

High Output Current, Rail-to-Rail Input/Output Dual CMOS Operational Amplifier

■GENERAL DESCRIPTION

The NJU7043 is a Rail-to-Rail Input/Output dual CMOS operational amplifier.

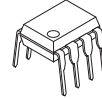
Based on C-MOS technology, there are excellent features such as high output current, low current consumption, low operating voltage, and very high input impedance.

■FEATURES

- Operating Voltage $V_{DD}=1.8$ to $5.5V$
- Rail-to-Rail Input/Output
- High Output Current $40mA$ typ. (at $V_o=0V$)
- Input Offset Voltage $V_{IO}=10mV$ max.
- Wide Input Common Mode Voltage Range V_{SS} to V_{DD}
- Operating Current $I_{DD}=300\mu A$ typ. (per Amplifier)
- High Input Impedance $1T\Omega$ typ.
- Low Input Bias Current $I_B=1pA$ typ.
- Ground Sensing
- Package

NJU7043D	DIP8
NJU7043M	DMP8
NJU7043E	EMP8
NJU7043V	SSOP8
NJU7043RB1	TVSP8

■PACKAGE OUTLINE



NJU7043D



NJU7043M



NJU7043E

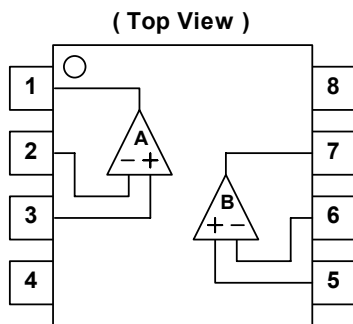


NJU7043V



NJU7043RB1

■PIN CONFIGURATION



PIN FUNCTION

1. OUTPUT A
2. -INPUT A
3. +INPUT A
4. V_{SS}
5. +INPUT B
6. -INPUT B
7. OUTPUT B
8. V_{DD}

NJU7043

■ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	7	V
Common Mode Input Voltage Range	V _{ICM}	0 to 7 (Note1)	V
Differential Input Voltage Range	V _{ID}	±7	V
Power Dissipation	P _D	500 (DIP8) 300 (DMP8) 300 (EMP8) 250 (SSOP8) 320 (TVSP8)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-55 ~ +125	°C

(Note1) When supply voltage is less than 7V, the absolute maximum input voltage is equal to the voltage.

(Note2) Decoupling capacitor should be connected between V_{DD} and V_{SS} due to the stabilized operation for the circuit.

■RECOMMENDED OPERATION CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	1.8 ~ 5.5	V

■ELECTRICAL CHARACTERISTICS

●DC CHARACTERISTICS

(V_{DD}=3.0V, Ta=25°C)

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

●AC CHARACTERISTICS

(V_{DD}=3.0V, Ta=25°C)

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

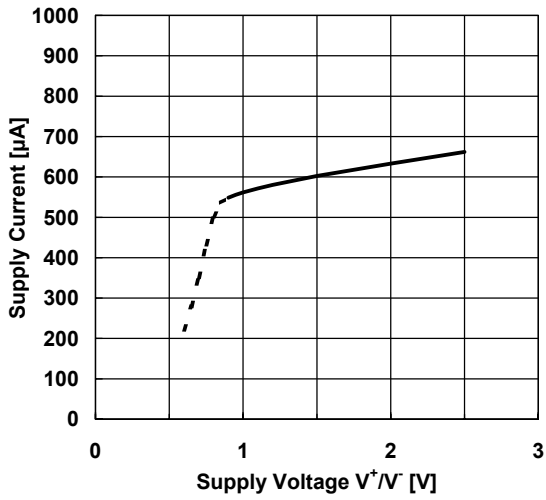
●TRANSIENT CHARACTERISTICS

(V_{DD}=3.0V, Ta=25°C)

