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

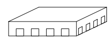
■GNERAL DESCRIPTION

The NJU7043SCC 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.

NJU7043SCC is available in the small PCSP package, which saves space on printed circuit boards and suitable for small portable devices.

■PACKAGE OUTLINE



NJU7043SCC

■FEATURES

● Operating Voltage	V_{DD}=1.8 to 5.5V
● Rail-to-Rail Input/Output	
● High Output Current	I_{sourse}≥40mA typ.
	I_{sink}≤-40mA typ.
● Input Offset Voltage	V_{IO}=10mV max.
● Wide Input Common Mode Voltage Range	V_{SS} to V_{DD}
● Operating Current	I_{DD}=300µA typ. (per Amplifier)
● High Input Impedance	1TΩ typ.
● Low Input Bias Current	I_{IB}=1pA typ.
● Ground Sensing	
● Package	PCSP-20

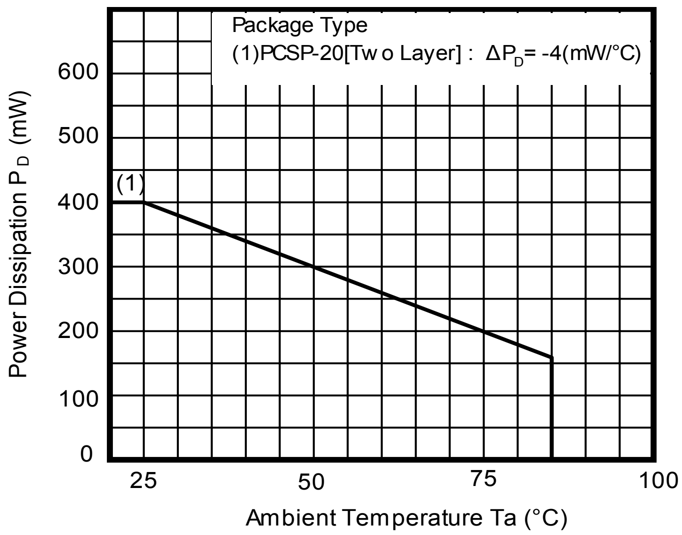
■**ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	7	V
Common Mode Input Voltage Range	V_{IC}	0 ~ 7 (Note 1)	V
Differential Input Voltage Range	V_{ID}	±7	V
Power Dissipation	P_D	400 [PCSP-20] (Note 3)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-55 ~ +125	°C

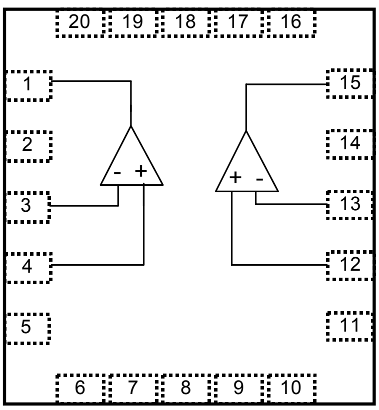
(Note 1) When supply voltage is less than 5.5.V, the absolute maximum input voltage is equal to the voltage.
(Note 2) Decoupling capacitor should be connected between V_{DD} and V_{SS} due to the stabilized operation for the circuit.
(Note 3) On the PCB " EIA/JEDEC (76.2x11.43x1.6mm, two layers, FR-4) ".

(Note 4) Do not exceed "Power dissipation: P_D" in which power dissipation in IC is shown by the absolute maximum rating.
Refer to following Figure 1 for a permissible loss when ambient temperature (Ta) is Ta≥25°C.

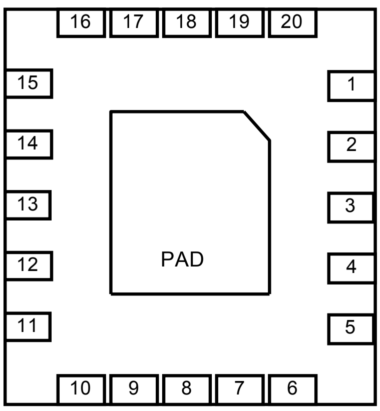
Figure 1 : Power Dissipation vs. Ambient Temperature



■ **PIN CONFIGURATION**



(Top View)



(Bottom View)

PIN CONFIGURATION

1. OUTPUT 1	11. NC
2. NC	12. +INPUT 1
3. -INPUT 1	13. –INPUT 1
4. +INPUT 1	14. NC
5. NC	15. OUTPUT 1
6. NC	16. NC
7. NC	17. NC
8. GND	18. V_{DD}
9. NC	19. NC
10. NC	20. NC

(Note 5) The NC pin and the PAD should connect with a GND terminal.
(Note 6) The NC pin is electrically not connected to the die in a package.
(Note 7) The PAD is electrically not connected to the backside of the die. The PAD cannot be used as GND pin.

