

## Single Supply Single Operational Amplifier with Full Swing Output

### ■ GENERAL DESCRIPTION

The NJM2741 is a low supply voltage operational amplifier with Full swing output.

The output full swing function provides wide dynamic range, is from ground to power supply level. And Input range rails from ground level.

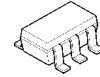
It is suitable for audio section of portable sets, PCs and any General-purpose use.

### ■ FEATURES

- Operating Voltage : 2.5V to 14V
- Output Full Swing :  $V_{OH} \geq 4.9V$  Typ. (at  $V^+ = 5V, R_L = 5k\Omega$ )  
:  $V_{OL} \leq 0.1V$  Typ. (at  $V^+ = 5V, R_L = 5k\Omega$ )
- Offset Voltage : 1mV Typ
- Slew Rate : 3.5V/ $\mu s$  Typ.
- Low Distortion : 0.001% typ. (at  $V^+ = 5V, f = 1kHz$ )
- Low Input Voltage Noise : 10nV/ $\sqrt{Hz}$  typ.
- Bipolar Technology
- Package Outline : MTP5, SC88A

### ■ PIN CONFIGURATION

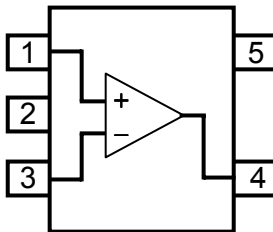
### ■ PACKAGE OUTLINE



NJM2741F



NJM2741F3



**NJM2741F**  
**NJM2741F3**  
(Top View)

### PIN FUNCTION

1. +INPUT
2. GND
3. -INPUT
4. OUTPUT
5.  $V^+$

# NJM2741

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## ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+$	15	V
Differential Input Voltage Range	$V_{ID}$	$\pm 15$ (Note1)	V
Common Mode Input Voltage Range	$V_{ICM}$	0 to 15 (Note1)	V
Power Dissipation	$P_D$	390[MTP5] (Note2) 280[SC88A] (Note2)	mW
Operating Temperature Range	$T_{opr}$	-40 to +85	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	-50 to +125	$^{\circ}\text{C}$

(Note1) For supply voltage less than 15V, the absolute maximum input voltage is equal to the supply voltage.

(Note2) On the PCB "EIA/JEDEC (76.2x114.3x1.6mm, two layers, FR-4)"

## ■ OPERATING VOLTAGE ( $T_a=25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+$	2.5 to 14	V

## ■ ELECTRICAL CHARACTERISTICS

### ● DC CHARACTERISTICS ( $V^+=5\text{V}, T_a=25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	$I_{CC}$	$R_L=\infty, V_{IN}=2.5\text{V}$ , No Signal Apply	-	2.2	3.3	mA
Input Offset Voltage	$V_{IO}$	$R_S \leq 10\text{k}\Omega$	-	1	6	mV
Input Bias Current	$I_B$		-	100	350	nA
Input Offset Current	$I_{IO}$		-	5	100	nA
Large Signal Voltage Gain	$A_V$	$R_L \geq 10\text{k}\Omega$ to 2.5V, $V_o=0.5\text{V}$ to 4.5V	65	85	-	dB
Common Mode Rejection Ratio	CMR	$0\text{V} \leq V_{CM} \leq 4\text{V}$	60	75	-	dB
Supply Voltage Rejection Ratio	SVR	$V^+=2.5\text{V}$ to 14V, $V_{CM}=V^+/2$	60	80	-	dB
Output Voltage	$V_{OH}$	$R_L=5\text{k}\Omega$ to 2.5V	4.75	4.9	-	V
	$V_{OL}$	$R_L=5\text{k}\Omega$ to 2.5V	-	0.1	0.25	V
Input Common Mode Voltage Range	$V_{ICM}$	CMR $\geq 60\text{dB}$	0	-	4	V

