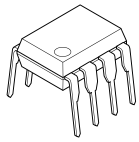
High Output Current, Rail-to-Rail Input/Output Dual CMOS Operational Amplifier

■GENERAL DESCRIPTION

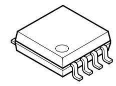
The NJU7043 is a Rail-to-Rail Input/Output dual CMOS operational amplifier with a low operating voltage from 1.8V to 5.5V and high output current of 40mA which is higher than our conventional CMOS operational amplifiers.

It also offers a rail-to-rail input/output between both rails, low operating current of 300μA per amplifier, low input bias current of 1pA and ground sensing, which is suitable for various applications. The NJU7043 is available in 8-lead package of DIP8, 8-lead small surface mount packages of DMP8, SOP8 JEDEC 150mil, SSOP8, MSOP8 (TVSP8) and PCSP20−CC.

■PACKAGE OUTLINE



NJU7043D
(DIP8)



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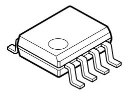
(DMP8)



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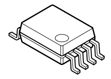
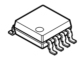
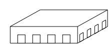
(SOP8)



NJU7043V
(SSOP8)



NJU7043RB1
(MSOP8(TVSP8))



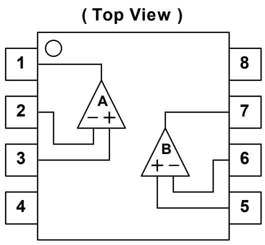
NJU7043SCC
(PCSP20−CC)

■FEATURES

● Operating Voltage	V_{DD}=1.8 to 5.5V
● Rail-to-Rail Input/Output	
● High Output Current	40mA typ. (at Vo=0V)
● 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	DIP8,DMP8,SOP8 JEDEC 150mil , SSOP8 MSOP8 (TVSP8)MEET JEDEC MO-187-DA / THIN TYPE, PCSP20−CC

■PIN CONFIGURATION

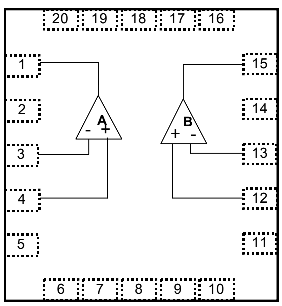
○NJU7043D,M,E,V,RB1



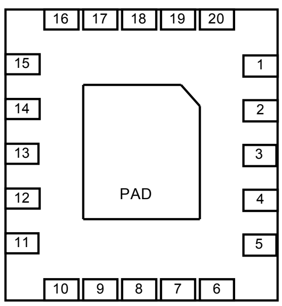
PIN FUNCTION

1. OUTPUT A
2. −INPUT A
3. +INPUT A
4. $V_{SS}(V^-)$
5. +INPUT B
6. −INPUT B
7. OUTPUT B
8. $V_{DD}(V^+)$

○NJU7043SCC



(Top View)



(Bottom View)

PIN FUNCTION

1. OUTPUT A	11. NC
2. NC	12. +INPUT B
3. –INPUT A	13. –INPUT B
4. +INPUT A	14. NC
5. NC	15. OUTPUT B
6. NC	16. NC
7. NC	17. NC
8. V_{SS} (V^-)	18. $V_{DD}(V^+)$
9. NC	19. NC
10. NC	20. NC

(Note 1) The NC pin and the PAD should connect with a VSS terminal.

(Note 2) The NC pin is electrically not connected to the die in a package.

(Note 3) The PAD is electrically not connected to the backside of the die. The PAD cannot be used as VSS pin.

■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 (Note4)	V
Differential Input Voltage Range	V_{ID}	±7	V
Power Dissipation	P_D	500 (DIP8) 300 (DMP8) 300 (SOP8) 250 (SSOP8) 320 (MSOP8 (TVSP8)) 400 (PCSP20−CC)(note 6)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-55 ~ +125	°C

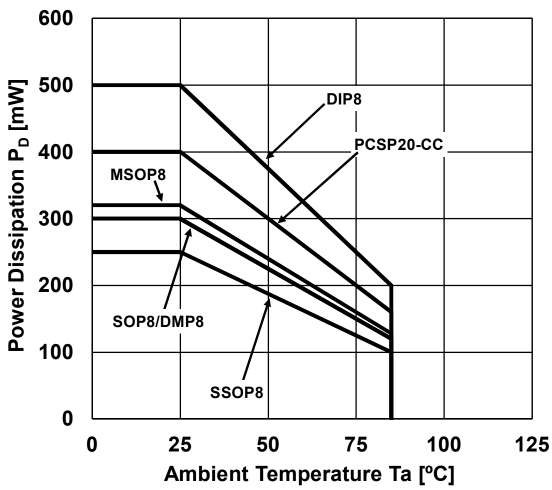
(Note 4) When supply voltage is less than 7V, the absolute maximum input voltage is equal to the voltage.