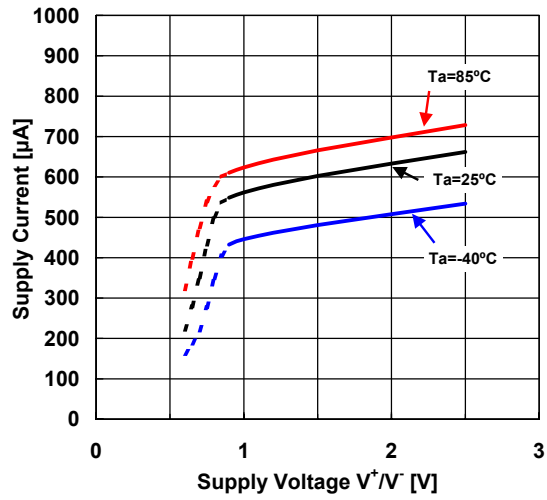
PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Slew Rate	SR	R _L =10 kΩ	-	0.7	-	V/μs

■ TYPICAL CHARACTERISTICS

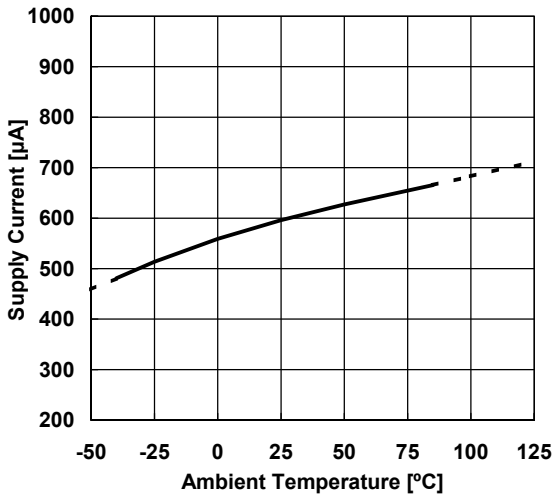
Supply Current vs. Supply Voltage
Gv = 0dB, Ta=25°C



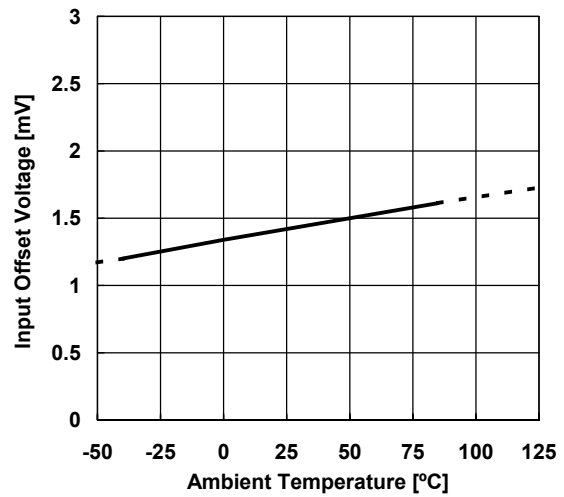
Supply Current vs. Supply Voltage
(Ambient Temperature)
Gv = 0dB



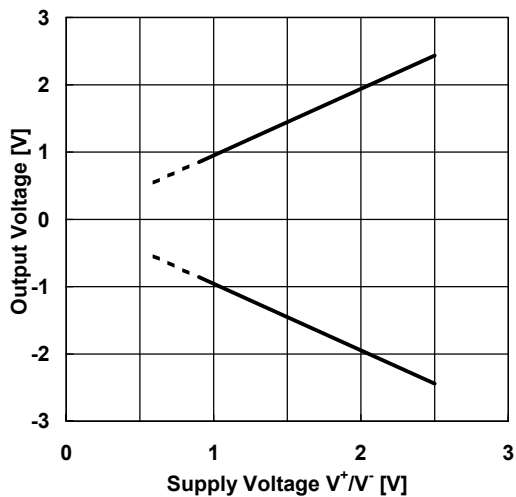
Supply Current vs. Ambient Temperature
V+/V- = ±1.5V, Gv = 0dB



