

## Single Ultra-High speed and Wide Band Operational Amplifier

### ■ GENERAL DESCRIPTION

The **NJM2722** is single and ultra-high speed and wide band operational amplifier.

The NJM2722 is 1000V/ $\mu$ s slew rate and 1k $\Omega$  load drive is possible, at supply voltage of  $\pm 4.5$ V.

The NJM2722 is suitable for video signal processing, video buffer, pulse amplifiers, ADC input buffer, measuring instrument, and digital communication.

### ■ PACKAGE OUTLINE



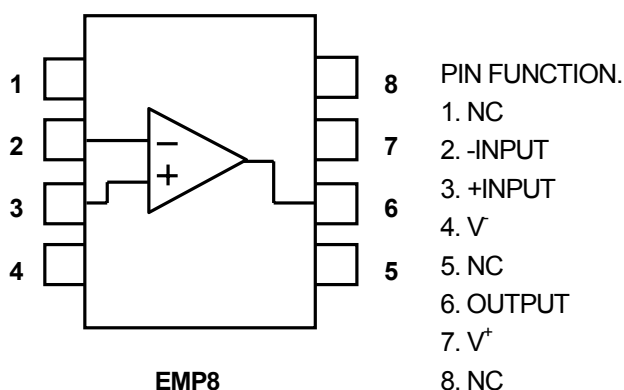
**NJM2722E**

### ■ FEATURES

- Operating Voltage :  $\pm 2.5$ V to  $\pm 5.0$ V
- Slew Rate : 1000V/ $\mu$ s Typ. (at  $V^+/V^- = \pm 4.5$ V,  $R_L = 1$ k $\Omega$ )
- Unity-Gain : 170MHz Typ.
- Output Voltage :  $V_{OH} = +3.2$ V Typ. (at  $V^+/V^- = \pm 4.5$ V,  $R_L = 1$ k $\Omega$ )  
:  $V_{OL} = -3.2$ V Typ. (at  $V^+/V^- = \pm 4.5$ V,  $R_L = 1$ k $\Omega$ )
- Offset Voltage : 5mV Typ.
- Operating Current : 16.5 mA Typ.
- Adequate phase margin :  $\Phi_M = 70$ deg. Typ. (at  $R_L = 2$ k $\Omega$ , voltage follower)
- Bipolar Technology
- Package Outline : EMP8

### ■ FEATURES

(Top View)



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                        | SYMBOL    | RATINGS           | UNIT |
|----------------------------------|-----------|-------------------|------|
| Supply Voltage                   | $V^+$     | 11.0              | V    |
| Power Dissipation                | $P_D$     | EMP8: 910 (Note1) | mW   |
| Differential Input Voltage Range | $V_{ID}$  | ±3.0              | V    |
| Common Mode Input Voltage Range  | $V_{ICM}$ | 11.0              | V    |
| Operating Temperature Range      | $T_{opr}$ | -40 to +85        | °C   |
| Storage Temperature Range        | $T_{stg}$ | -40 to +150       | °C   |

(Note 1) On the PCB " EIA/JEDEC (76.2x11.43x1.6mm, four layers, FR-4) "

## ■ RECOMMENDED OPERATING CONDITION

(Ta=25°C)

| PARAMETER      | SYMBOL    | RATING       | UNIT |
|----------------|-----------|--------------|------|
| Supply Voltage | $V^+/V^-$ | ±2.5 to ±5.0 | V    |

## ■ ELECTRICAL CHARACTERISTICS

### ●DC CHARACTERISTICS

( $V^+/V^- = \pm 2.5V$ , Ta=25°C)