(Note 5) Decoupling capacitor should be connected between V_{DD} and V_{SS} due to the stabilized operation for the circuit.

(Note 6) On the PCB " EIA/JEDEC (76.2x114.3x1.6mm, two layers, FR-4) ".

(Note 7) 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.

Figure1. Power Dissipation vs. Temperature



■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 (note7)	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.

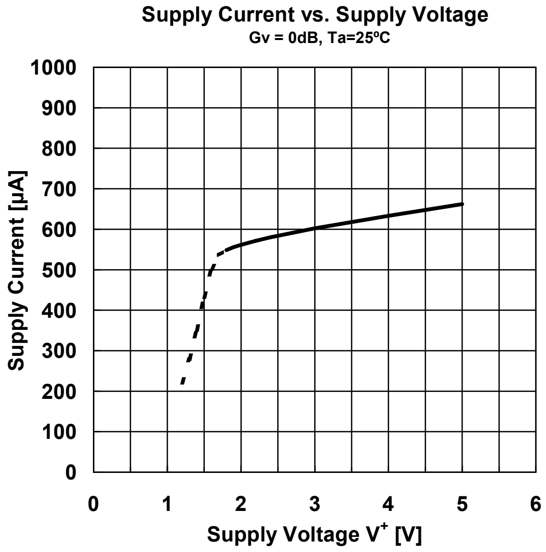
● AC CHARACTERISTICS (V_{DD}=3.0V, Ta=25°C)

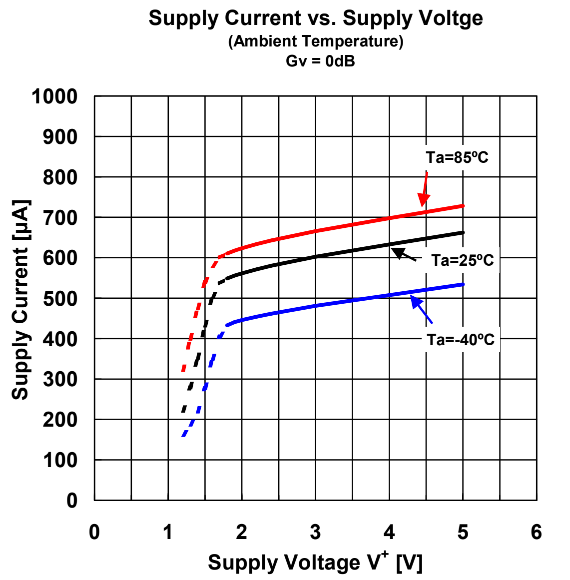
PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Unity Gain Bandwidth	GB	R_L=10kΩ	-	0.8	-	MHz
Total Harmonic Distortion	THD	f=1kHz , Vin=1Vpp , A_V=0dB	-	0.05	-	%
Equivalent Input Noise Voltage	e_n	f=1kHz	-	40	-	nV/√Hz

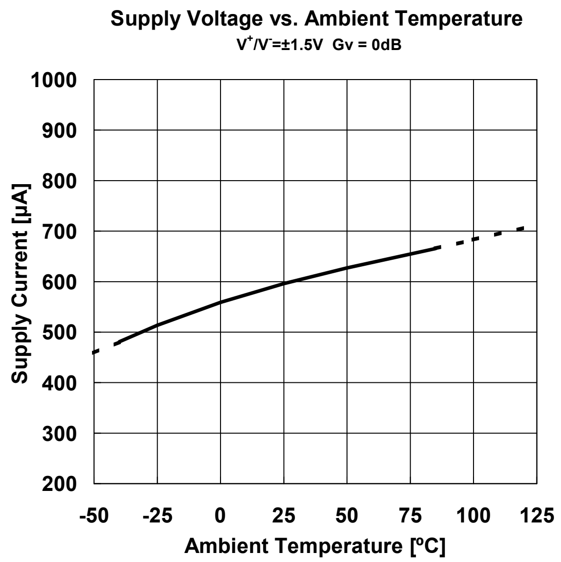
● TRANSIENT CHARACTERISTICS (V_{DD}=3.0V, Ta=25°C)