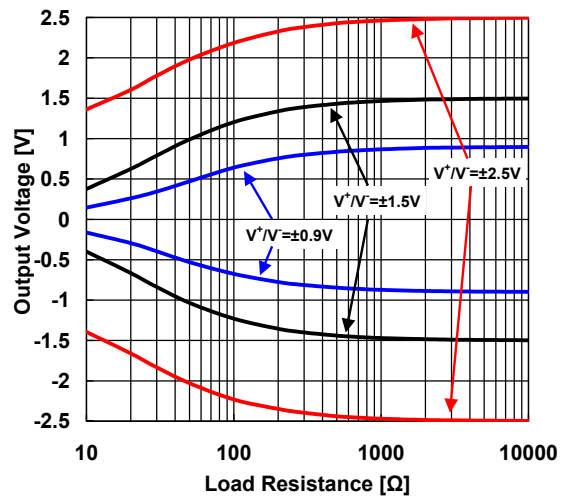
Input Offset Voltage vs. Ambient Temperature
V+/V- = ±1.5V



Output Voltage vs. Supply Voltage
Gv = OPEN, RL = 600Ω, Ta = 25°C

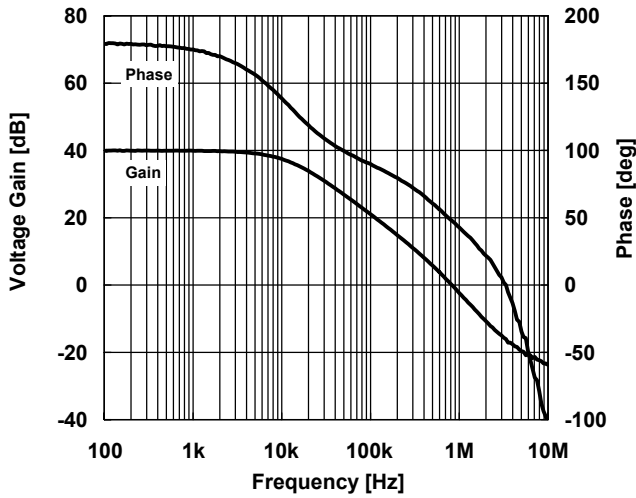


Output Voltage vs. Load Resistance (Supply Voltage)
Gv = OPEN, Ta = 25°C

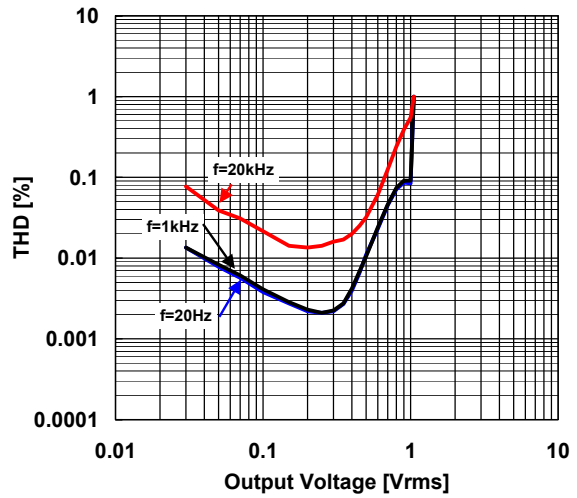


■ TYPICAL CHARACTERISTICS

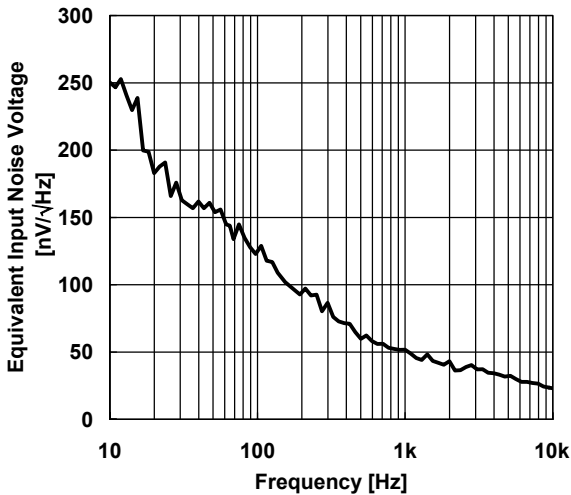
Gain/Phase vs. Frequency
 $V^+ / V^- = \pm 1.5V, G_v = 40dB, R_F = 100k, R_g = 1k, C_L = 0$