| PARAMETER                       | SYMBOL    | TEST CONDITION                          | MIN. | TYP. | MAX. | UNIT |
|---------------------------------|-----------|-----------------------------------------|------|------|------|------|
| Operating Current               | $I_{CC}$  | No Signal                               | -    | 16.5 | 25.5 | mA   |
| Input Offset Voltage            | $V_{IO}$  |                                         | -    | 5.0  | 28.0 | mV   |
| Input Bias Current              | $I_B$     |                                         | -    | 25.5 | 70.0 | μA   |
| Input Offset Current            | $I_{IO}$  |                                         | -    | 0.3  | 1.7  | μA   |
| Large Signal Voltage Gain       | $A_V$     | $R_L = 2k\Omega$ (Note 2)               | 50   | 60   | -    | dB   |
| Input Common Mode Voltage Range | $V_{ICM}$ | $V^+/V^- = \pm 4.5V$                    | +3.1 | +3.5 | -    | V    |
|                                 |           |                                         | -2.7 | -3.0 | -    | V    |
| Common Mode Rejection Ratio     | CMR       | $V^+/V^- = \pm 4.5V$                    | 60   | 80   | -    | dB   |
|                                 |           | $-2.7V \leq V_{ICM} \leq +3.1V$         |      |      |      |      |
| Supply Voltage Rejection Ratio  | SVR       | $\pm 2.5V \leq V^+/V^- \leq \pm 5.0V$   | 50   | 60   | -    | dB   |
| Maximum Output Voltage Swing    | $V_{OM}$  | $V^+/V^- = \pm 4.5V$ , $R_L = 1k\Omega$ | ±2.9 | ±3.2 | -    | V    |

(Note 2) When using NJM2722, the closed gain should be 40dB or lower.

### ●AC CHARACTERISTICS

( $V^+/V^- = \pm 4.5V$ , Ta=25°C)

| PARAMETER            | SYMBOL   | TEST CONDITION                                                                        | MIN. | TYP. | MAX. | UNIT |
|----------------------|----------|---------------------------------------------------------------------------------------|------|------|------|------|
| Unity Gain Frequency | $f_T$    | $A_V = 40dB$ , $R_F = 1.98k\Omega$<br>$R_G = 20\Omega$ , $R_L = \infty$ , $C_L = 5pF$ | -    | 170  | -    | MHz  |
| Phase Margin         | $\Phi_M$ | $A_V = 40dB$ , $R_F = 1.98k\Omega$<br>$R_G = 20\Omega$ , $R_L = \infty$ , $C_L = 5pF$ | -    | 70.0 | -    | Deg  |

### ●AC CHARACTERISTICS

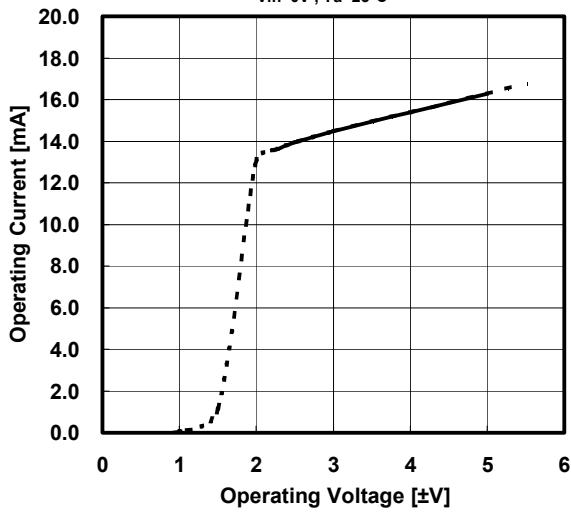
( $V^+/V^- = \pm 4.5V$ , Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION                                                                                           | MIN. | TYP. | MAX. | UNIT |
|-----------|--------|----------------------------------------------------------------------------------------------------------|------|------|------|------|
| Slew Rate | SR     | $A_V = 0dB$ , $R_F = 0\Omega$ , $R_G = \infty$<br>$R_L = 1k\Omega$ , $C_L = 1.5pF$<br>$V_{IN} = 4V_{PP}$ | -    | 1000 | -    | V/μs |

## ■ TYPICAL CHARACTERISTICS

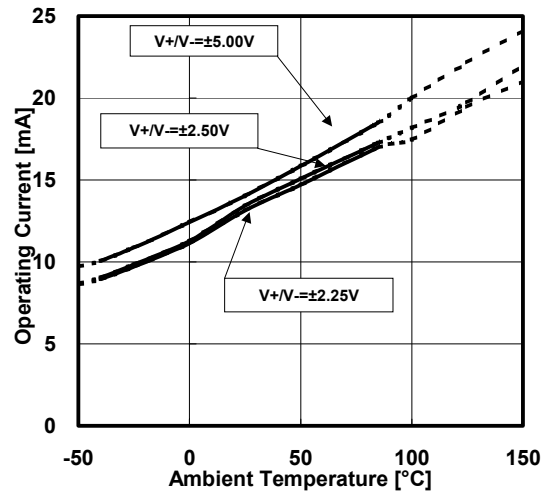
Maximum Output Voltage Swing  
vs. Operating Voltage