### ● AC CHARACTERISTICS ( $V^+=5\text{V}, T_a=25^{\circ}\text{C}$ )

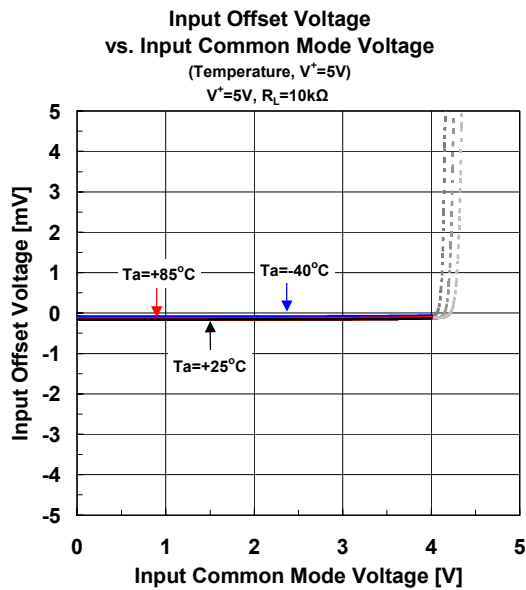
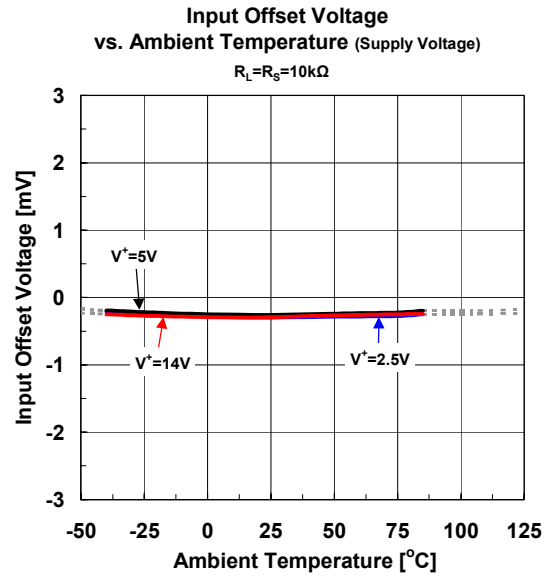
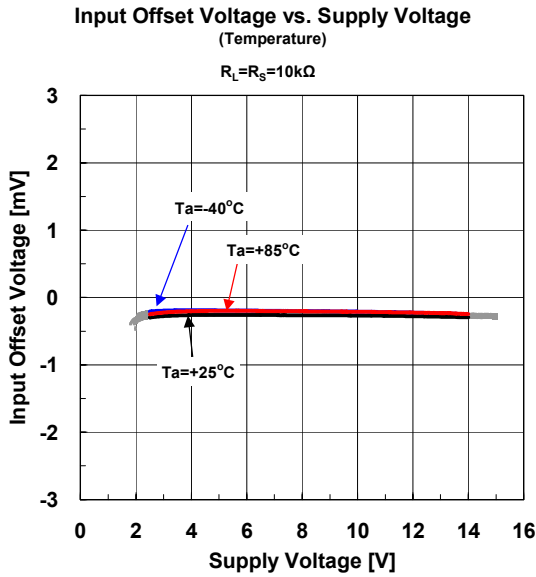
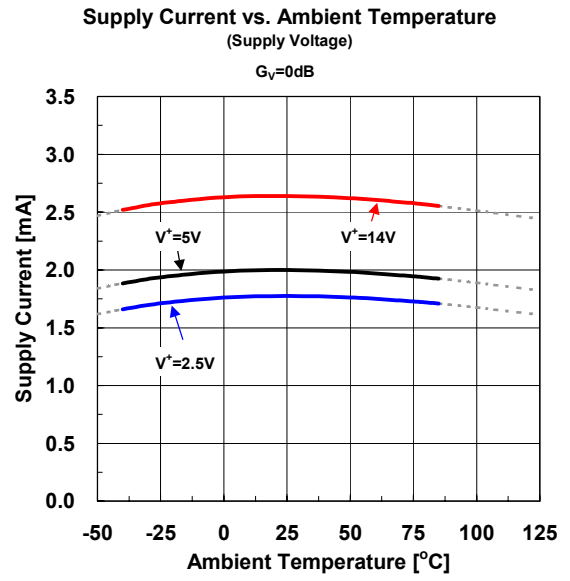
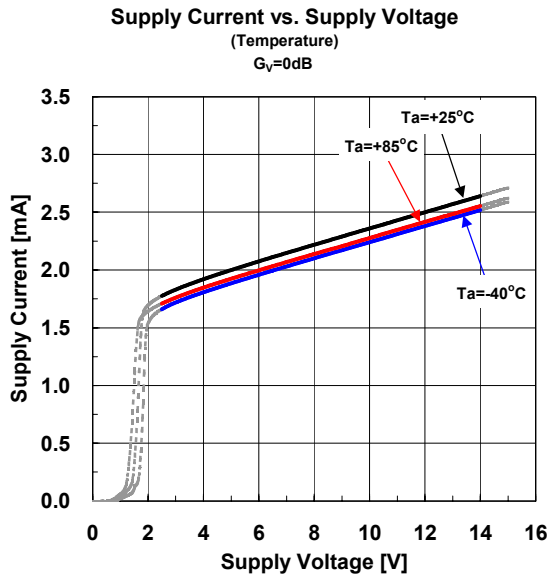
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	$f=10\text{kHz}, R_L=10\text{k}\Omega$ to 2.5V	-	10	-	MHz
Phase Margin	$\Phi_M$	$R_L=10\text{k}\Omega$ to 2.5V, $C_L=10\text{pF}$	-	75	-	Deg
Equivalent Input Noise Voltage	$V_{NI}$	$f=1\text{kHz}, V_{CM}=2.5\text{V}$	-	10	-	nV/ $\sqrt{\text{Hz}}$
Total Harmonic Distortion	THD	$f=1\text{kHz}, A_V=+2$ $R_L=10\text{k}\Omega$ to 2.5V, $V_o=1.5\text{Vrms}$	-	0.001	-	%