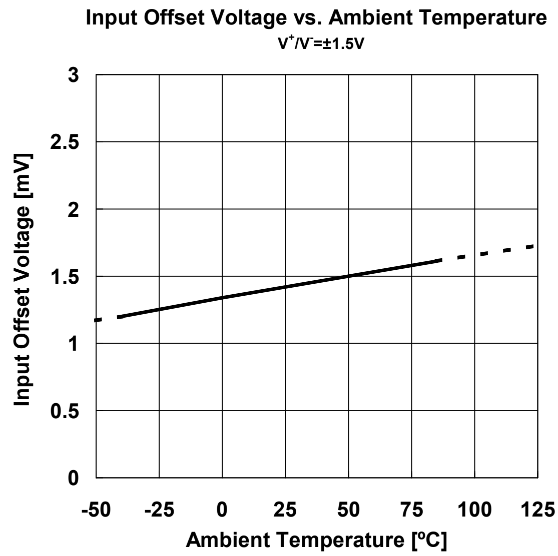
PARAMETER	SYMBOL	RATING	MIN	TYP	MAX	UNIT
Slew Rate	SR	R_L=10 kΩ	-	0.7	-	V/µs

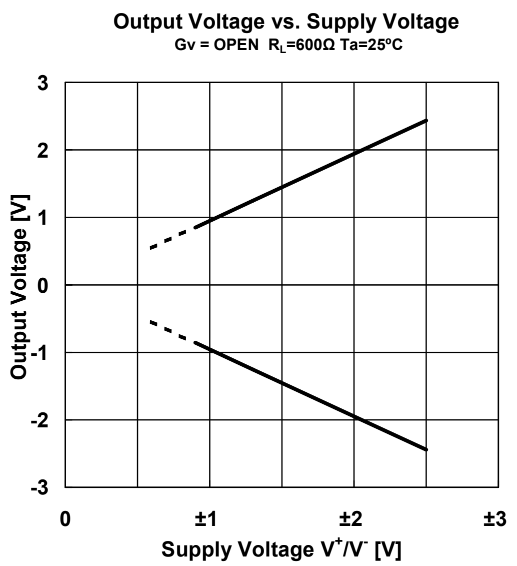
■TYPICAL CHARACTERISTICS

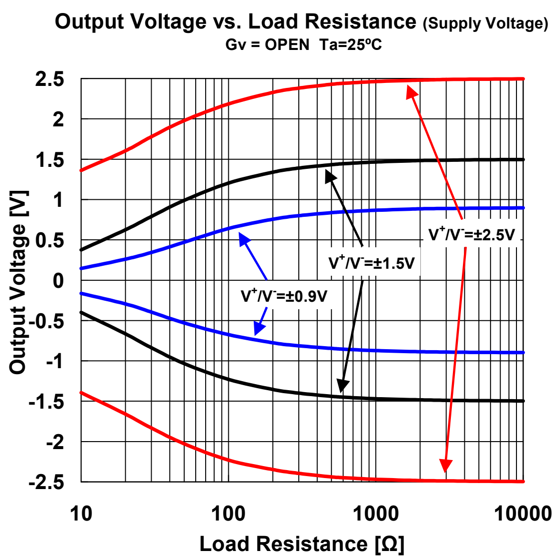








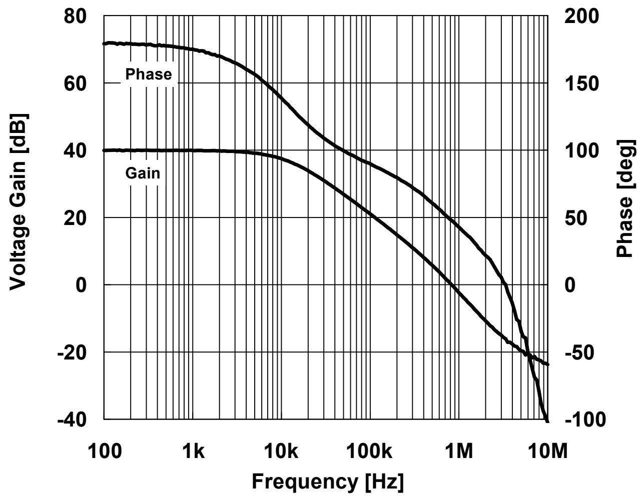




■TYPICAL CHARACTERISTICS

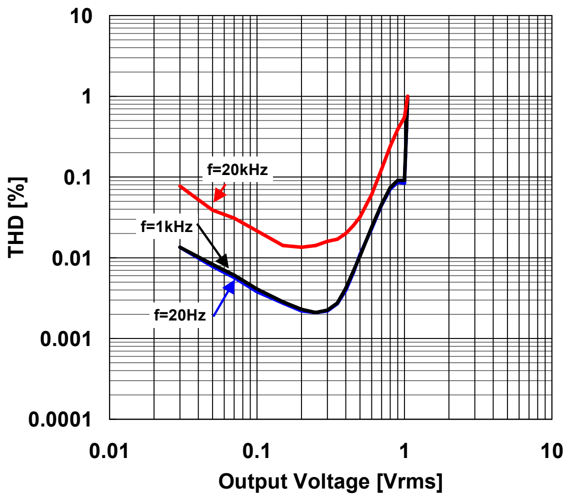
Gain/Phase vs. Frequency

V^+/V^-=±1.5V, Gv=40dB, R_F=100k, Rg=1k, C_L=0



