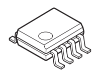
Single-Supply High-Operating voltage Dual Operational Amplifier

■ GENERAL DESCRIPTION

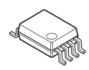
The NJM2718 is a single-supply high voltage dual operational amplifier. It is suitable for high supply voltage applications.

Large-capacitance drive capability is better or equal than competing products.

■PACKAGE OUTLINE



NJM2718E



NJM2718V

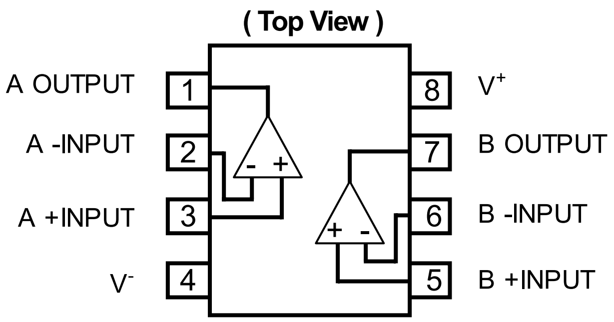
■ FEATURES

●Single Supply	
●Operating Voltage	3V~36V
●Input Offset Voltage	4mV max.
●Large Capacitance Drive Capability	1000pF typ.
●Output Voltage	V_{OH}≥+13.5V, V_{OL}≤-14.0V (at V^+/V^- = ±15V, R_L=2kΩ)
	V_{OH}≥+3.7V, V_{OL}≤0.3V (at V^+=+5V, R_L=2kΩ)
●Slew Rate	3.5V/µs typ. (at Vin = 1Vpp, R_L=2kΩ)
	9V/µs typ. (at Vin = 20Vpp, R_L=2kΩ)
●Bipolar Technology	
●Package Outline	EMP8, SSOP8

■ APPLICATION

- ●Low-Side Current Sense
- ●PWM Motor Control System
- ●Power Supply Module
- ●Line Driver, ADC/DAC Buffer

■ PIN CONFIGURATION



EMP8 [NJM2718E]
SSOP8 [NJM2718V]

■ ABSOLUTE MAXIMUM RATINGS (Ta=25˚C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	+40	V
Common Mode Input Voltage Range	V_{ICM}	V^--0.3V to V^++0.3V	V
Differential Input Voltage Range	V_{ID}	±40	V
Output Voltage	V_O	V^--0.3V to V^++0.3V (Note1)	V
Output Sink/Source Current for Each one Output Terminal	I_{OPORT}	±80 (Note3)	mA
Flow in Current for V^+ terminal	I_{IV+}	90 (Note3)	mA
Flow out Current for V^- terminal	I_{OV-}	90 (Note3)	mA
Power Dissipation	P_D	300 [EMP8], 250[SSOP8]	mW
		500[EMP8] (Note2)	mW
		350[SSOP8] (Note2)	mW
Operating Temperature Range	T_{opr}	-40 to +85	˚C
Storage Temperature Range	T_{stg}	-50 to +125	˚C

(Note 1) The output voltage of normal operation will be the Output Voltage Swing of electrical characteristics.

(Note 2) On the PCB " EIA/JEDEC (76.2x114.3x1.6mm, two layers, FR-4) "

(Note 3) Do not exceed "Power dissipation: PD" 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.