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



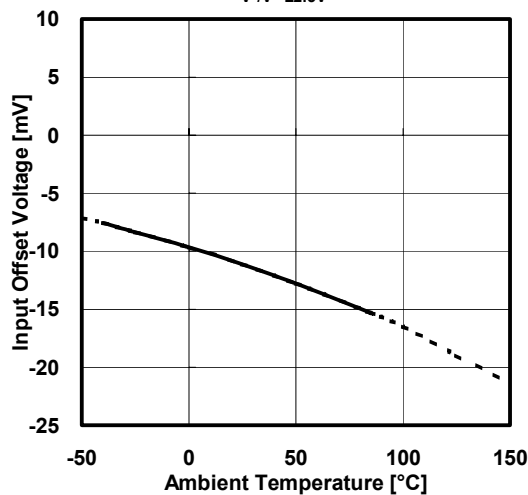
Operating Current vs. Ambient Temperature

$V_{in}=0V$



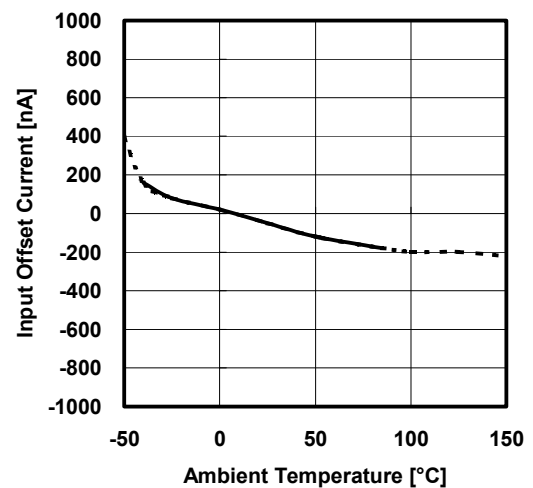
Input Offset Voltage vs. Ambient Temperature

$V+/V-=\pm 2.5V$



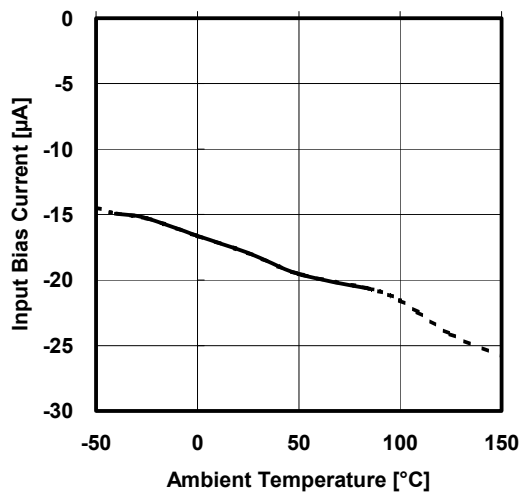
Input Offset Current vs. Ambient Temperature