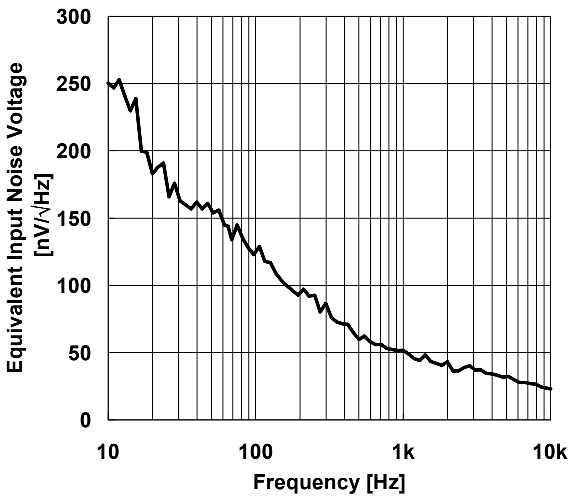
THD vs. Output Voltage

V^+/V^-=±1.5V, Gv=0dB, R_L=10k, Ta=25°C



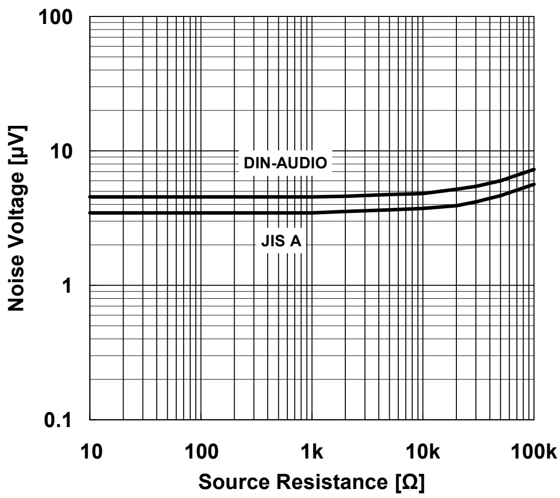
Equivalent Input Noise Voltage vs. Frequency

V^+/V^-=±1.5V, Gv=40dB, Rs=600, R_G=100, R_F=10k, Ta=25°C



Noise Voltage vs. Source Resistance

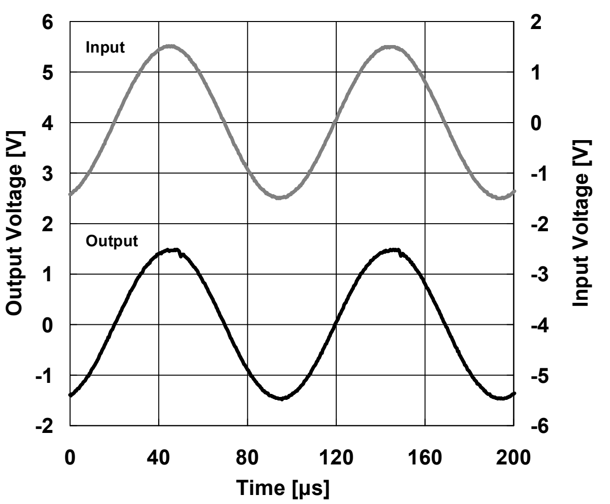
V^+/V^-=±1.5V, Gv=40dB, R_G=100, R_F=1k, Ta=25°C