### ● AC CHARACTERISTICS ( $V^+=5\text{V}, T_a=25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	(Note 3), $A_V=1, V_{IN}=2\text{Vpp}$ $R_L=10\text{k}\Omega$ to 2.5V, $C_L=10\text{pF}$	-	3.5	-	V/ $\mu\text{s}$

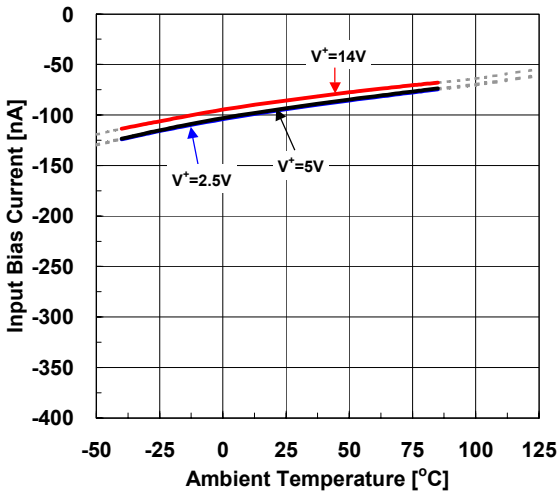
(Note 3) Number specified is the slower of the positive and negative slew rates.