$V+/V-=\pm 2.5V$

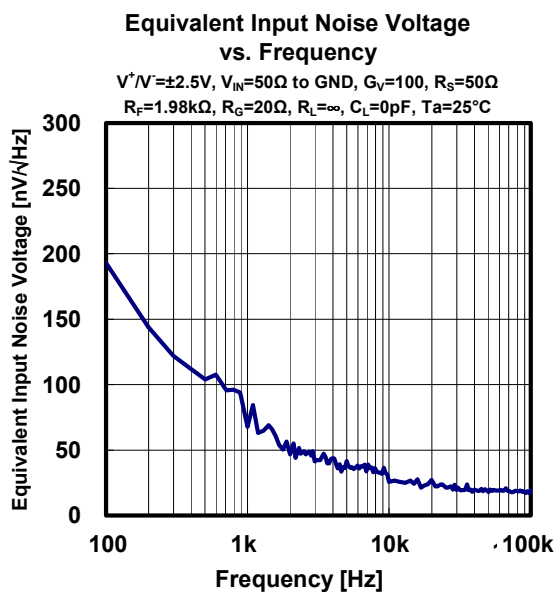
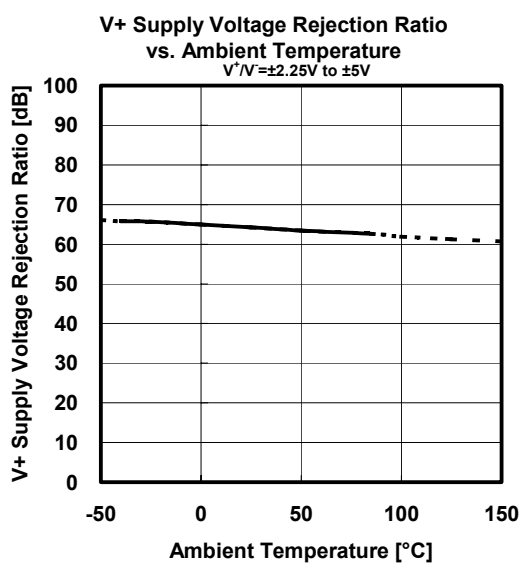
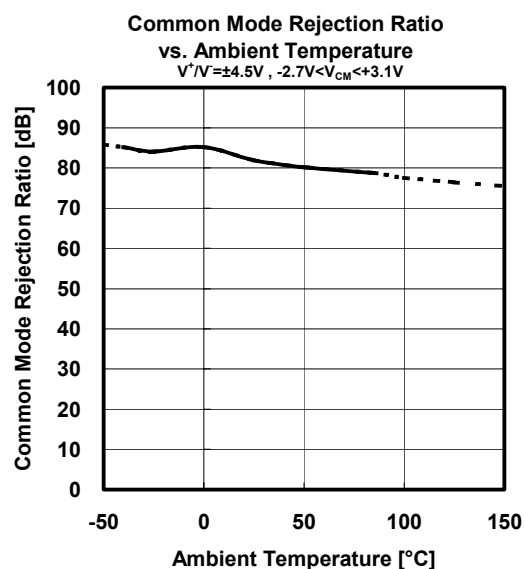
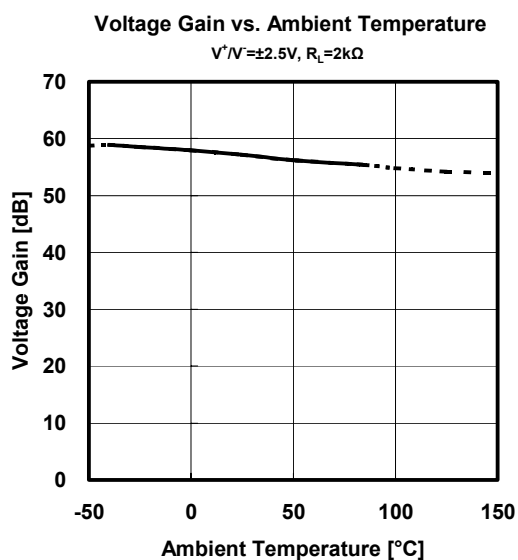
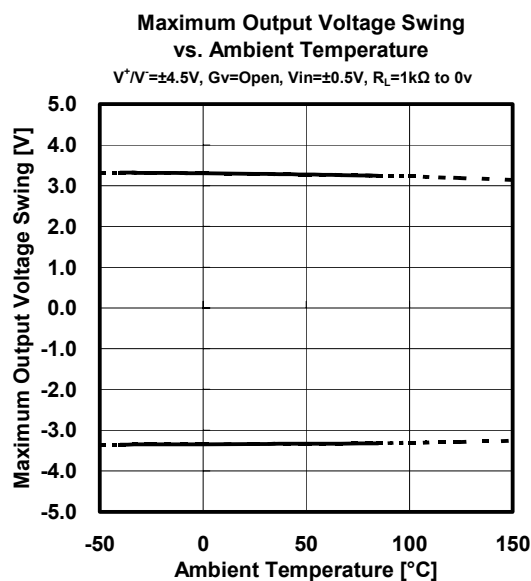
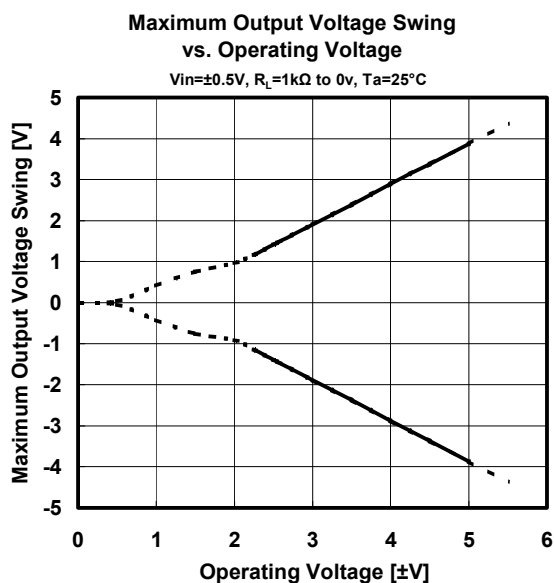