Pulse Response

V^+/V^-=±1.5V, V_{IN}=3Vp-p, f=10kHz

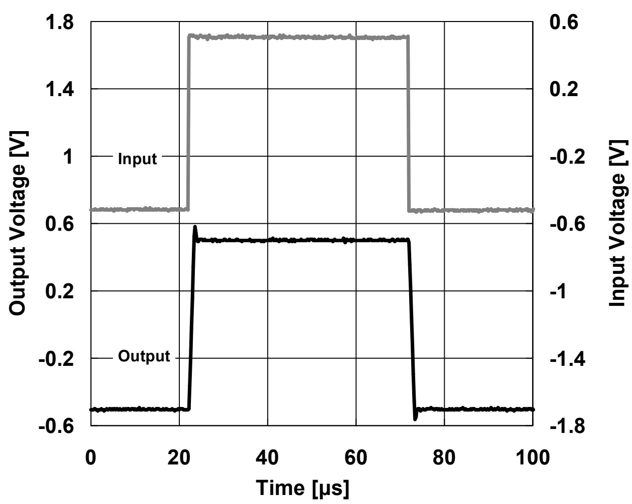
Gv=0dB, Rs=50, R_L=10k, C_L=0F, Ta=25°C



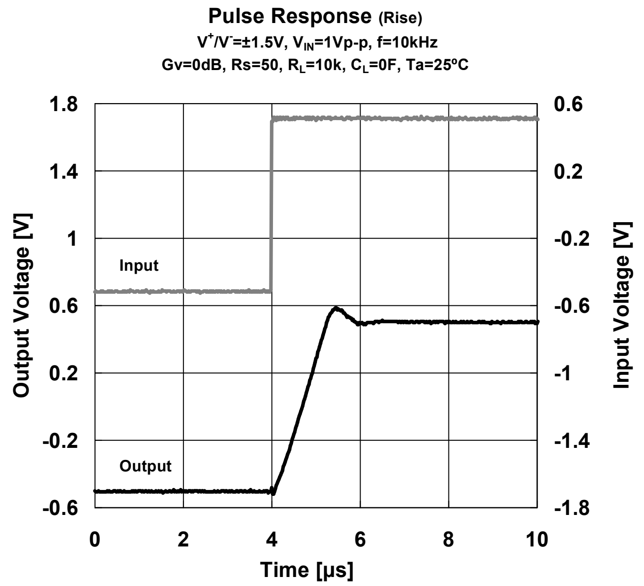
Pulse Response

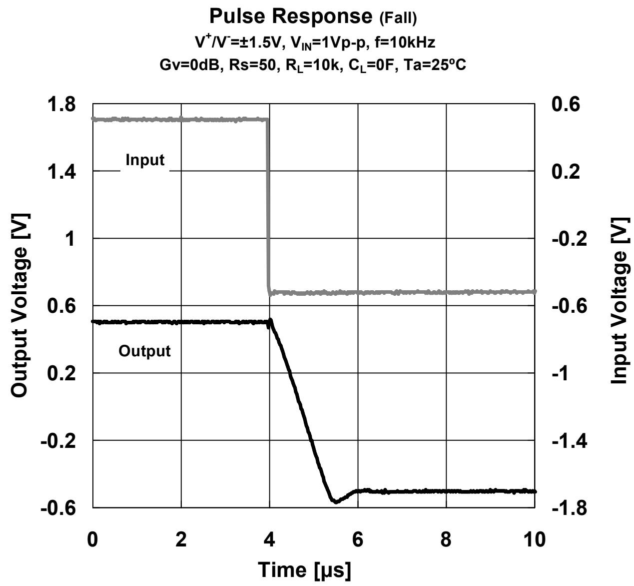
V^+/V^-=±1.5V, V_{IN}=1Vp-p, f=10kHz