## ■ Typical Characteristics

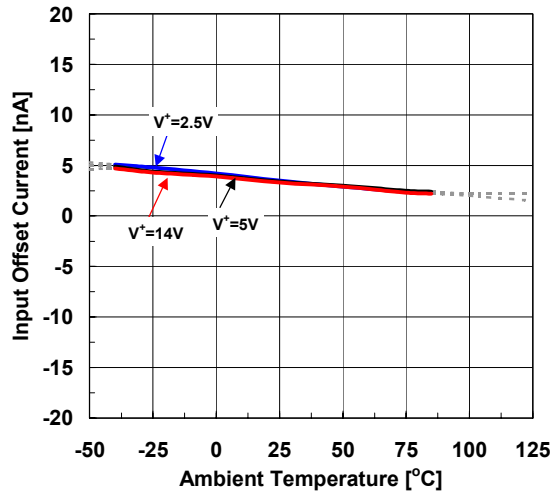


## ■ Typical Characteristics

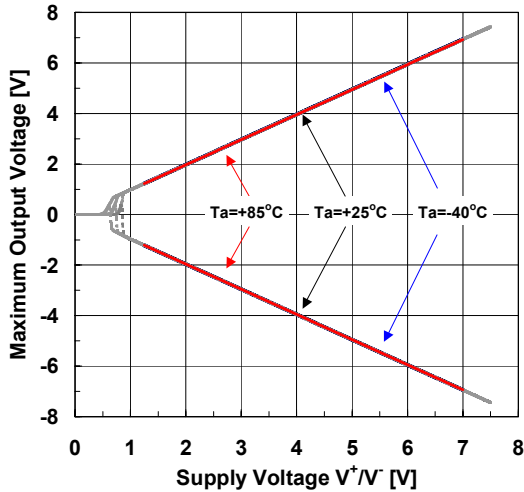
**Input Bias Current vs. Ambient Temperature**  
(Supply Voltage)  
 $R_L=10k\Omega$



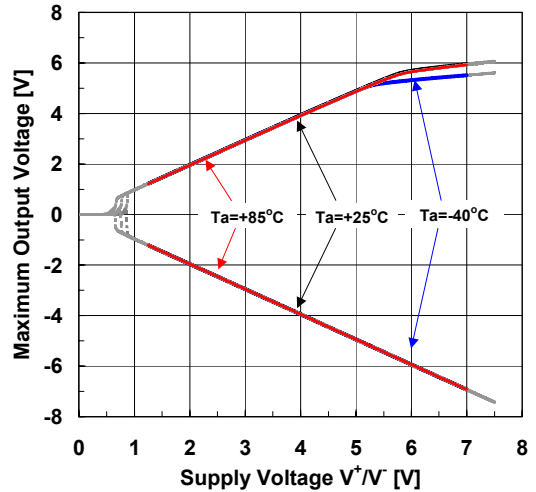
**Input Offset Current vs. Ambient Temperature**  
(Supply Voltage)  
 $R_L=10k\Omega$



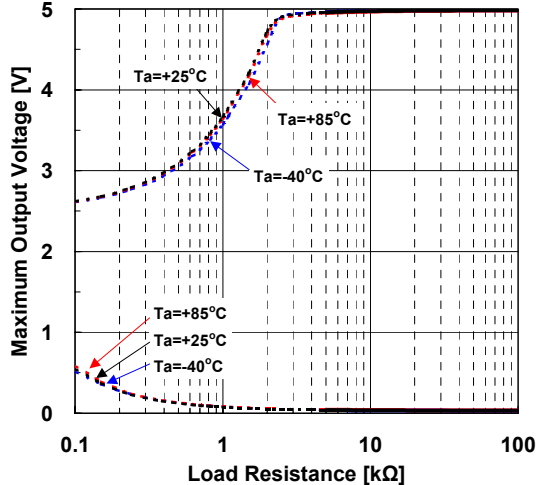
**Maximum Output Voltage vs. Supply Voltage**  
(Temperature,  $R_L=10k\Omega$ )  
 $G_V=OPEN, R_L=10k\Omega$



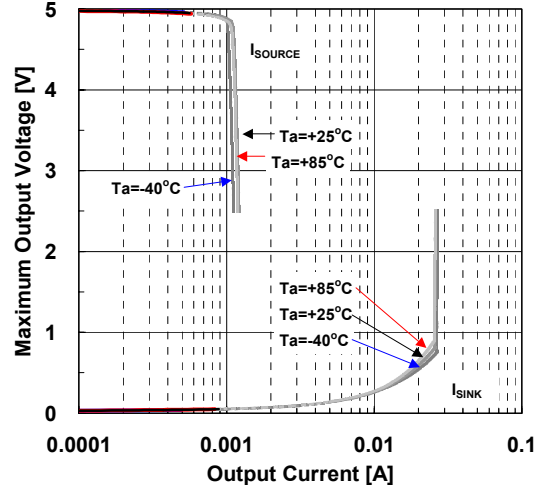
**Maximum Output Voltage vs. Supply Voltage**  
(Temperature,  $R_L=5k\Omega$ )  
 $G_V=OPEN, R_L=5k\Omega$