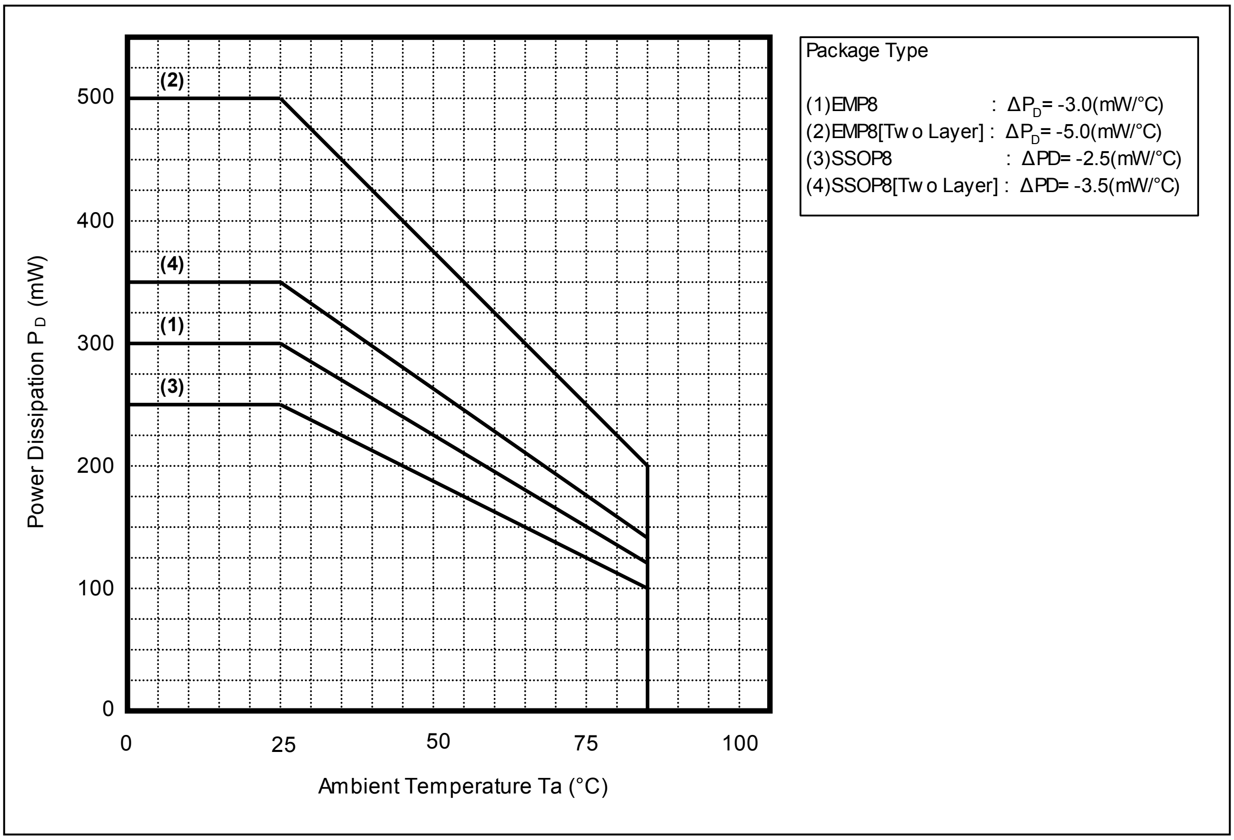


Figure1: Power Dissipation – Ambient Temperature

■ OPERATING VOLTAGE (Ta=25˚C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V^+	(Note3)	+3	-	+36	V

■ ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	Icc	No Signal	-	3.7	5.3	mA
Input Offset Voltage	V_{IO}	Rs=50Ω	-	1	4	mV
Input Offset Voltage Drift	ΔVio/ΔT	Rs=50Ω	-	10	-	μV/deg
Input Bias Current	I_B	Rs=50Ω	-	1.2	4	μA
Input Offset Current	I_{IO}	Rs=50Ω	-	0.1	1.8	μA
Voltage Gain	Av	R_L≥2kΩ, Vo=±10V, Rs=50Ω	88	100	-	dB
Common Mode Rejection Ratio	CMR	-15V≤ V_{ICM} ≤+13V, Rs=50Ω	70	83	-	dB
Supply Voltage Rejection Ratio	SVR	±1.5V≤ V^+/V^- ≤±18V, Rs=50Ω	70	100	-	dB
Maximum Output Voltage 1	$V_{OH}1$	R_L=10kΩ to 0V	+13.7	+14	-	V
	$V_{OL}1$	R_L=10kΩ to 0V	-	-14.6	-14.2	V
Maximum Output Voltage 2	$V_{OH}2$	R_L=2kΩ to 0V	+13.5	+14.0	-	V
	$V_{OL}2$	R_L=2kΩ to 0V	-	-13.9	-13.5	V
Output Source Current	I source	Vin+=+1V, Vin-=0V, Vo=0V	10	30	-	mA
Output Sink Current	Isink	Vin+=0V, Vin-=+1V, Vo=0V	20	30	-	mA
Common Mode Input Voltage	V_{ICM}	CMR≥70dB	-15	-	+13	V

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gain Bandwidth Product	GBW	f=100kHz	-	1.8	-	MHz
Power Band1	PBW1	Gv=+1, R_L=2kΩ to 0V, Vo=20Vpp, THD=1%	-	80	-	kHz
Power Band2	PBW2	Gv=+1, R_L=2kΩ to 0V, Vo=2Vpp, THD=1%	-	800	-	kHz
Phase Margin	φM1	R_L=2kΩ to 0V, C_L=0pF	-	85	-	deg
	φM2	R_L=2kΩ to 0V, C_L=300pF	-	75	-	deg
Gain Margin	AM1	R_L=2kΩ to 0V, C_L=0pF	-	18	-	dB
	AM2	R_L=2kΩ to 0V, C_L=300pF	-	11	-	dB
Equivalent Input Noise Voltage	V_{NI}	Rs=50Ω, f=1kHz	-	24	-	nV/√Hz
Total Harmonic Distortion	THD	Gv=+10, R_L=2kΩ to 0V Vo=20Vpp, f=10kHz	-	0.03	-	%
Input Capacitance	ci	V_{ICM}=0V, f=1MHz, Vinpower=0dBm	-	4.5	-	pF
Channel Separation	CT	f=20~20kHz, R_L=2kΩ	-	120	-	dB

