HIGH-SPEED AND HIGH OPERATING VOLTAGE OPERATIONAL AMPLIFIER

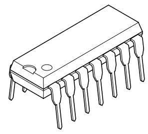
■GENERAL DESCRIPTION

The NJM2727 is a high-speed, high operating voltage single operational amplifier.

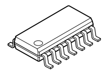
With 300V/µs slew rate, 40MHz unity gain bandwidth and 4mV input offset voltage the NJM2727 offers high performance.

The NJM2727 operates on ±15V power supply for systems requiring large voltage swings, such as industrial equipment.

■PACKAGE OUTLINE



NJM2727D



NJM2727E

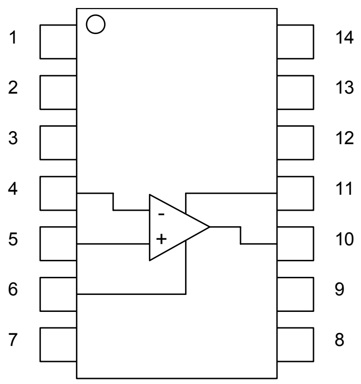
■FEATURES

•Operating Voltage	± 4.5V to ± 18V
•Input Offset Voltage	V_{IO}=4mV max.
•Output Voltage	± 12V typ. (at R_L=500Ω V^+/V^-=±15V)
•Unity Gain Bandwidth	40MHz typ.
•High Slew Rate	300V/µs typ. (at R_L=500Ω V^+/V^-=±15V)
•Bipolar Technology	
•Package Outline	NJM2727D DIP14
	NJM2727E EMP14

■ Application

- ●Active Filters
- ●ADC/DAC Buffers
- ●Line Drivers, Cable Drivers
- ●Pulse Amplifiers
- ●Ultrasound Amplifiers

■ PIN CONFIGURATION



NJM2727D
NJM2727E

PIN FUNCTION

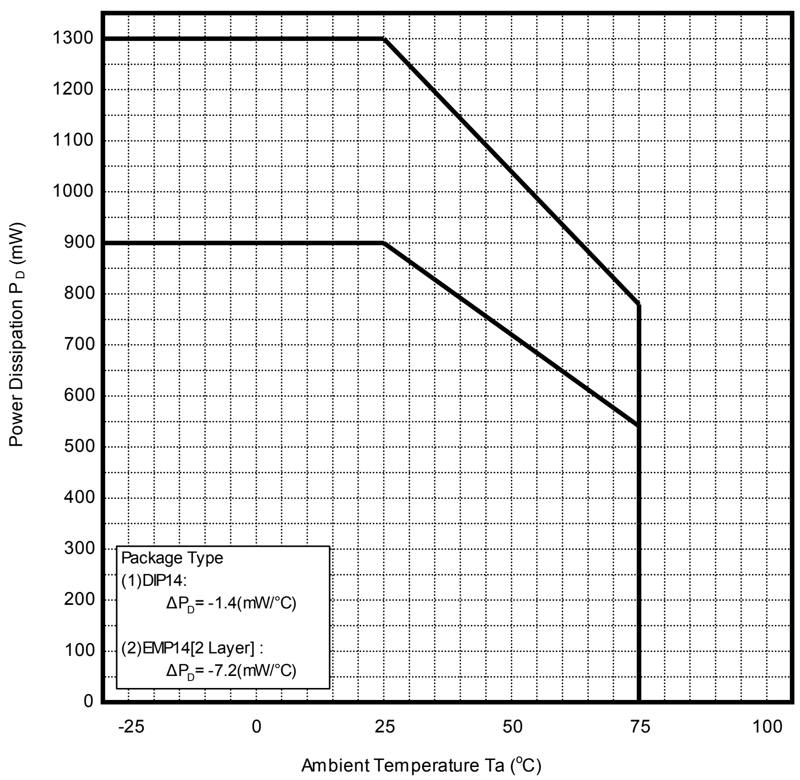
1. NC	8. NC
2. NC	9. NC
3. NC	10. OUTPUT
4. −INPUT	11. V^+
5. +INPUT	12. NC
6. V-	13. NC
7. NC	14. NC

■ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+ / V^-	±20	V
Differential Input Voltage Range	V_{ID}	±6	V
Common Mode Input Voltage Range	V_{ICM}	±20 (Note 1)	V
Power Dissipation	P_D	1300 [DIP8] 900 [EMP8] (Note 2)	mW
Operating Temperature Range	Topr	−40 ~ +75	°C
Storage Temperature Range	Tstg	−50 ~ +150	°C

(Note 1) For supply Voltages less than±20V, the maximum input voltage is equal to the Supply Voltage.
(Note 2) On a PCB (76.2×114×31.6mm, two layers, FR-4)
(Note 3) 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. Ambient Temperature