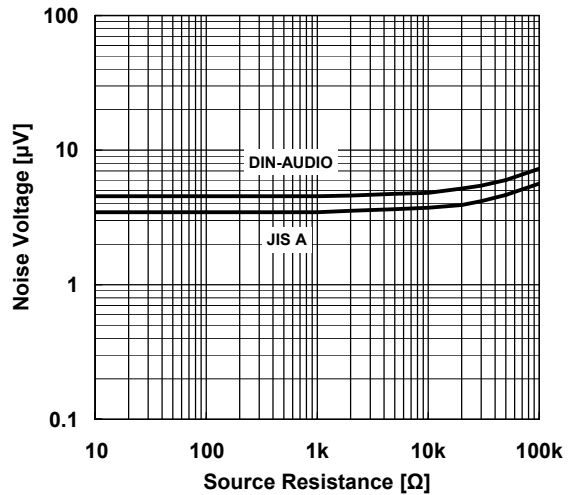
THD vs. Output Voltage
 $V^+ / V^- = \pm 1.5V, G_v = 0dB, R_L = 10k, T_a = 25^\circ C$



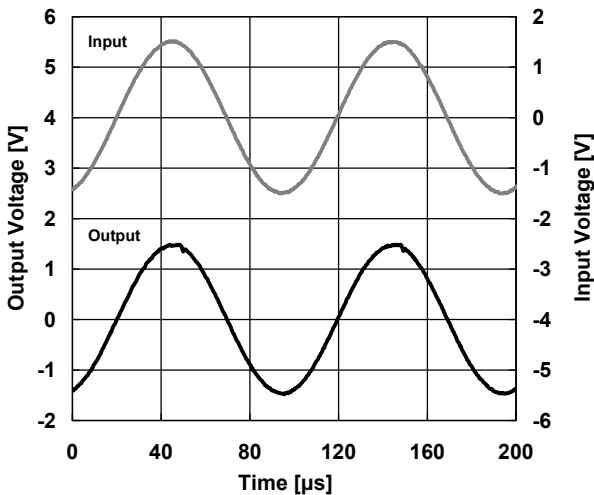
Equivalent Input Noise Voltage vs. Frequency
 $V^+ / V^- = \pm 1.5V, G_v = 40dB, R_s = 600, R_G = 100, R_F = 10k, T_a = 25^\circ C$



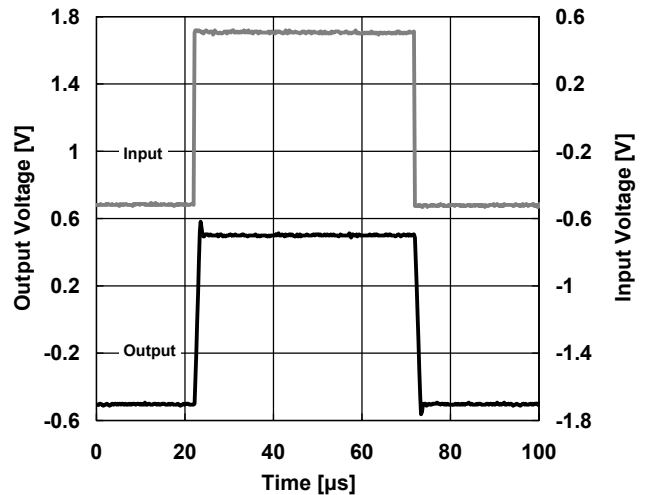
Noise Voltage vs. Source Resistance
 $V^+ / V^- = \pm 1.5V, G_v = 40dB, R_G = 100, R_F = 1k, T_a = 25^\circ C$