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate 1	$SR1_P$	Vin=1Vpp (-0.5V to +0.5V), Gv=+1, R_L=2kΩ to 0V, C_L=500pF	-	3.5	-	V/μs
	$SR1_N$	Vin=1Vpp (-0.5V to +0.5V), Gv=-1, R_L=2kΩ to 0V, C_L=500pF	-	3.5	-	V/μs
Slew Rate 2	$SR2_P$	Vin=20Vpp (-10V to +10V), Gv=+1, R_L=2kΩ to 0V, C_L=500pF	-	9	-	V/μs
	$SR2_N$	Vin=20Vpp (-10V to +10V), Gv=-1, R_L=2kΩ to 0V, C_L=500pF	-	9	-	V/μs
Settling time(0.1%)	ts1	Vin=10Vpp, Gv=-1, Rin=1kΩ, Rf=1kΩ, Rg=5kΩ, C_L=470pF	-	0.9	-	μs
Settling time(0.01%)	ts2		-	1.9	-	μs

■ ELECTRICAL CHARACTERISTICS

●DC CHARACTERISTICS (V^+=+5V, V^-=0V, Ta=25˚C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	Icc	No Signal	-	2.8	3.5	mA
Input Offset Voltage	V_{IO}	Rs=50Ω	-	1	4	mV
Input Offset Voltage Drift	ΔVio/ΔT	Rs=50Ω	-	10	-	μV/deg
Input Bias Current	I_B	Rs=50Ω	-	1	4	μA
Input Offset Current	I_{IO}	Rs=50Ω	-	0.1	1.8	μA
Voltage Gain	Av	R_L≥2kΩ, Vo=1.5V to 3.5V, Rs=50Ω	80	100	-	dB
Common Mode Rejection Ratio	CMR	0V≤ V_{ICM} ≤3V, Rs=50Ω	65	80	-	dB
Supply Voltage Rejection Ratio	SVR	±1.5V≤ V^+/V^- ≤±2.5V, Rs=50Ω	70	85	-	dB
Maximum Output Voltage 1	V_{OH}1	R_L=2kΩ to 0V	3.7	4	-	V
	V_{OL}1	R_L=2kΩ to 0V	-	0.1	0.2	V
Output Source Current	Isource	Vin+=+1V, Vin-=0V, Vo=+2.5V	10	20	-	mA
Output Sink Current	Isink	Vin+=0V, Vin-=+1V, Vo=+2.5V	20	30	-	mA
Common Mode Input Voltage	V_{ICM}	CMR≥65dB	0	-	3	V

●AC CHARACTERISTICS (V^+=+5V, V^-=0V, Ta=25˚C)

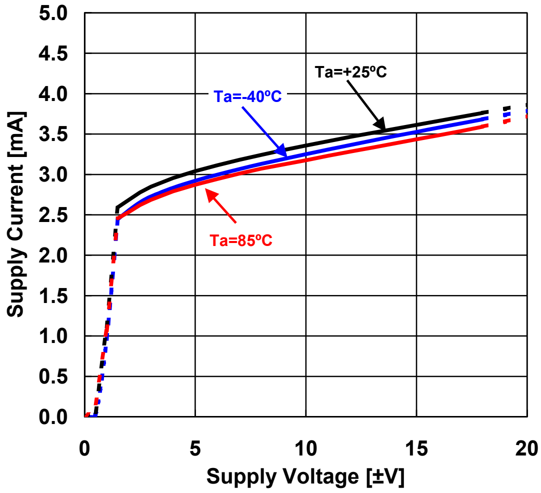
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gain Bandwidth Product	GBW	f=100kHz	-	1.7	-	MHz
Power Band1	PBW1	Gv=+1, R_L=2kΩ to 2.5V, Vo=2Vpp, THD=1%	-	600	-	kHz
Phase Margin	φM1	R_L=2kΩ to 2.5V, C_L=0pF	-	75	-	deg
	φM2	R_L=2kΩ to 2.5V, C_L=300pF	-	70	-	deg
Gain Margin	AM1	R_L=2kΩ to 2.5V, C_L=0pF	-	17	-	dB
	AM2	R_L=2kΩ to 2.5V, C_L=300pF	-	11	-	dB
Equivalent Input Noise Voltage	V_{NI}	Rs=50Ω, f=1kHz	-	24	-	nV/√Hz
Total Harmonic Distortion	THD	Gv=+10, R_L=2kΩ to 2.5V, Vo=3Vpp, f=10kHz	-	0.05	-	%
Input Capacitance	ci	Vcm=0V, f=1MHz, Vinpower=0dBm	-	5	-	pF
Channel Separation	CT	f=10kHz	-	110	-	dB