■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 (Note 8)	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

(Note 8) 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.

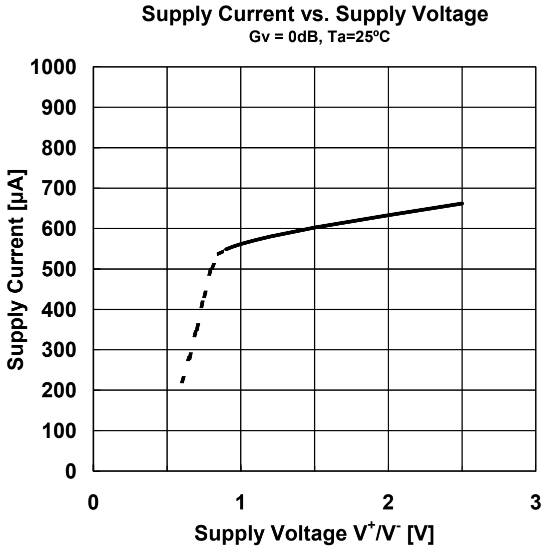
● AC CHARACTERISTICS (V_{DD}=3.0V, Ta=25°C)

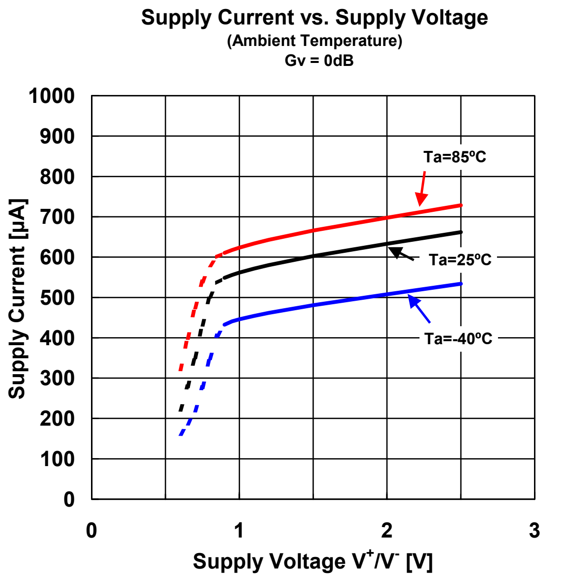
PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Unity Gain Bandwidth	GB	R_L=10kΩ	-	0.8	-	MHz
Total Harmonic Distortion	THD	f=1kHz, Vin=1Vpp, A_V=0dB	-	0.05	-	%
Equivalent Input Noise Voltage	e_n	f=1kHz	-	40	-	nV/√Hz

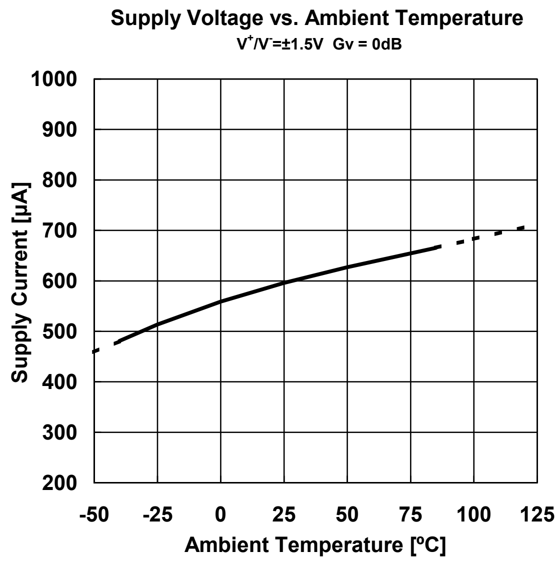
● TRANSIENT CHARACTERISTICS (V_{DD}=3.0V, Ta=25°C)