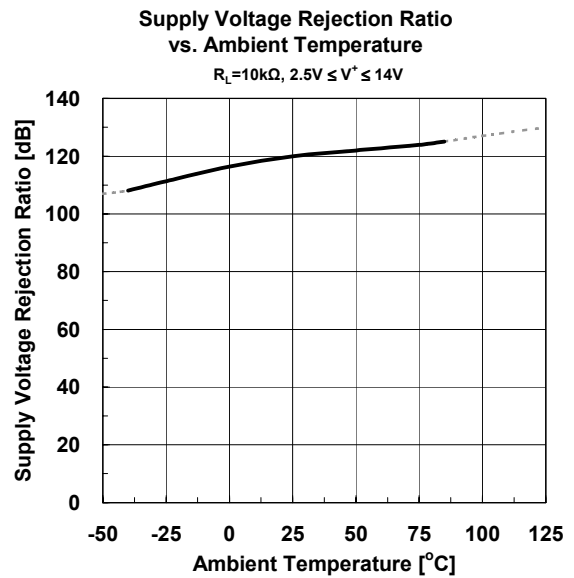
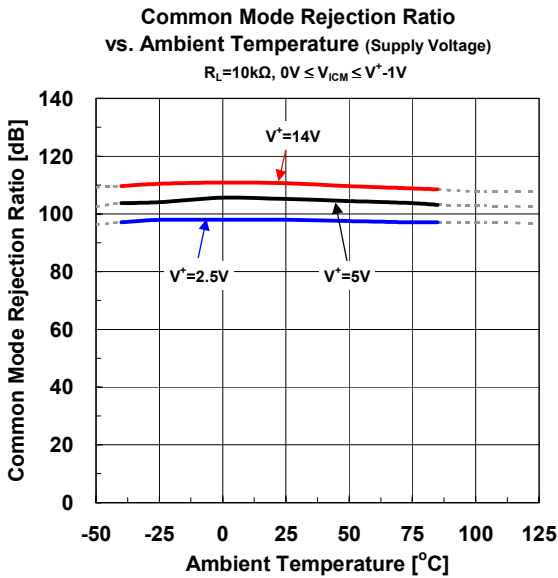
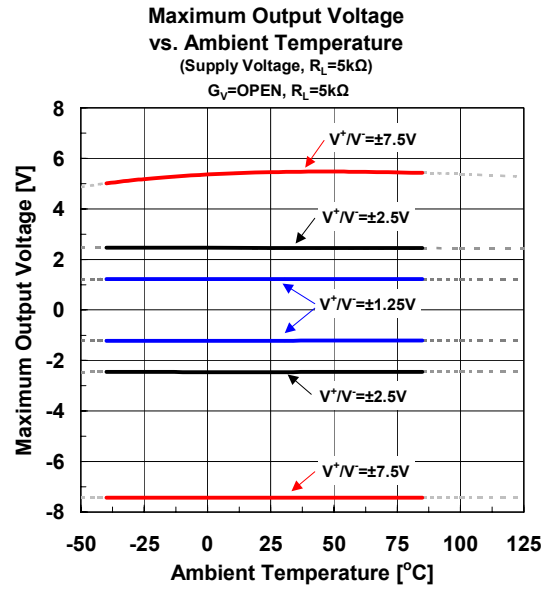
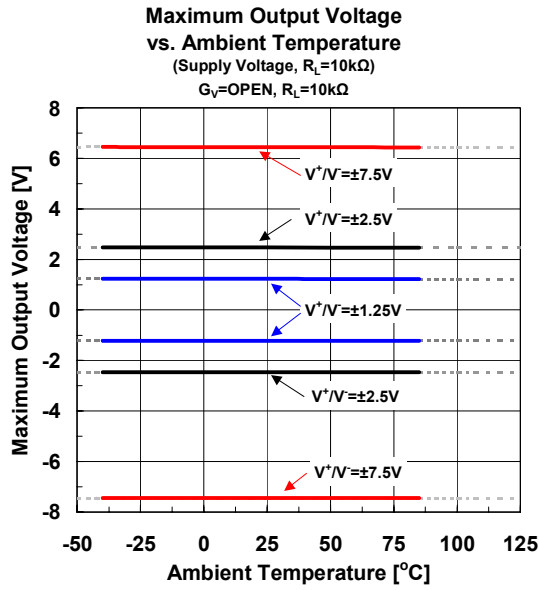
**Maximum Output Voltage vs. Load Resistance**  
(Ambient Temperature,  $V^+=5V$ )  
 $V^+=5V, G_V=OPEN$