■RECOMMENDED OPERATING CONDITION (Ta=25°C)

PARAMETER	SYMBOL	RATING	Min.	Typ.	Max.	UNIT
Operating Voltage	V^+/V^-		±4.5	±15	±18	V

■ELECTRIC CHARACTERISTICS

•DC CHARACTERISTICS (V^+/V^-=±15V, Ta= 25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	Icc	No Signal	-	10	13	mA
Input Offset Voltage	V_{IO}	Rs=50Ω, R_F=50kΩ	-	1	4	mV
Input Bias Current	I_B	R_B=500Ω	-	10	30	μA
Input Offset Current	I_{IO}	R_B=500Ω	-	0.2	1.2	μA
Large Signal Voltage Gain	Av	R_L=2kΩ, Vo=±5V	60	66	-	dB
Common Mode Rejection Ratio	CMR	−11V≤V_{ICM}≤+11V	80	100	-	dB
Supply Voltage Rejection Ratio	SVR	V^+ / V^-=±4.5V ~ ±18V	70	80	-	dB
Maximum Output Voltage1	V_{OM1}	R_L=500Ω (Note 3)	±11	±12	-	V
Maximum Output Voltage2	V_{OM2}	R_L=150Ω (Note 3)	-	±3	-	V
Input Common Mode Voltage Range	V_{ICM}	CMR≥80dB	±11	±12	-	V

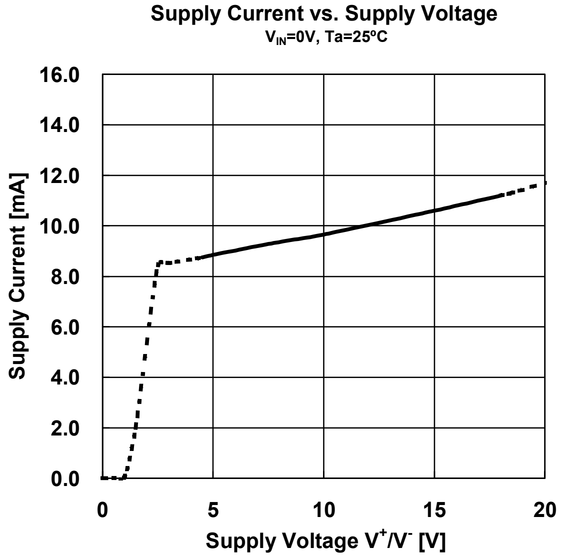
•AC CHARACTERISTICS (V^+/V^-=±15V, Ta= 25°C)

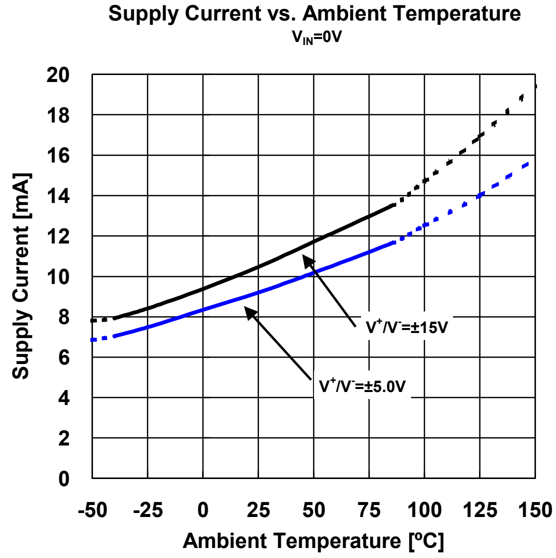
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Frequency	fT	A_V=40dB, R_F=1.98kΩ, R_G=20Ω R_L=∞, C_L=5pF	-	40	-	MHz
Phase Margin	φM	A_V=40dB, R_F=1.98kΩ, R_G=20Ω RL=∞, C_L=5pF	-	60	-	deg
Equivalent Input Noise Voltage	V_{NI}	A_V=40dB, R_F=1.98kΩ, R_G=20Ω R_L=∞, C_L=5pF, f=100kHz	-	14	-	nV/√Hz

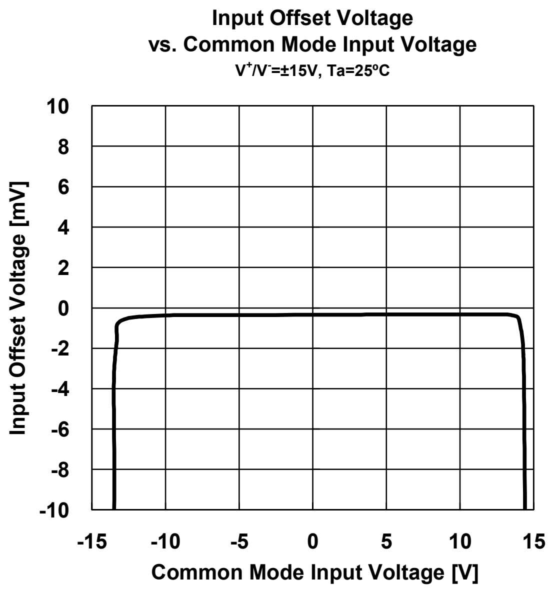
•TRANSIENT CHARACTERISTICS (V^+/V^-=±15V, Ta= 25°C)