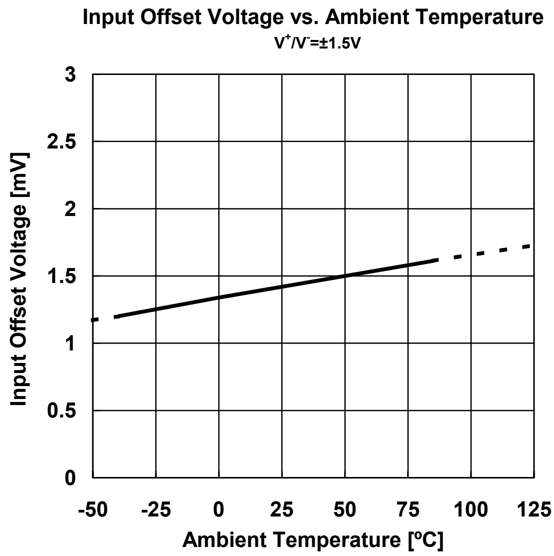
PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Slew Rate	SR	R_L=10kΩ	-	0.7	-	V/µs

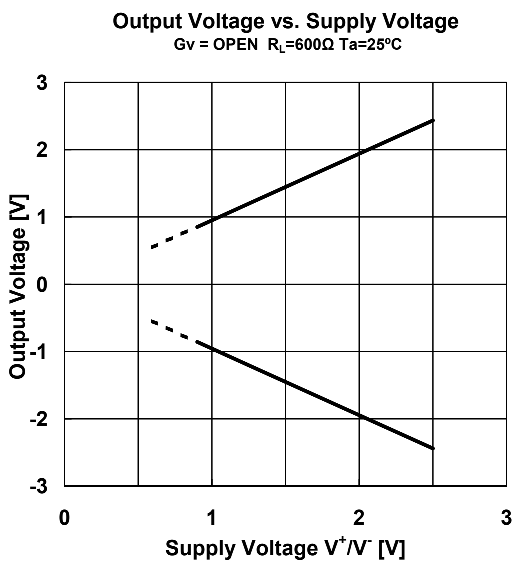
■TYPICAL CHARACTERISTICS

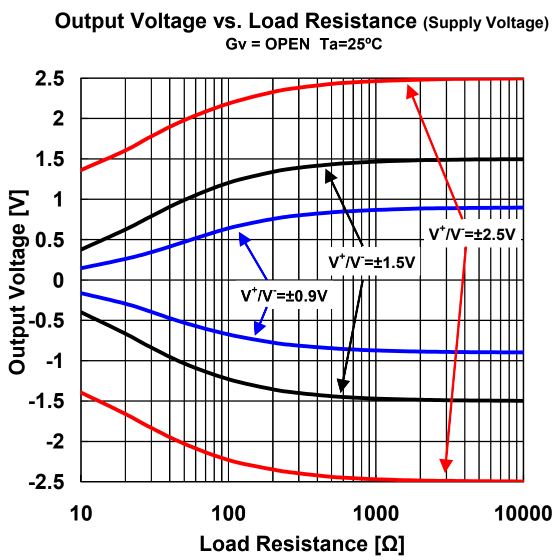






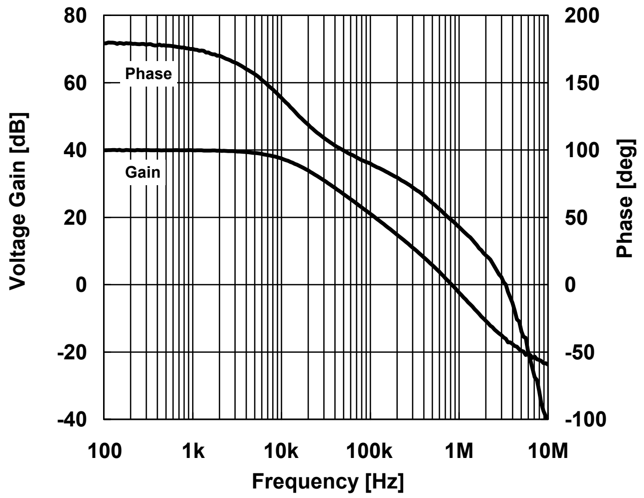




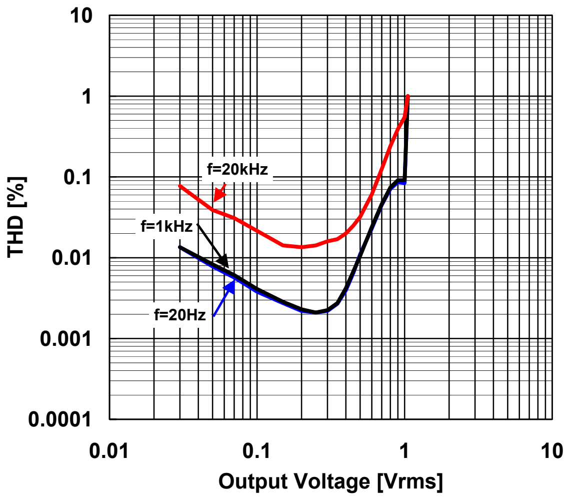


■TYPICAL CHARACTERISTICS