●TRANSIENT CHARACTERISTICS (V^+=+5V, V^-=0V, Ta=25˚C)

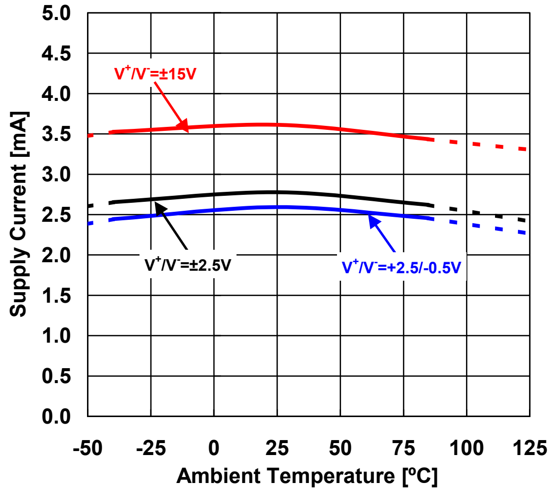
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate 1	$SR1_P$	Vin=1Vpp (+2V to +3V), Gv=+1, R_L=2kΩ to 0V, C_L=500pF	-	3	-	V/μs
	$SR1_N$	Vin=1Vpp (+2V to +3V), Gv=-1, R_L=2kΩ to 0V, C_L=500pF	-	2.5	-	V/μs
Settling time(0.1%)	ts1	Vin=1Vpp, Gv=-1, Rin=1kΩ, Rf=1kΩ, Rg=5kΩ, C_L=470pF	-	1.5	-	μs
Settling time(0.01%)	ts2		-	3	-	μs

■ TYPICAL CHARACTERISTICS

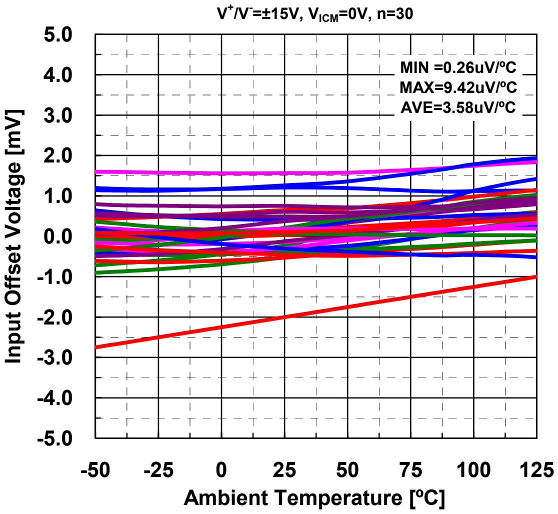
Supply Current vs. Supply Voltage (Temperature)
V_{IN}=0, R_S=50Ω



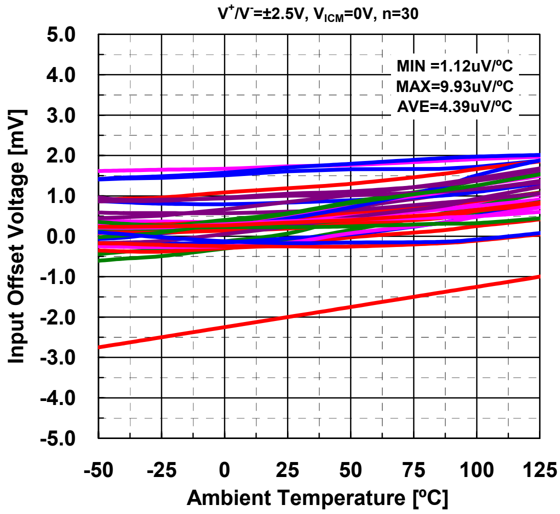
Supply Current vs. Temperature (supply Voltage)
V_{IN}=0, R_S=50Ω



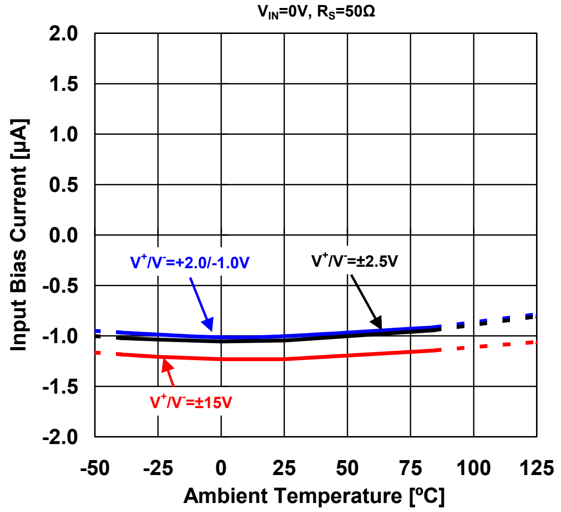
Input Offset Voltage vs. Temperature
V^+/V^-=±15V, V_{ICM}=0V, n=30