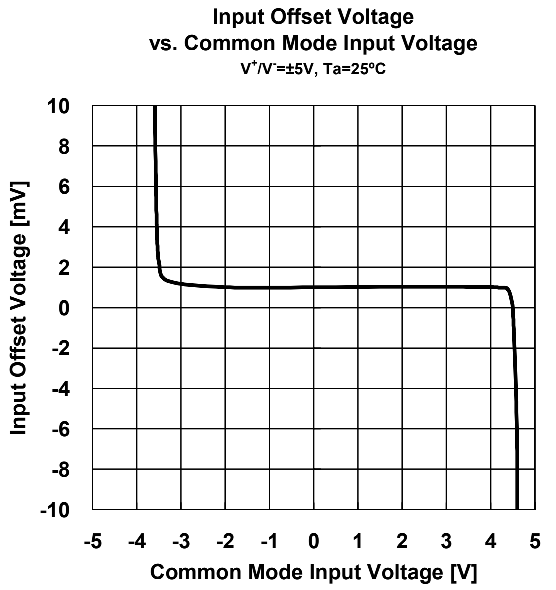
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate1	$SR1_P$	Gain= +1, R_F=0Ω, R_G=∞ R_L=500Ω, C_L=5pF, V_{IN}=10Vpp	-	300	-	V/μs
	$SR1_N$	Gain= −1, R_F=1kΩ, R_G=1kΩ R_L=∞, C_L=5pF, V_{IN}=10Vpp	-	300	-	V/μs
Slew Rate2	$SR2_P$	Gain= +1, R_F=0Ω, R_G=∞ R_L=500Ω, C_L=5pF, V_{IN}=1Vpp	-	100	-	V/μs
	$SR2_N$	Gain= −1, R_F=1kΩ, R_G=1kΩ R_L=∞, C_L=5pF, V_{IN}=1Vpp	-	100	-	V/μs
Differential Gain	DG	A_V=6dB, R_F=2kΩ, R_G=2kΩ, R_L=150Ω, C_L=5pF, Vin=1Vpp(NTSC)	-	0.09	-	%
Differential Phase	DP		-	0.64	-	deg