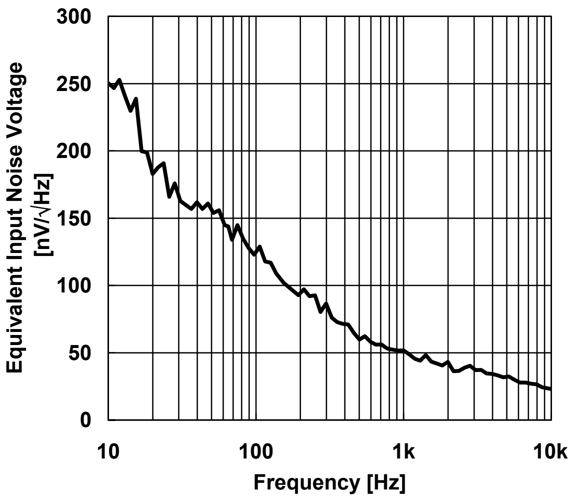
Gain/Phase vs. Frequency
V^+/V^-=±1.5V, Gv=40dB, R_F=100k, Rg=1k, C_L=0



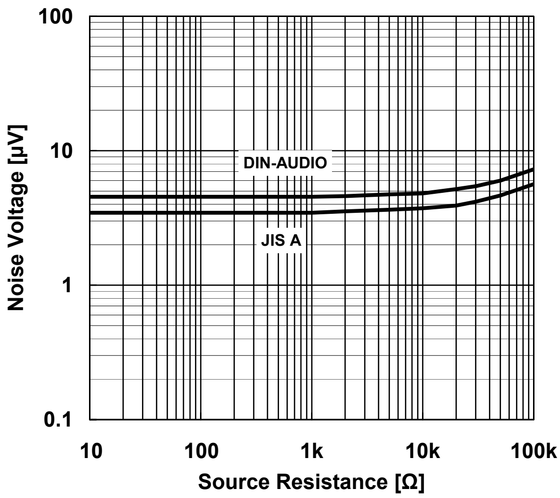
THD vs. Output Voltage
V^+/V^-=±1.5V, Gv=0dB, R_L=10k, Ta=25ºC



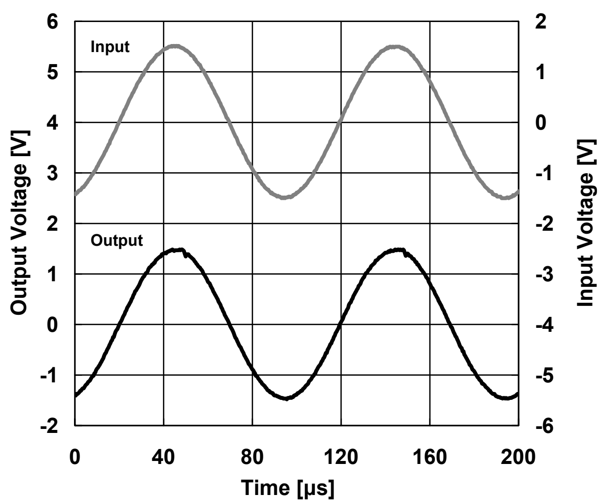
Equivalent Input Noise Voltage vs. Frequency
V^+/V^-=±1.5V, Gv=40dB, Rs=600, R_G=100, R_F=10k, Ta=25ºC