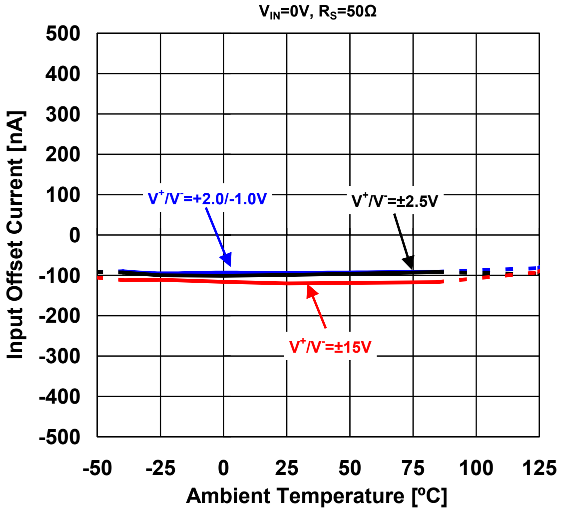
Input Offset Voltage vs. Temperature
V^+/V^-=±2.5V, V_{ICM}=0V, n=30



Input Bias Current vs. Temperature (Supply Voltage)
V_{IN}=0V, R_S=50Ω

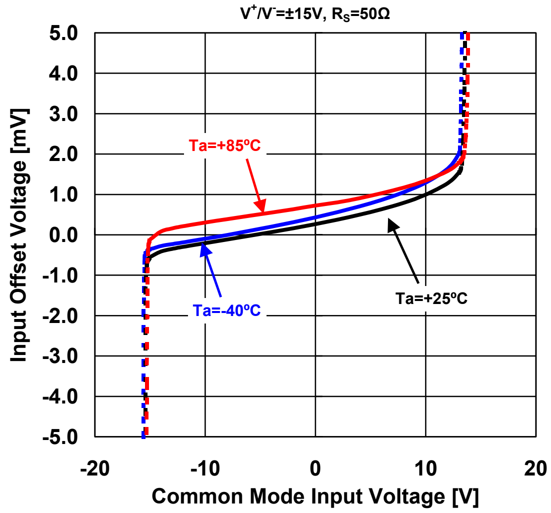


Input Offset Current vs. Temperature (Supply Voltage)
V_{IN}=0V, R_S=50Ω

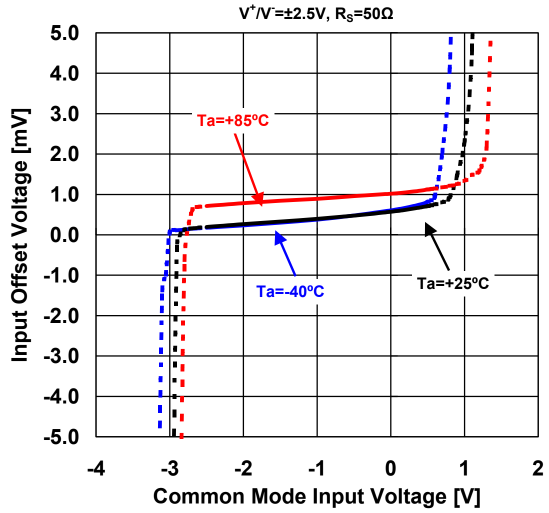


■ TYPICAL CHARACTERISTICS

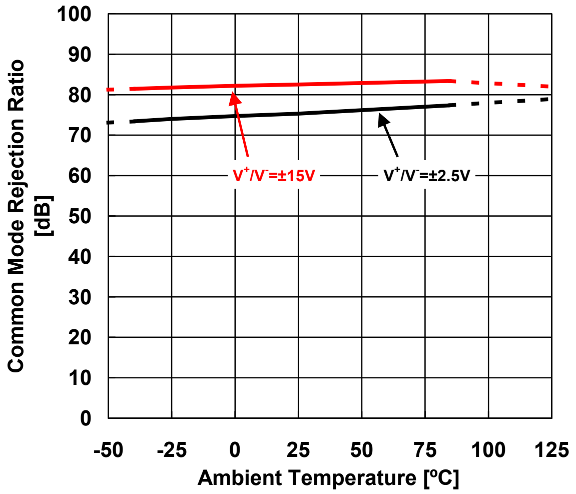
Input Offset Voltage
vs. Common Mode Input Voltage
(Temperature)
$V^+/V^-=\pm15V$, $R_S=50\Omega$