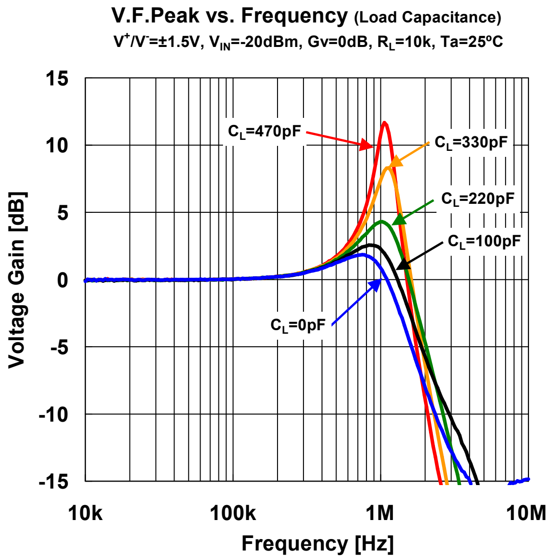
Gv=0dB, Rs=50, R_L=10k, C_L=0F, Ta=25°C

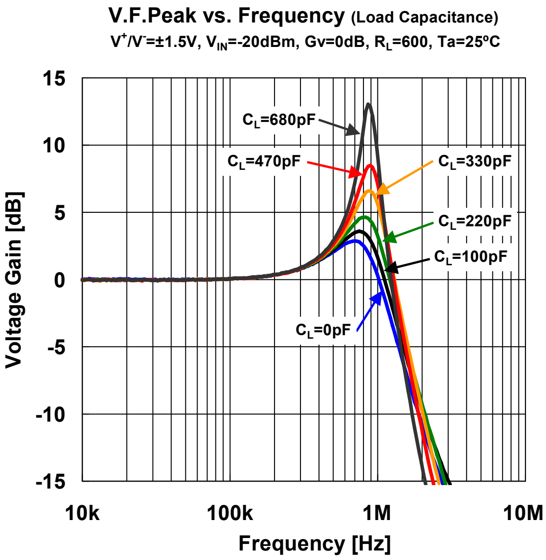


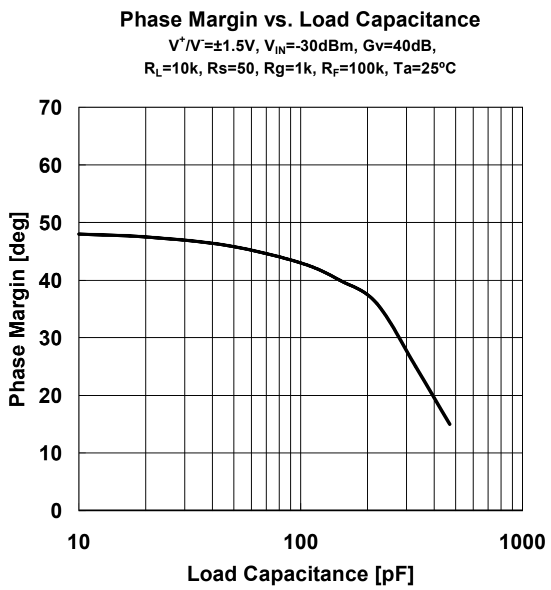
■TYPICAL CHARACTERISTICS

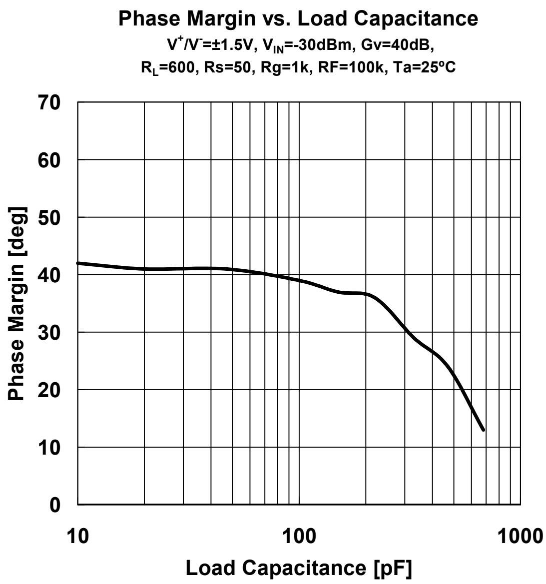












■TYPICAL CHARACTERISTICS