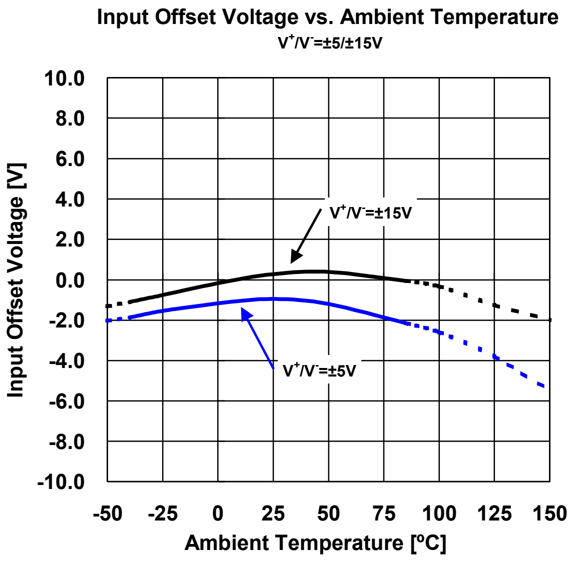
■TYPICAL CHARACTERISTICS







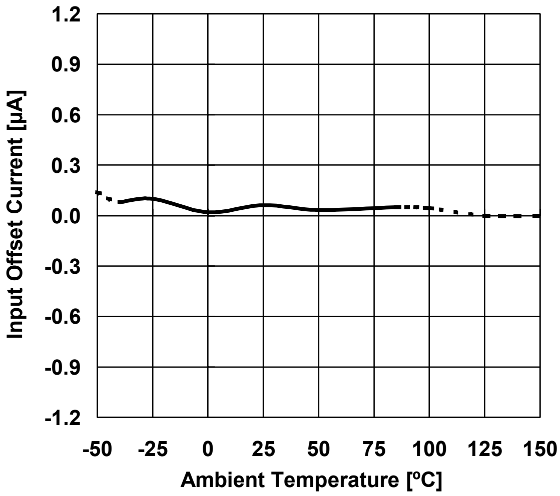




■TYPICAL CHARACTERISTICS

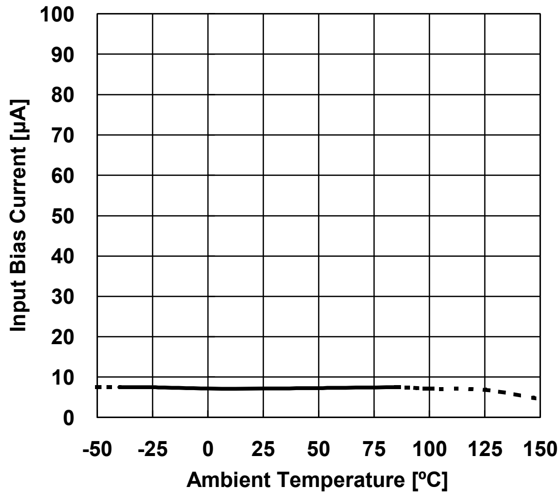
Input Offset Current vs. Ambient Temperature

V^+/V^-=±15V



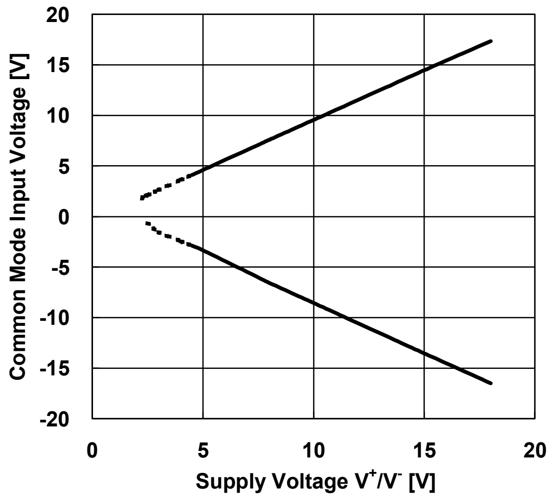
Input Bias Current vs. Ambient Temperature

V^+/V^-=±15V



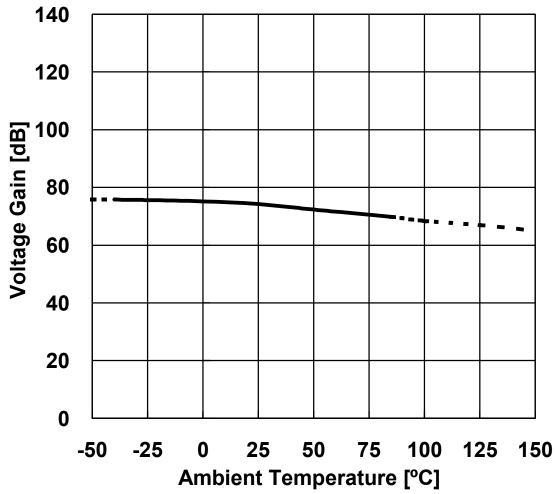
Common Mode Input Voltage vs. Supply Voltage

CMR≥80dB, Ta=25ºC



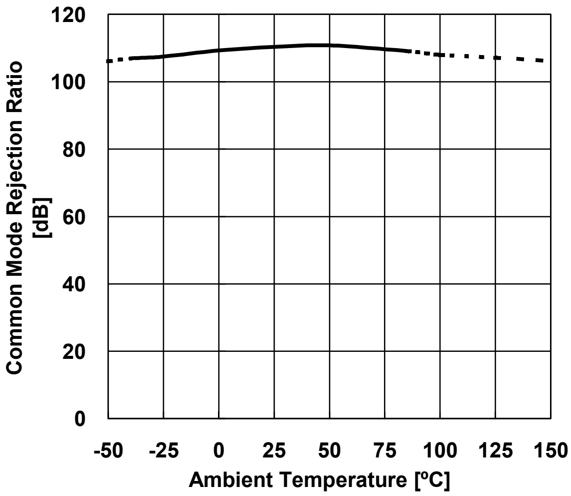
Voltage Gain vs. Ambient Temperature

V^+/V^-=±15V, R_L=2kΩ



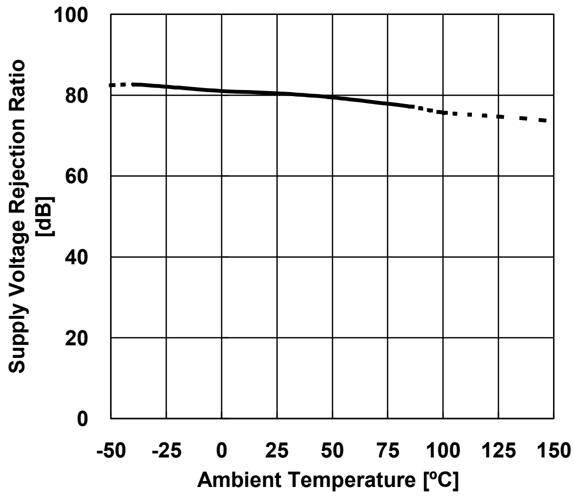
Common Mode Rejection Ratio vs. Ambient Temperature