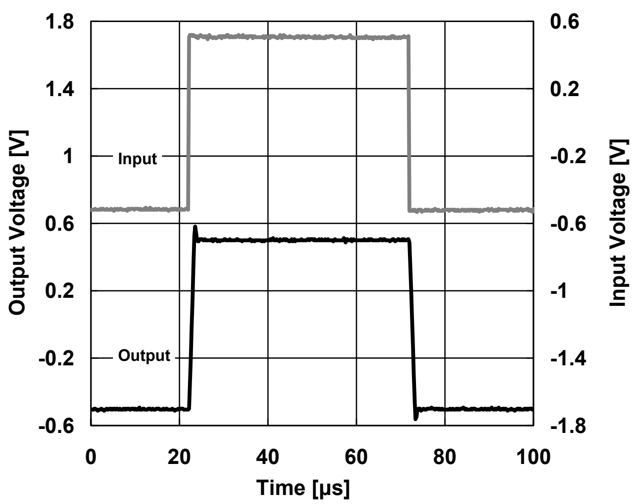
Noise Voltage vs. Source Resistance
V^+/V^-=±1.5V, Gv=40dB, R_G=100, R_F=1k, Ta=25ºC



Pulse Response
V^+/V^-=±1.5V, V_{IN}=3Vp-p, f=10kHz
Gv=0dB, Rs=50, R_L=10k, C_L=0F, Ta=25ºC

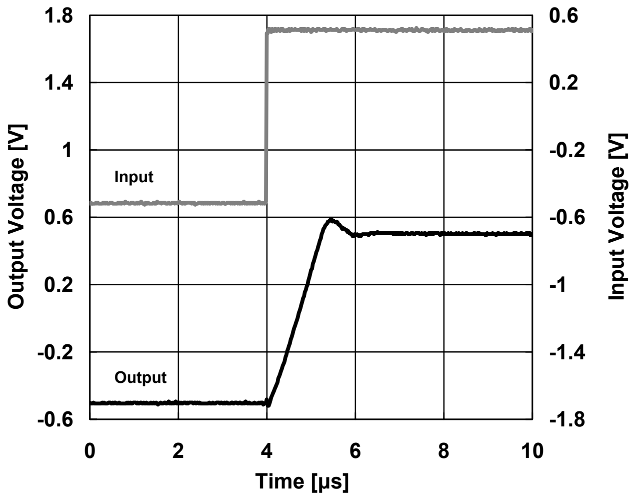


Pulse Response
V^+/V^-=±1.5V, V_{IN}=1Vp-p, f=10kHz
Gv=0dB, Rs=50, R_L=10k, C_L=0F, Ta=25ºC

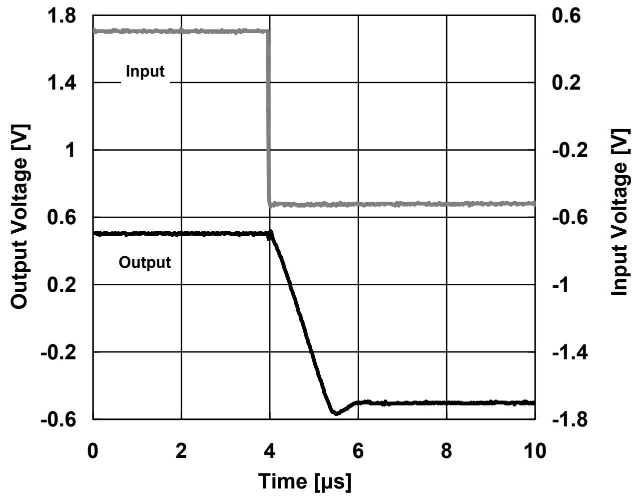


■TYPICAL CHARACTERISTICS

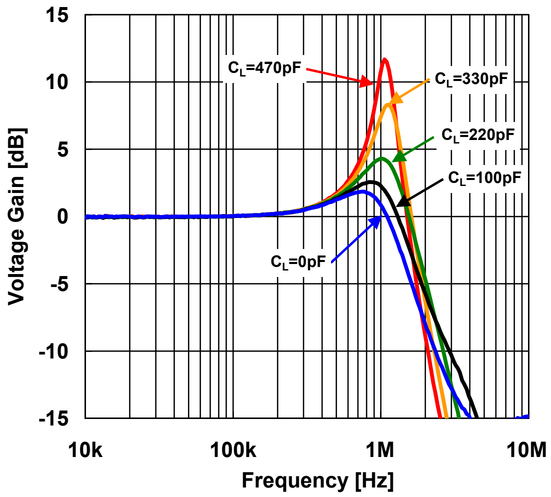
Pulse Response (Rise)
V^+/V^-=±1.5V, V_{IN}=1Vp-p, f=10kHz
Gv=0dB, Rs=50, R_L=10k, C_L=0F, Ta=25ºC