Input Bias Current vs. Ambient Temperature

$V+/V-=\pm 2.5V$



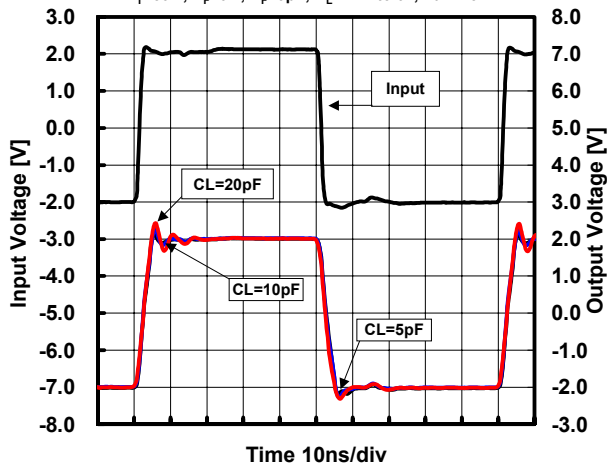
## ■ TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS

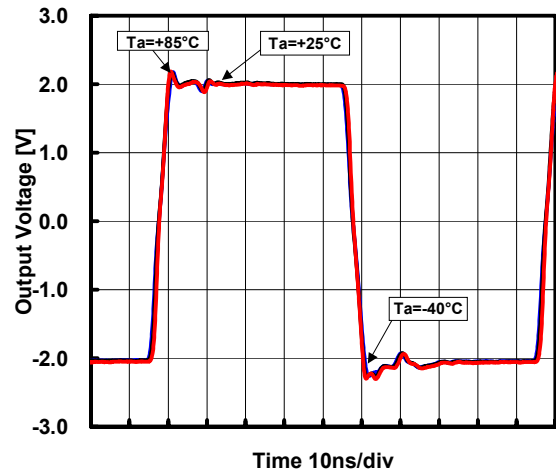
Pulse Response (with Capacitive load)

$V^+/V^- = \pm 4.5V$ ,  $f = 10MHz$ ,  $V_O = 4V_{PP}$ ,  $G_V = 0dB$   
 $R_T = 50\Omega$ ,  $R_F = 0\Omega$ ,  $C_F = 0pF$ ,  $R_L = 1k\Omega$  to  $0V$ ,  $T_a = +25^\circ C$



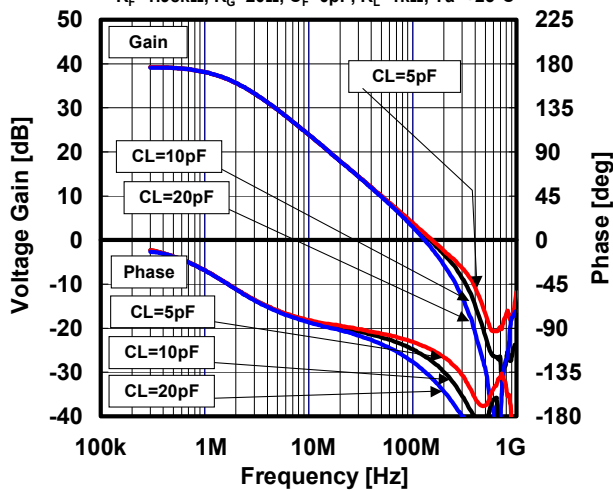
Pulse Response (correlation with  $T_a$ )

$V^+/V^- = \pm 4.5V$ ,  $f = 10MHz$ ,  $V_O = 4V_{PP}$ ,  $G_V = 0dB$   
 $R_T = 50\Omega$ ,  $R_F = 0\Omega$ ,  $C_F = 0pF$ ,  $C_L = 5pF$ ,  $R_L = 1k\Omega$  to  $0V$