V^+/V^-=±15V, -15V≤V_{ICM}≤+12.5V

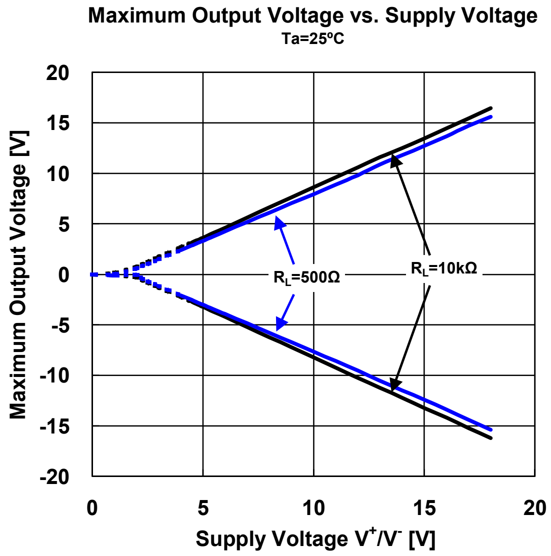


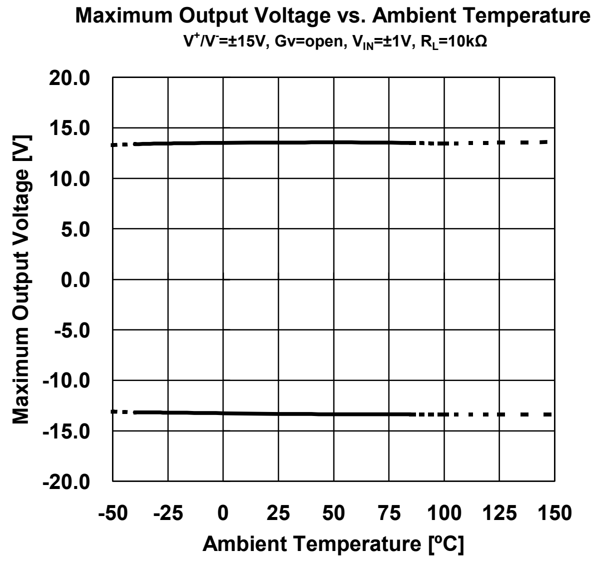
Supply Voltage Rejection Ratio vs. Ambient Temperature