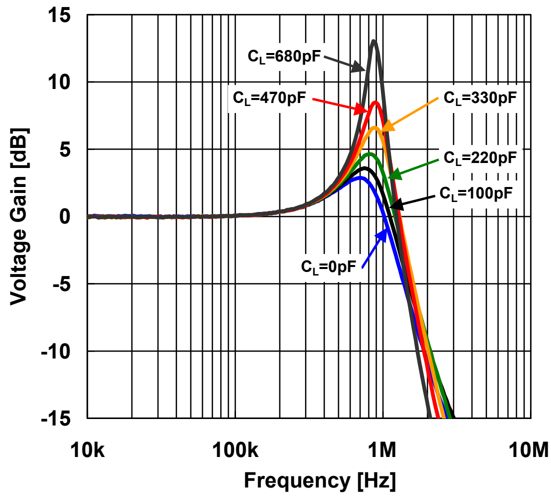
Pulse Response (Fall)
V^+/V^-=±1.5V, V_{IN}=1Vp-p, f=10kHz
Gv=0dB, Rs=50, R_L=10k, C_L=0F, Ta=25ºC



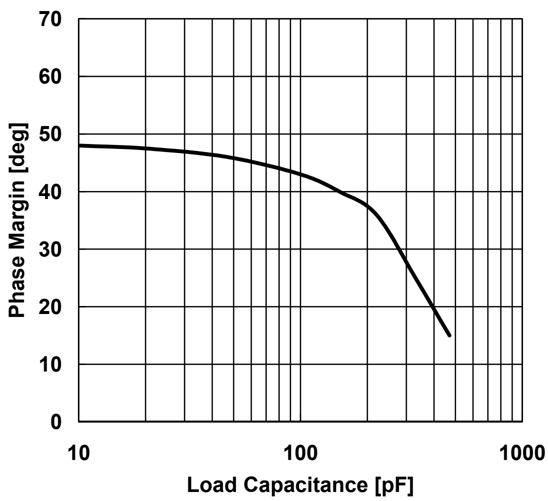
V.F.Peak vs. Frequency (Load Capacitance)
V^+/V^-=±1.5V, V_{IN}=-20dBm, Gv=0dB, R_L=10k, Ta=25ºC



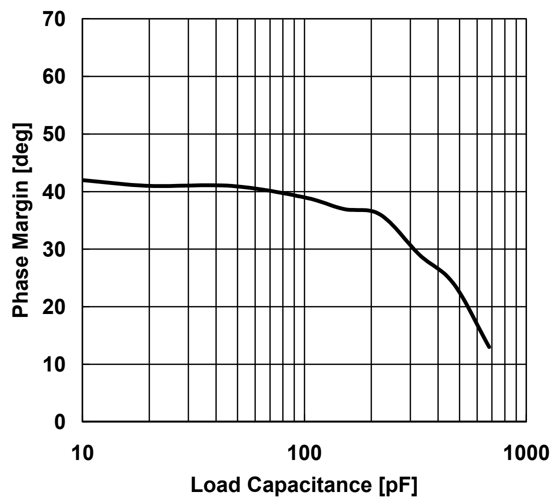
V.F.Peak vs. Frequency (Load Capacitance)
V^+/V^-=±1.5V, V_{IN}=-20dBm, Gv=0dB, R_L=600, Ta=25ºC