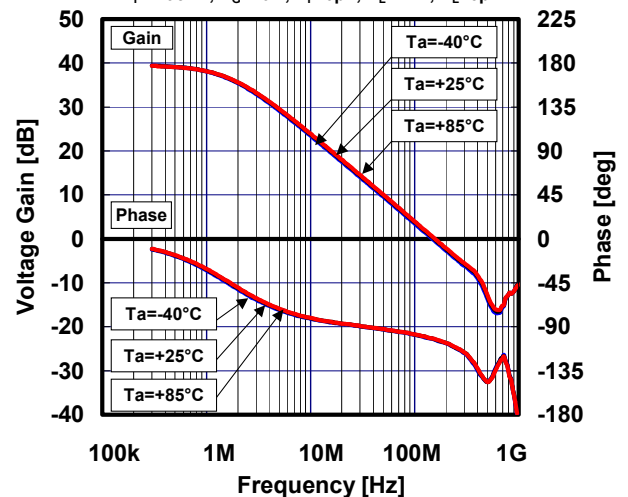
Voltage Gain vs. Frequency (with Capacitive load)

$V^+/V^- = \pm 4.5V$ ,  $V_{IN} = 0.02V_{PP}$ ,  $G_V = 40dB$ ,  $R_T = 50\Omega$   
 $R_F = 1.98k\Omega$ ,  $R_G = 20\Omega$ ,  $C_F = 0pF$ ,  $R_L = 1k\Omega$ ,  $T_a = +25^\circ C$



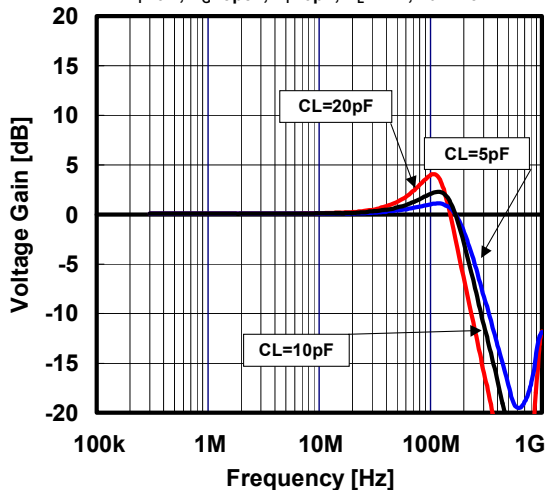
Voltage Gain vs. Frequency (correlation with  $T_a$ )

$V^+/V^- = \pm 2.5V$ ,  $V_{IN} = 0.02V_{PP}$ ,  $G_V = 40dB$ ,  $R_T = 50\Omega$   
 $R_F = 1.98k\Omega$ ,  $R_G = 20\Omega$ ,  $C_F = 0pF$ ,  $R_L = 2k\Omega$ ,  $C_L = 5pF$



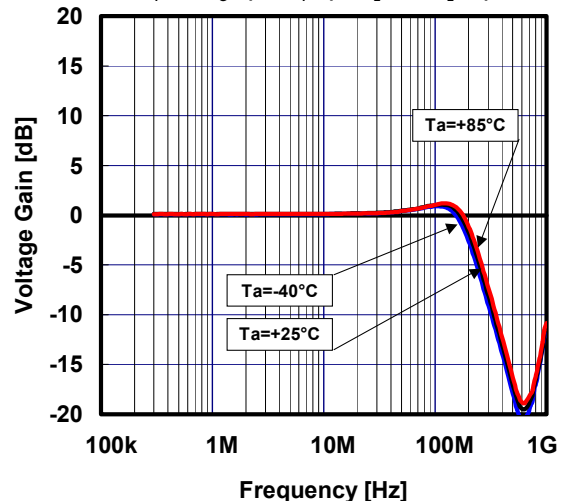
Voltage Gain vs. Frequency (with Capacitive load)

$V^+/V^- = \pm 4.5V$ ,  $V_{IN} = 0.02V_{PP}$ ,  $G_V = 0dB$ ,  $R_T = 50\Omega$   
 $R_F = 0\Omega$ ,  $R_G = \text{open}$ ,  $C_F = 0pF$ ,  $R_L = 1k\Omega$ ,  $T_a = +25^\circ C$



Voltage Gain vs. Frequency (correlation with  $T_a$ )

$V^+/V^- = \pm 4.5V$ ,  $V_{IN} = 0.02V_{PP}$ ,  $G_V = 0dB$ ,  $R_T = 50\Omega$   
 $R_F = 0\Omega$ ,  $R_G = \text{open}$ ,  $C_F = 0pF$ ,  $R_L = 1k\Omega$ ,  $C_L = 20pF$



[CAUTION]  
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