**Maximum Output Voltage vs. Output Current**  
(Temperature,  $V^+=5V$ )  
 $V^+=5V, G_V=OPEN$



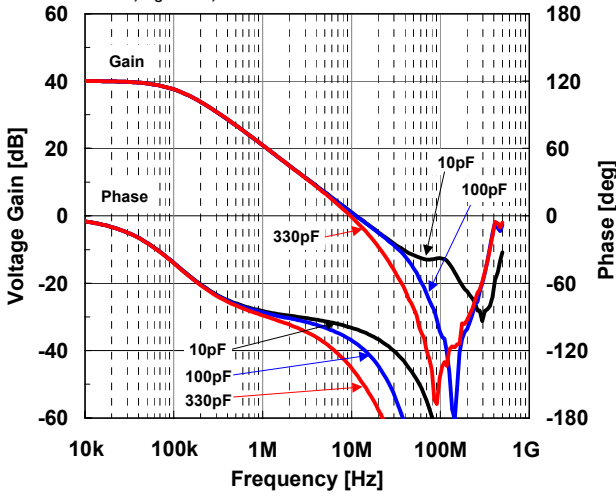
## ■ Typical Characteristics



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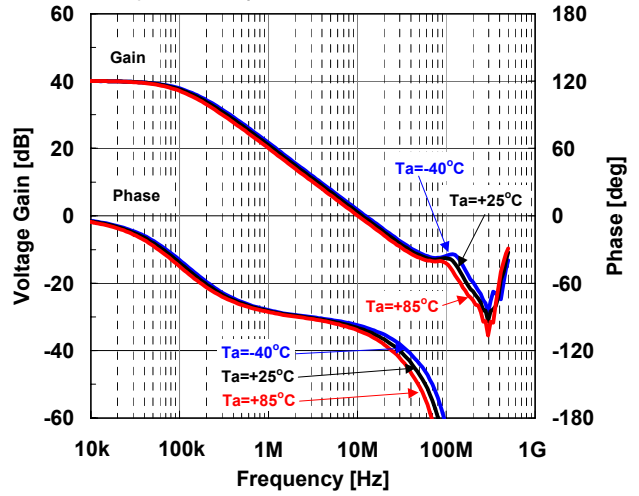
**Gain/Phase vs. Frequency (capacitive Load)**

$V^+=5V$ ,  $V_{IN}=-30dBm$ ,  $G_V=40dB$ ,  $R_T=50\Omega$ ,  $R_F=10k\Omega$ ,  $R_G=100\Omega$ ,  $T_a=25^\circ C$



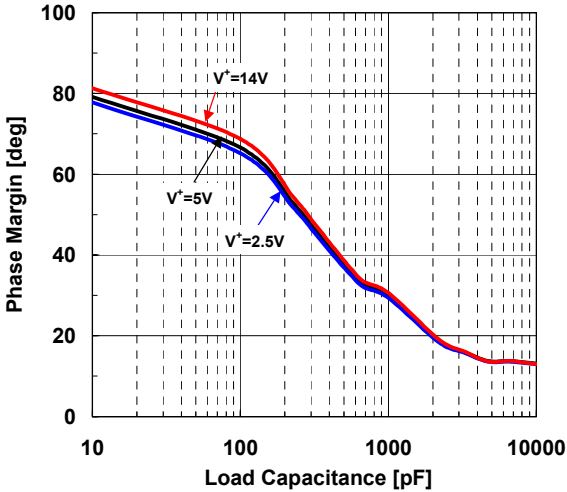
**Gain/Phase vs. Frequency (Temperature)**