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



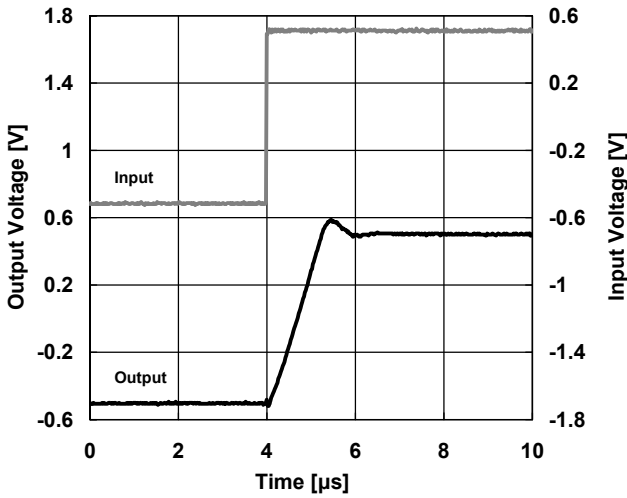
Pulse Response
 $V^+ / V^- = \pm 1.5V, V_{IN} = 1Vp-p, f = 10kHz, G_v = 0dB, R_s = 50, R_L = 10k, C_L = 0F, T_a = 25^\circ C$



■ TYPICAL CHARACTERISTICS

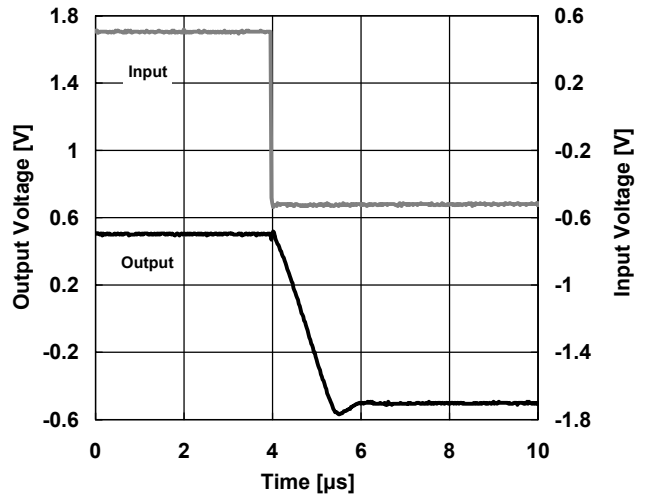
Pulse Response (Rise)

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



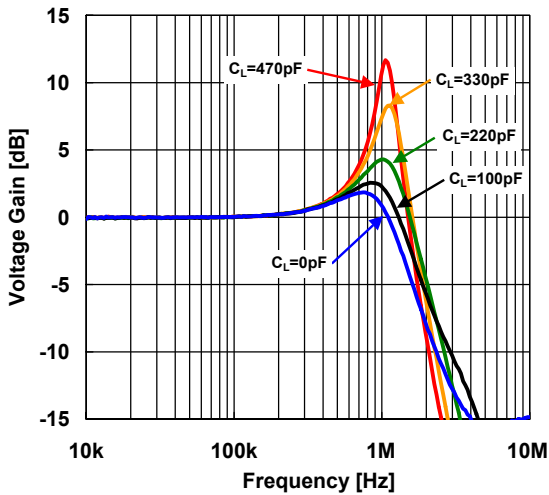
Pulse Response (Fall)