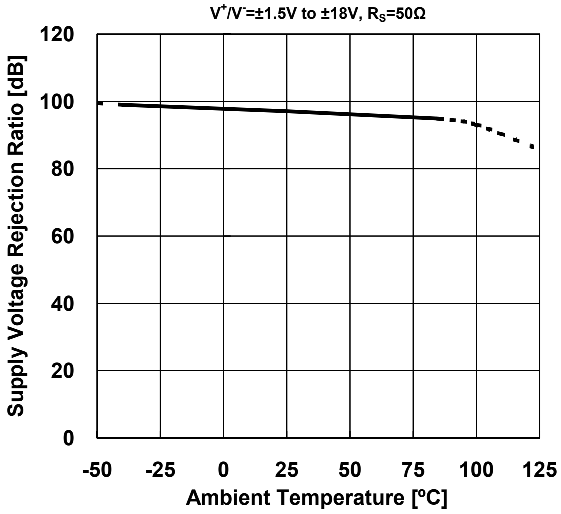
Input Offset Voltage
vs. Common Mode Input Voltage
(Temperature)
$V^+/V^-=\pm2.5V$, $R_S=50\Omega$



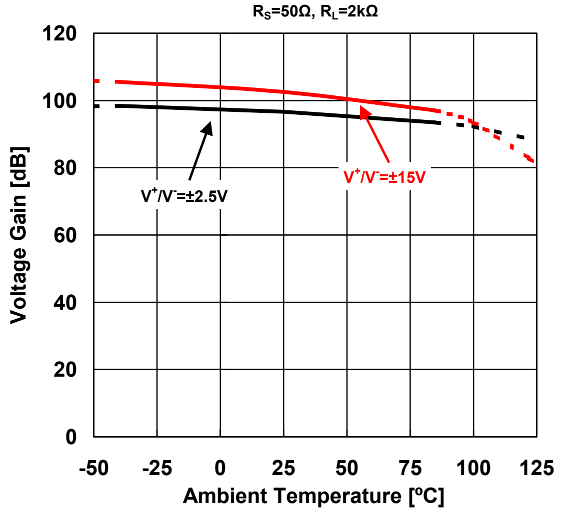
Common Mode Rejection Ratio vs. Temperature
(Supply Voltage)
$R_S=50\Omega$



Supply Voltage Rejection Ratio vs. Temperature
$V^+/V^-=\pm1.5V$ to $\pm18V$, $R_S=50\Omega$



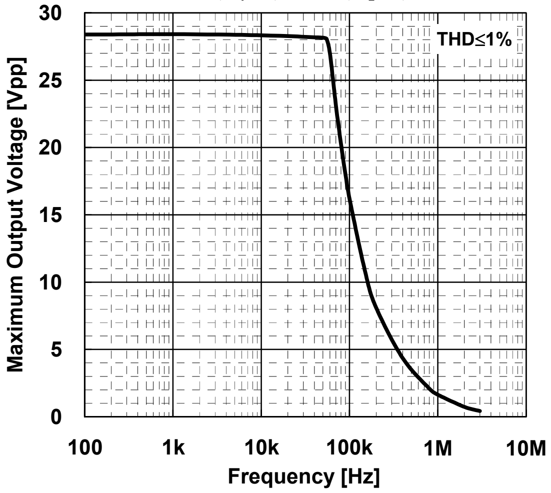
Voltage Gain vs. Temperature (Supply Voltage)
$R_S=50\Omega$, $R_L=2k\Omega$



■ TYPICAL CHARACTERISTICS

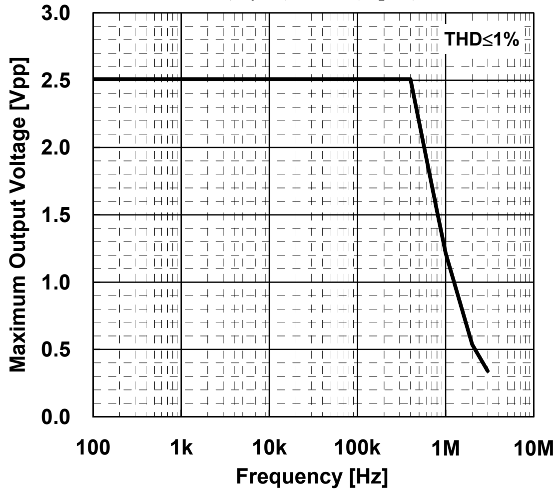
Maximum Output Voltage vs. Frequency

V^+/V^-=±15V, A_V=+1, THD≤1%, R_L=2k, Ta=25°C



Maximum Output Voltage vs. Frequency

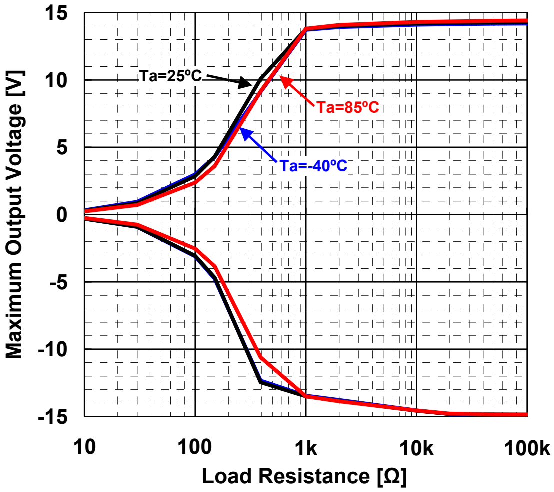
V^+/V^-=±2.5V, A_V=+1, THD≤1%, R_L=2k, Ta=25°C