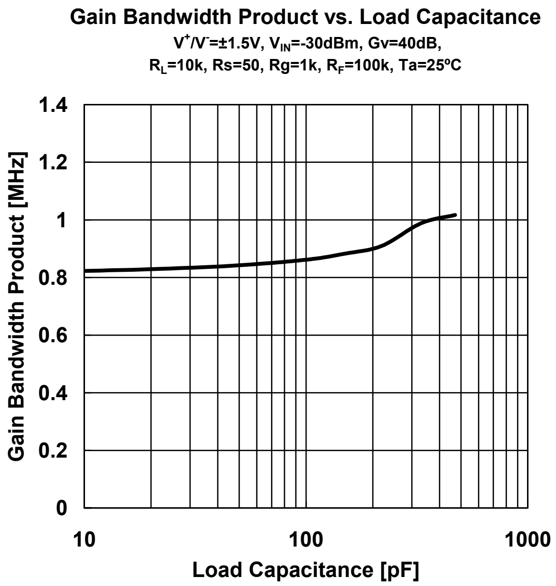
Phase Margin vs. Load Capacitance
V^+/V^-=±1.5V, V_{IN}=-30dBm, Gv=40dB,
R_L=10k, Rs=50, Rg=1k, R_F=100k, Ta=25ºC

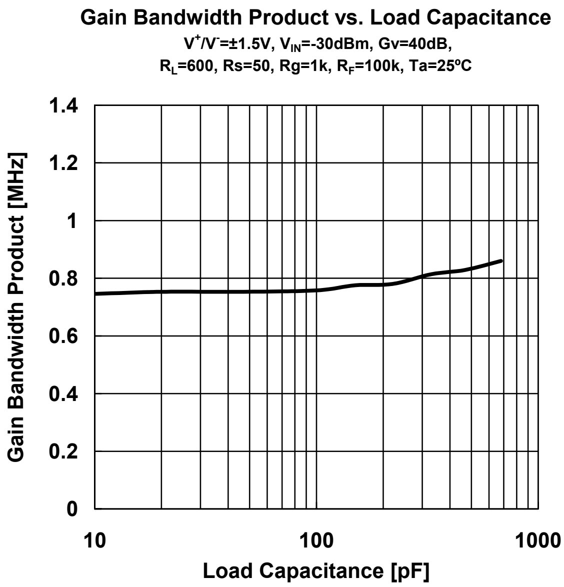


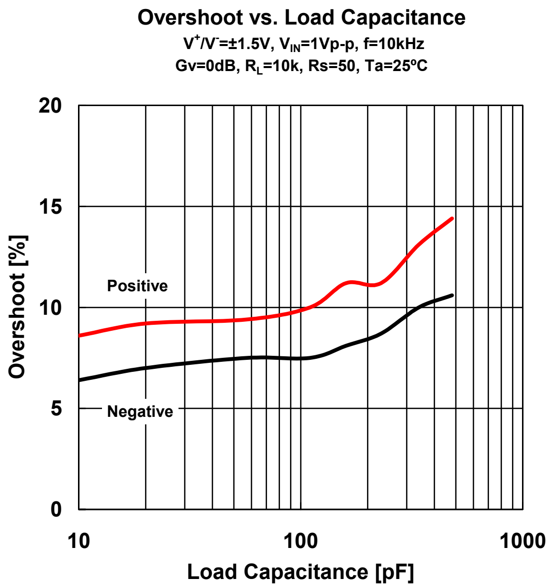
Phase Margin vs. Load Capacitance
V^+/V^-=±1.5V, V_{IN}=-30dBm, Gv=40dB,
R_L=600, Rs=50, Rg=1k, RF=100k, Ta=25ºC

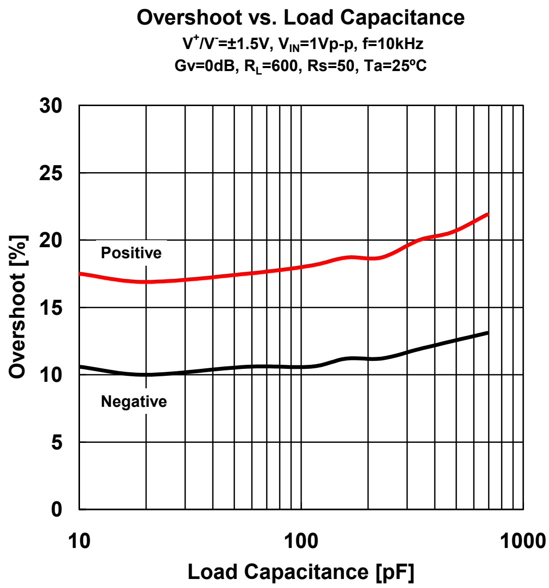


■TYPICAL CHARACTERISTICS









■MEMO