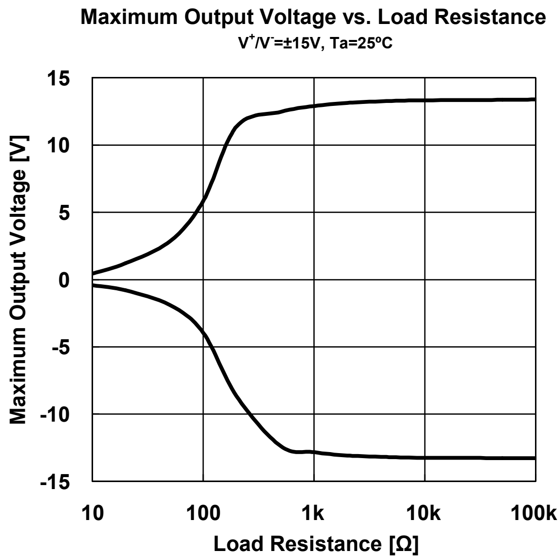
V^+/V^-=±2.5V to ±15V

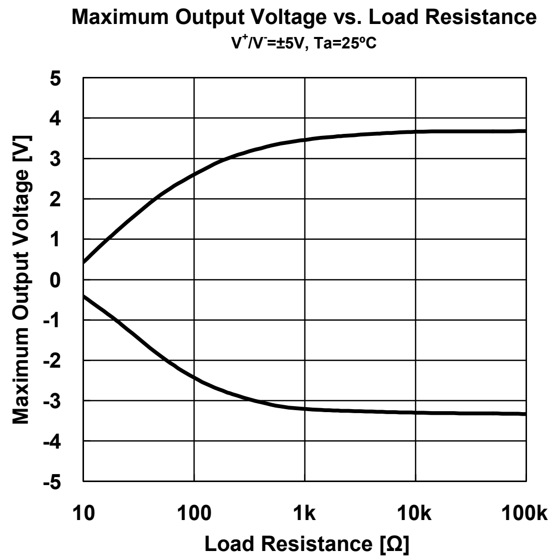


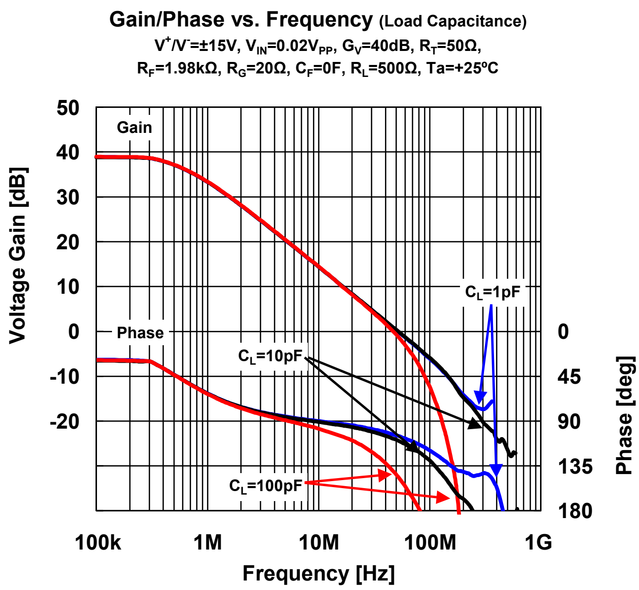
■TYPICAL CHARACTERISTICS

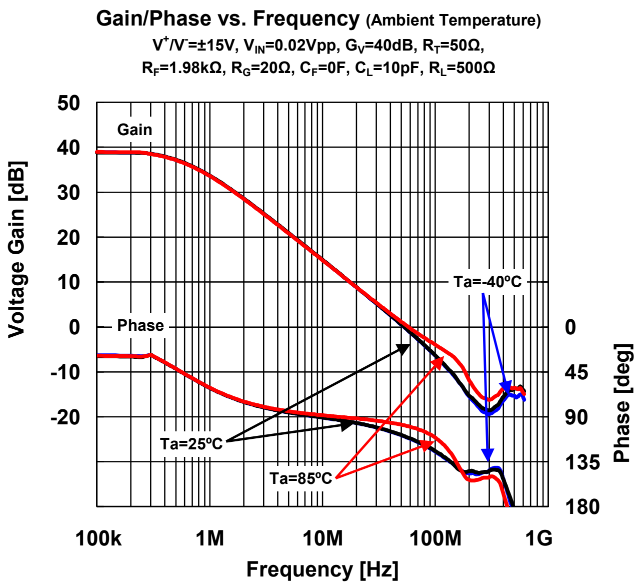








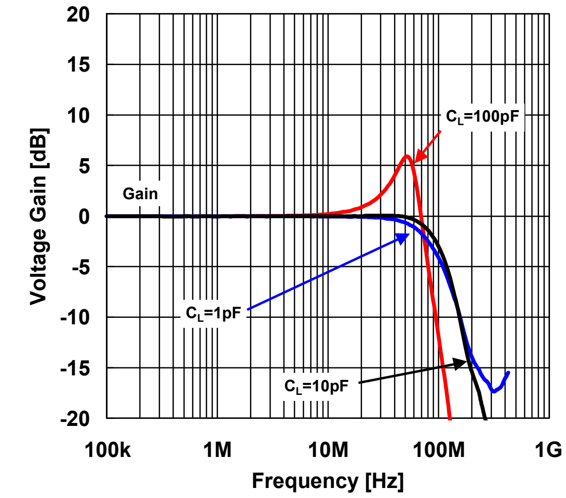




■TYPICAL CHARACTERISTICS

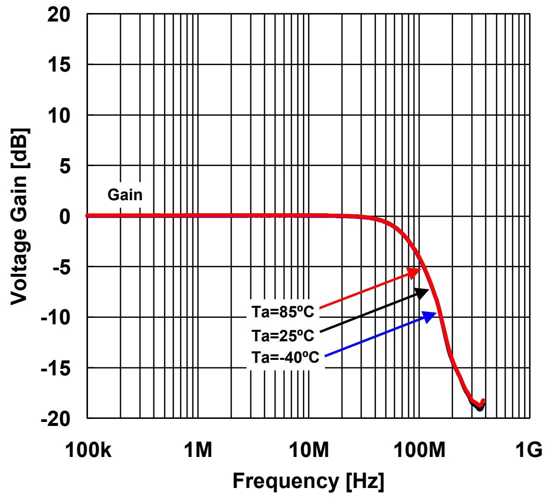
V.F. Peak vs. Frequency (Load Capacitance)

V^+/V^-=±15V, V_{IN}=0.02Vpp, G_V=0dB, R_T=50Ω,
R_F=0Ω, R_G=open, C_F=0F, R_L=500Ω, Ta=+25°C