Maximum Output Voltage vs. Load Resistance

(Temperature)

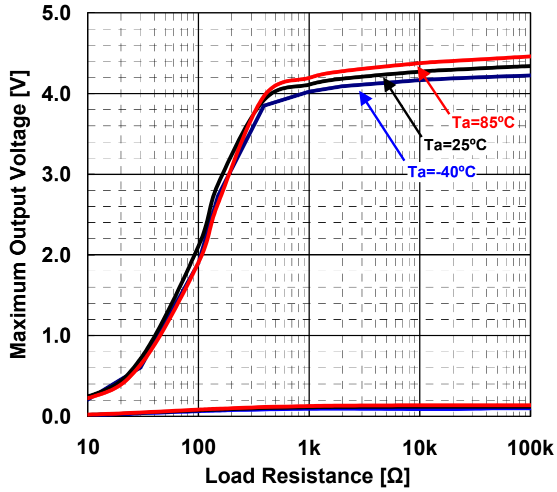
V^+/V^-=±15V, R_L to 0V



Maximum Output Voltage vs. Load Resistance

(Temperature)

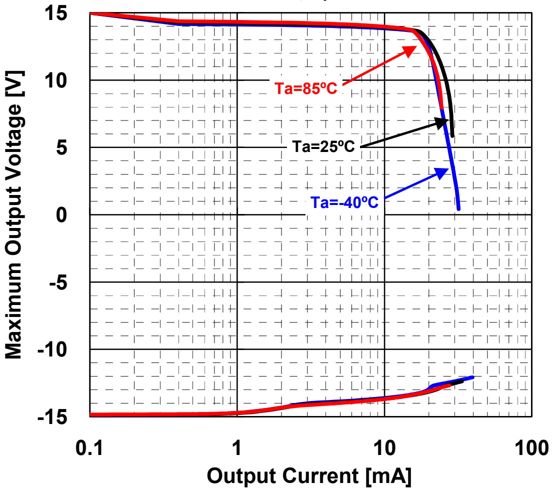
V^+=5V, R_L to 0V



Maximum Output Voltage vs. Output Current

(Temperature)

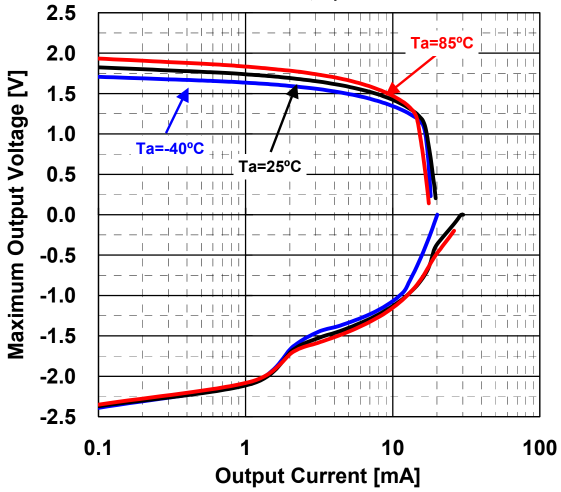
V^+/V^-=±15V, Input=+1/-1V



Maximum Output Voltage vs. Output Current

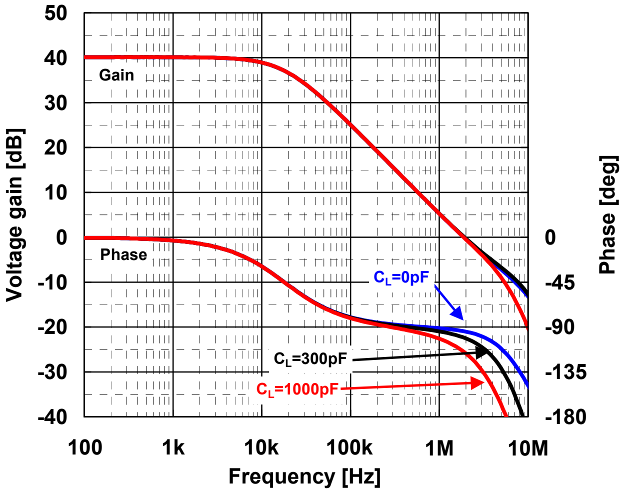
(Temperature)