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



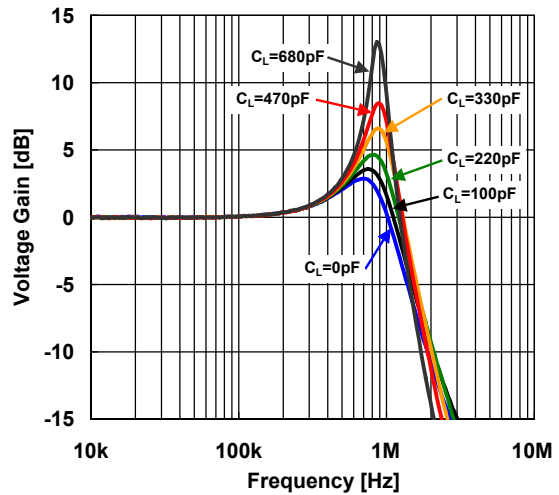
V.F.Peak vs. Frequency (Load Capacitance)

$V^+/V^-\approx\pm 1.5V$, $V_{IN}=-20dBm$, $G_v=0dB$, $R_L=10k$, $T_a=25^\circ C$



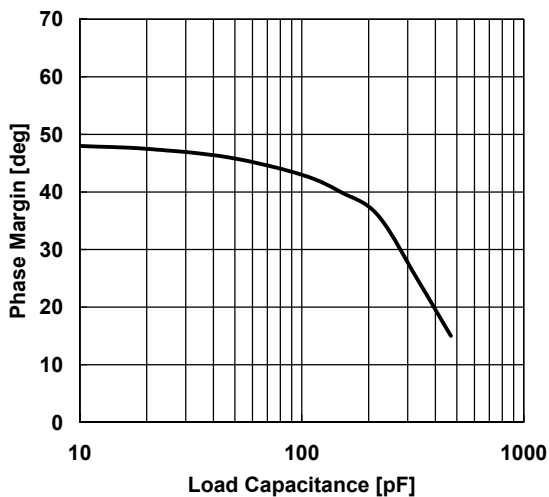
V.F.Peak vs. Frequency (Load Capacitance)

$V^+/V^-\approx\pm 1.5V$, $V_{IN}=-20dBm$, $G_v=0dB$, $R_L=600$, $T_a=25^\circ C$



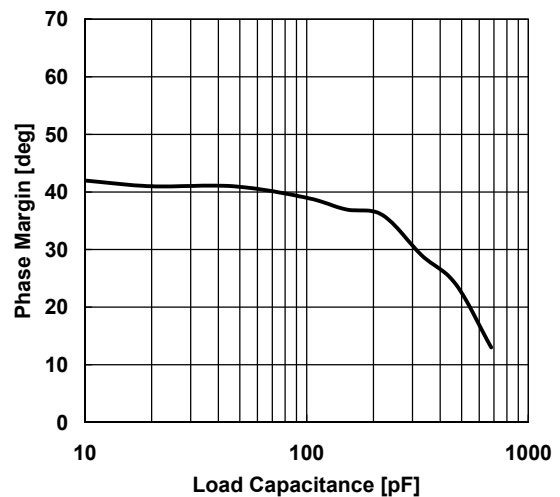
Phase Margin vs. Load Capacitance

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



Phase Margin vs. Load Capacitance

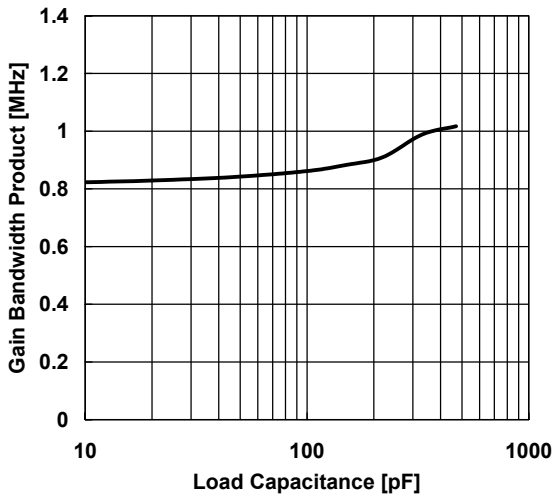
$V^+/V^-\approx\pm 1.5V$, $V_{IN}=-30dBm$, $G_v=40dB$,
 $R_L=600$, $R_s=50$, $R_g=1k$, $R_F=100k$, $T_a=25^\circ C$