$V^+=5V$ ,  $V_{IN}=-30dBm$ ,  $G_V=40dB$ ,  $R_T=50\Omega$ ,  $R_F=10k\Omega$ ,  $R_G=100\Omega$ ,  $C_L=10pF$



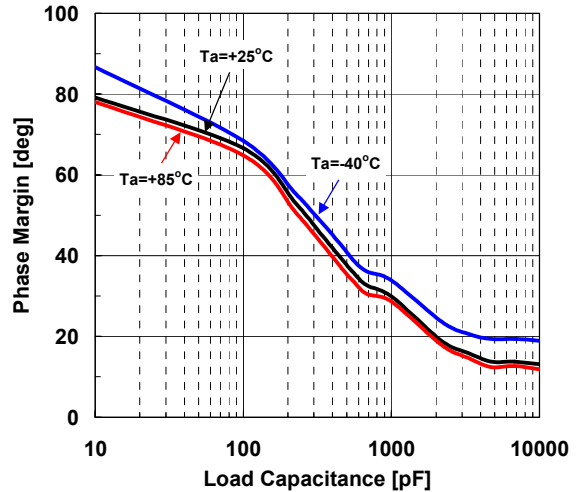
**Phase Margin vs. Load Capacitance (Supply Voltage)**

$V_{IN}=-30dBm$ ,  $G_V=40dB$ ,  $R_T=50\Omega$ ,  $R_F=10k\Omega$ ,  $R_G=100\Omega$ ,  $T_a=25^\circ C$



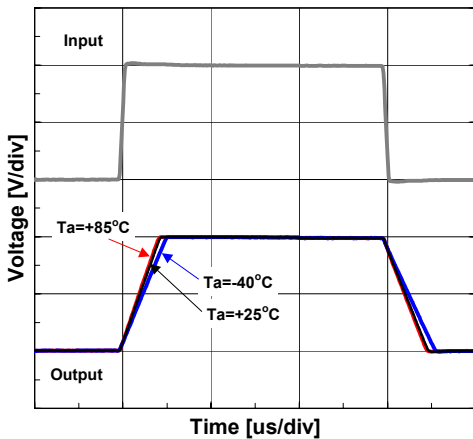
**Phase Margin vs. Load Capacitance (Temperature)**

$V^+=5V$ ,  $V_{IN}=-30dBm$ ,  $G_V=40dB$ ,  $R_T=50\Omega$ ,  $R_F=10k\Omega$ ,  $R_G=100\Omega$



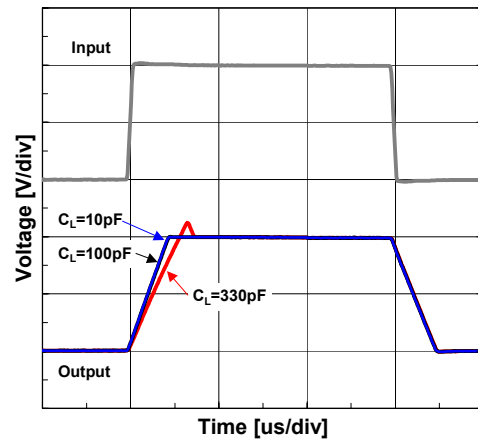
**Pulse Response (Ambient Temperature,  $V^+/V^-\approx\pm 2.5V$ )**

$V^+/V^-\approx\pm 2.5V$ ,  $V_{IN}=1V_{pp}$ ,  $A_V=+1$ ,  $R_L=10k\Omega$ ,  $C_L=10pF$