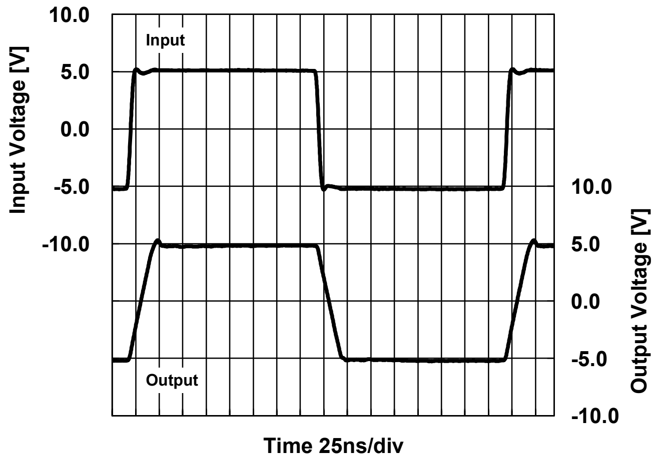
V.F. Peak vs. Frequency (Ambient Temperature)

V^+/V^-=±15V, V_{IN}=0.02Vpp, G_V=0dB, R_T=50Ω,
R_F=0Ω, R_G=open, C_F=0F, C_L=10pF, R_L=500Ω



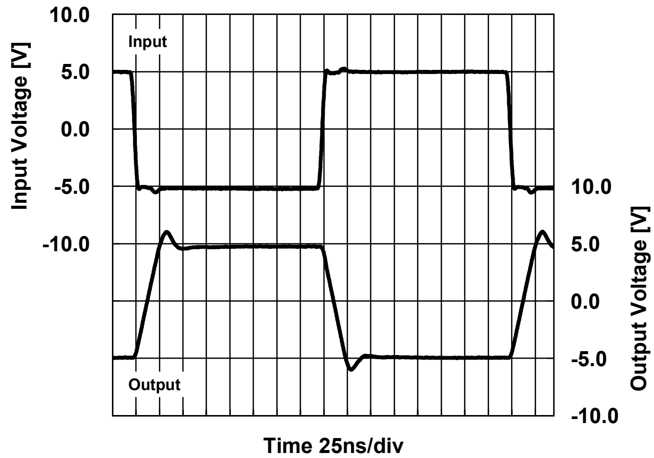
Pulse Response

(Non Inverting Configuration, Large Signal)
V^+/V^-=±15V, f=2.5MHz, V_O=10V_{PP}, G_V=0dB, R_T=50Ω,
R_F=0Ω, R_G=∞, R_L=500Ω, C_L=10pF, Ta=+25°C



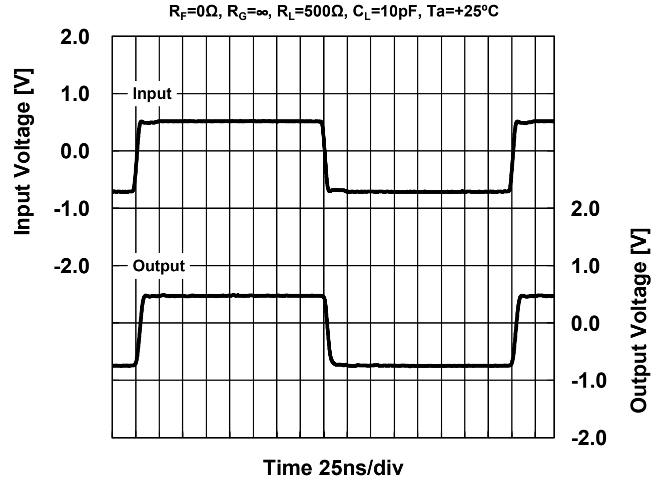
Pulse Response

(Inverting Configuration, Large Signal)
V^+/V^-=±15V, f=2.5MHz, V_O=10V_{PP}, G_V=0dB, R_T=56Ω,
R_F=1kΩ, R_G=1kΩ, R_L=1kΩ, C_L=10pF, Ta=+25°C



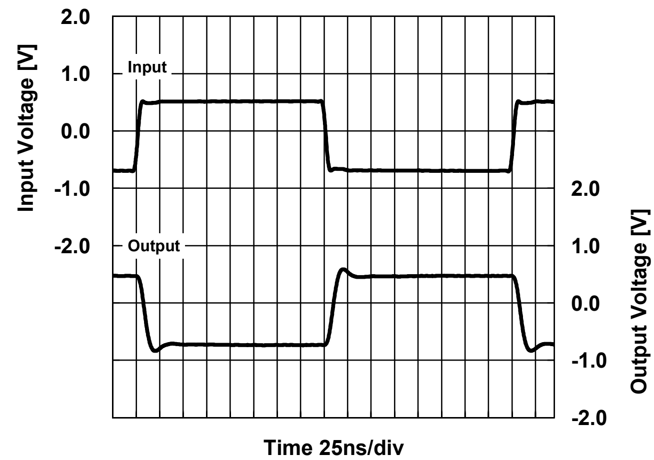
Pulse Response

(Non Inverting Configuration, Small Signal)
V^+/V^-=±15V, f=2.5MHz, V_O=1V_{PP}, G_V=0dB, R_T=50Ω,
R_F=0Ω, R_G=∞, R_L=500Ω, C_L=10pF, Ta=+25°C