■ TYPICAL CHARACTERISTICS

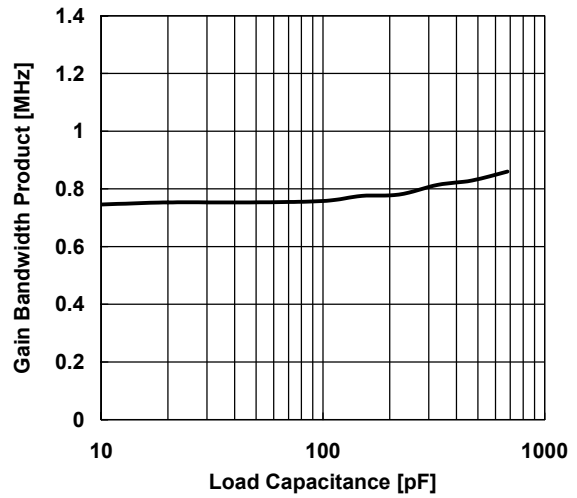
Gain Bandwidth Product vs. Load Capacitance

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



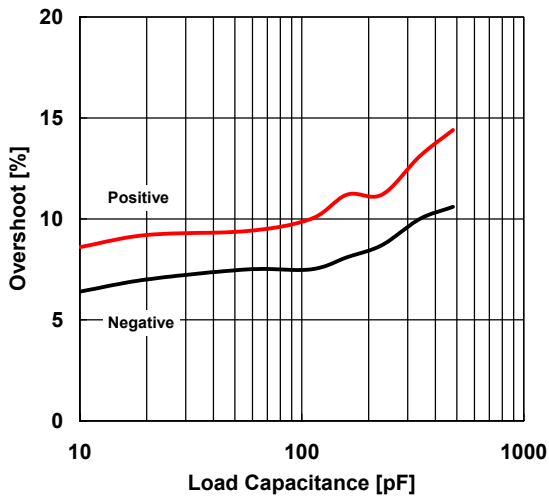
Gain Bandwidth Product vs. Load Capacitance

$V^+ / V^- = \pm 1.5V$, $V_{IN} = -30dBm$, $G_v = 40dB$,
 $R_L = 600$, $R_s = 50$, $R_g = 1k$, $R_f = 100k$, $T_a = 25^\circ C$



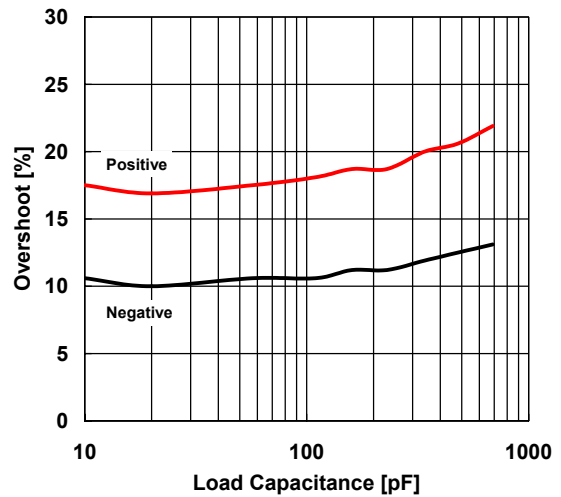
Overshoot vs. Load Capacitance

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



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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