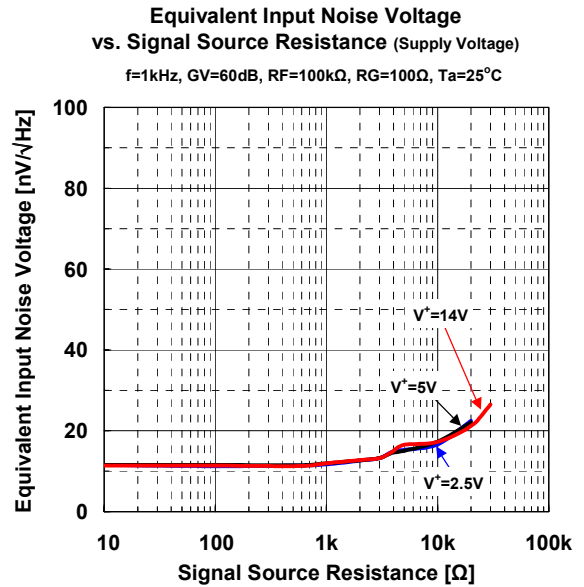
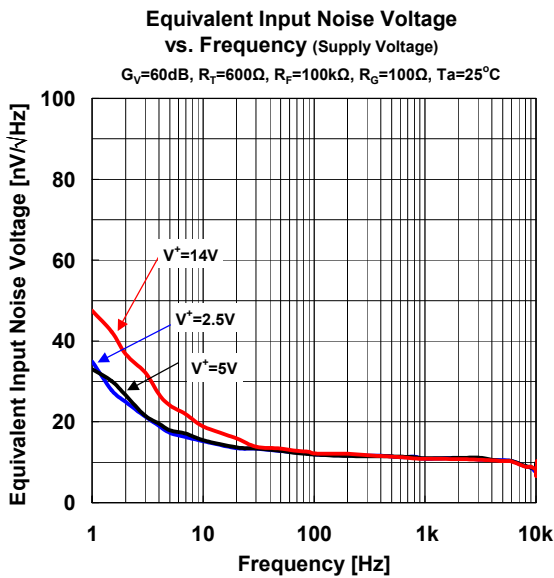
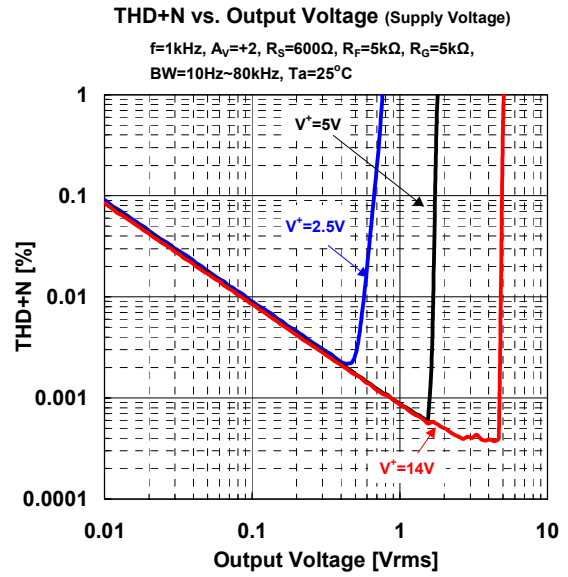
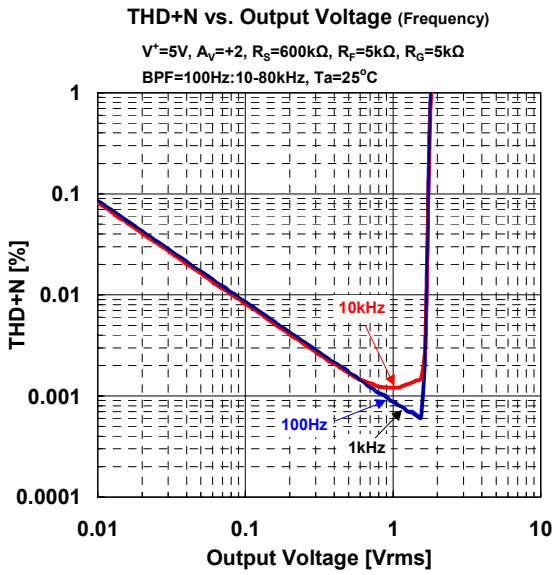


**Pulse Response (Load Capacitance,  $V^+/V^-\approx\pm 2.5V$ )**

$V^+/V^-\approx\pm 2.5V$ ,  $V_{IN}=1V_{pp}$ ,  $A_V=+1$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$



## ■ Typical Characteristics



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## ■ MEMO

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