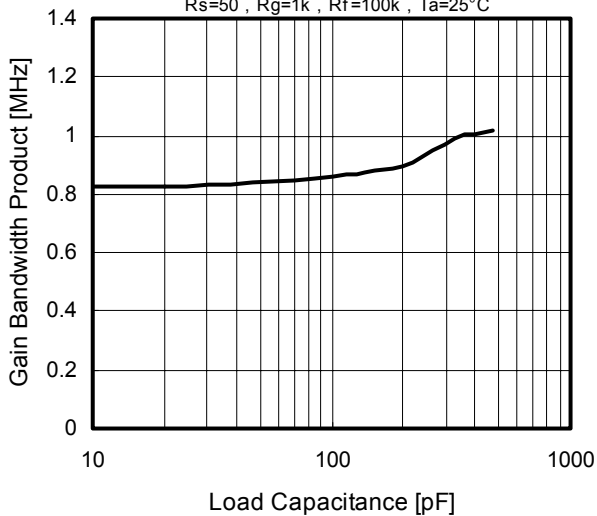
### Phase Margine vs. Load Capacitance



## TYPICAL CHARACTERISTICS

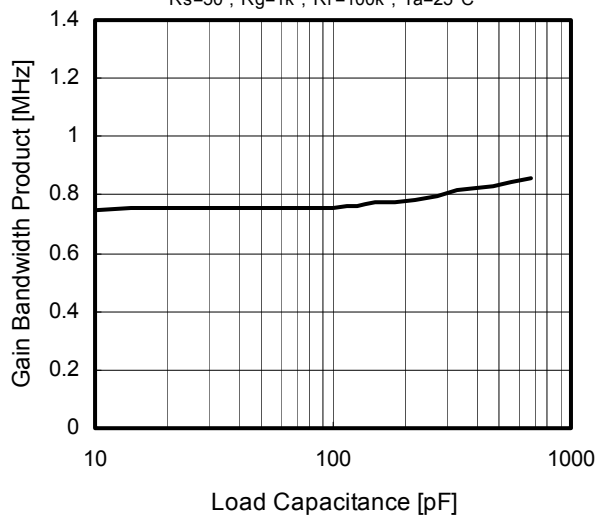
**Gain Bandwidth Product vs. Load Capacitance**

$V+/V-=\pm 1.5V$ ,  $V_{in}=-30dBm$ ,  $G_v=40dB$ ,  $R_L=10k$   
 $R_s=50$ ,  $R_g=1k$ ,  $R_f=100k$ ,  $T_a=25^\circ C$



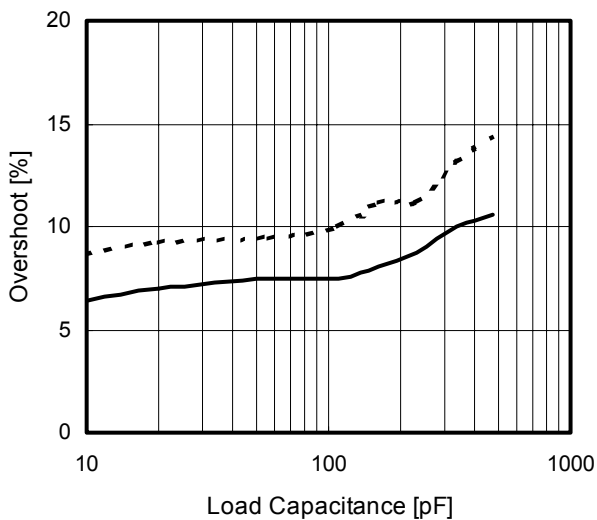
**Gain Bandwidth Product vs. Load Capacitance**

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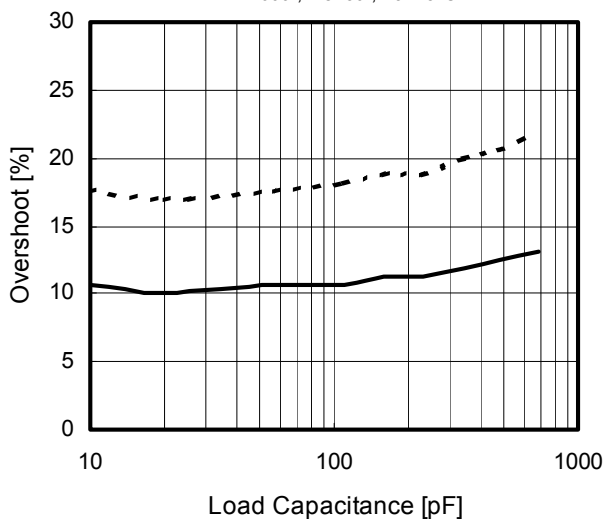
**Overshoot vs. Load Capacitance**

$V+/V-=\pm 1.5V$ ,  $V_{in}=1Vp-p$ ,  $f=10kHz$ ,  $G_v=0dB$   
 $R_L=10k$ ,  $R_s=50$ ,  $T_a=25^\circ C$



**Overshoot vs. Load Capacitance**

$V+/V-=\pm 1.5V$ ,  $V_{in}=1Vp-p$ ,  $f=10kHz$ ,  $G_v=0dB$   
 $R_L=600$ ,  $R_s=50$ ,  $T_a=25^\circ C$



**[CAUTION]**

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