Pulse Response

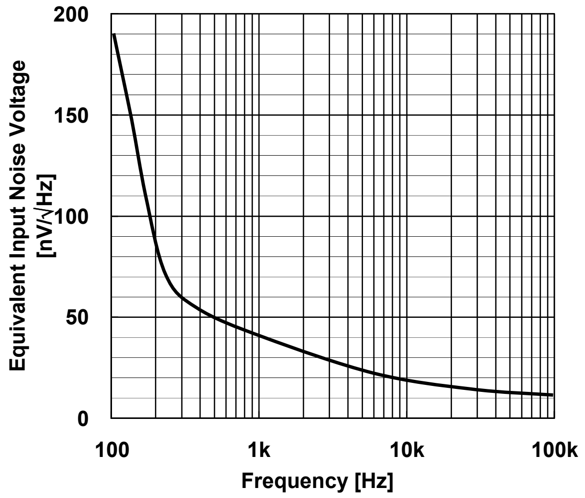
(Inverting Configuration, Small Signal)
V^+/V^-=±15V, f=2.5MHz, V_O=1V_{PP}, G_V=0dB, R_T=56Ω,
R_F=1kΩ, R_G=1kΩ, R_L=1kΩ, C_L=10pF, Ta=+25°C



■TYPICAL CHARACTERISTICS

Equivalent Input Noise Voltage vs. Frequency

V^+/V^-=±15V, V_{IN}=50Ω to GND, G_V=40dB, R_S=50Ω, R_F=1.98k, R_G=20Ω, R_L=∞, C_L=0pF, Ta=25ºC



■TEST CIRCUITS

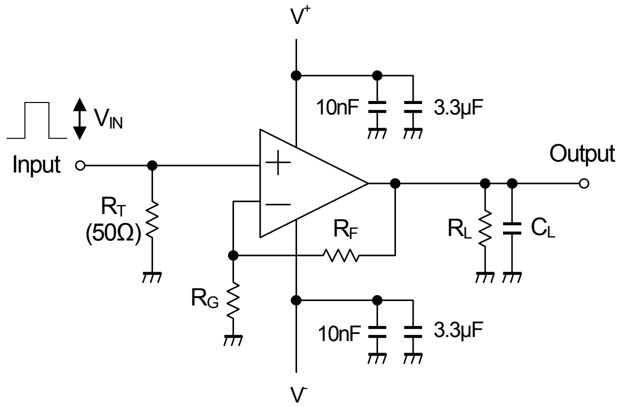


Figure 2 - 1: Slew Rate Test Circuit (Non Inverting)

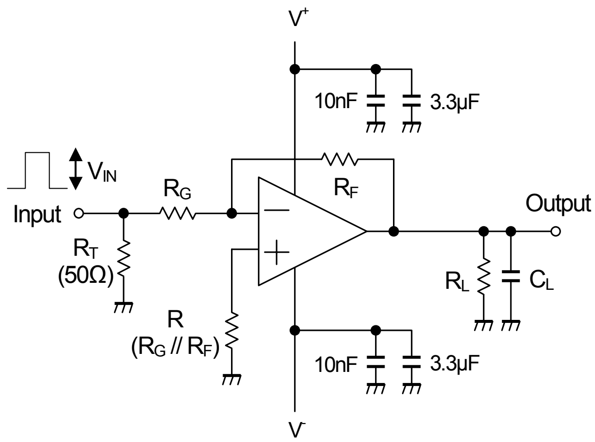


Figure 2 - 2: Slew Rate Test Circuit (Inverting)

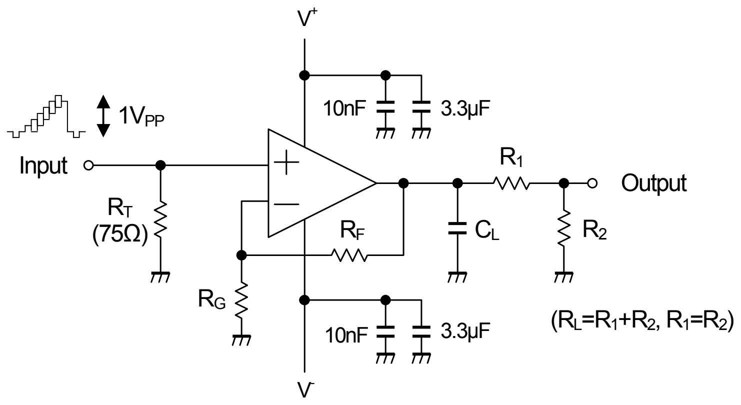


Figure 2 - 3: DG / DP Test Circuit