V^+/V^-=±2.5V, Input=+1/-1V

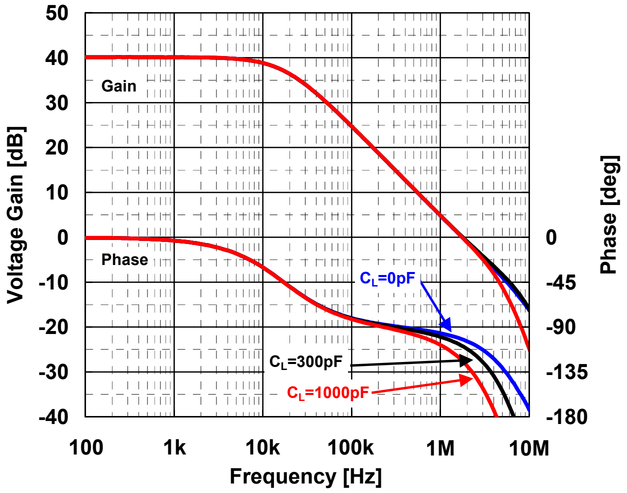


■ TYPICAL CHARACTERISTICS

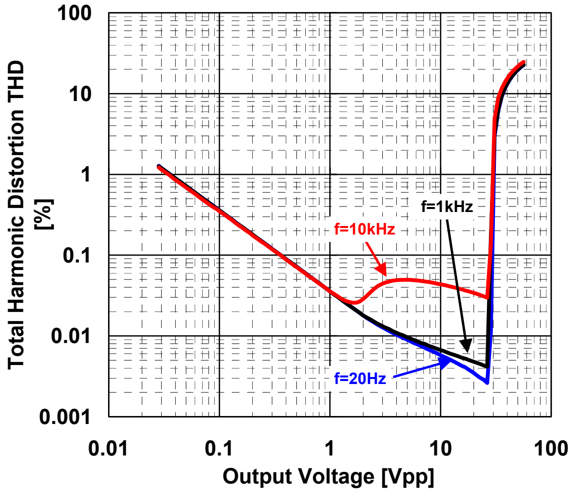
40dB Gain/Phase vs. Frequency (Load Capacitance)
V^+/V^-=±15V, V_{IN}=-20dBm, R_G=20Ω,
R_F=2kΩ, R_L=2kΩ to 0V, Ta=25ºC



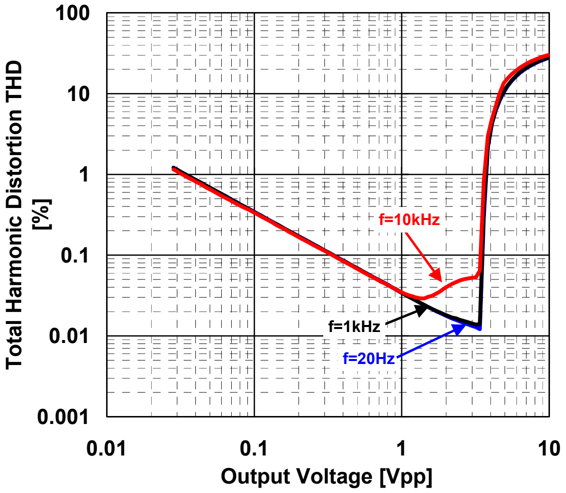
40dB gain/Phase vs. Frequency (Load Capacitance)
V^+/V^-=±2.5V, V_{IN}=-20dBm, R_G=20Ω,
R_F=2kΩ, R_L=2kΩ to 0V, Ta=25ºC



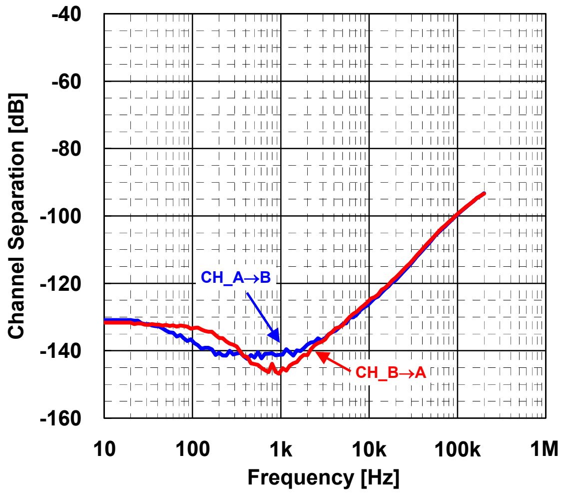
THD vs. Output Voltage (Frequency)
V^+/V^-=±15V, V_{IN}=2Vpp, A_V=20dB, V_O=20Vpp,
R1=1kΩ, R2=9kΩ, R_G=1kΩ, R_L=2kΩ,
BW=10~500kHz, Ta=25ºC



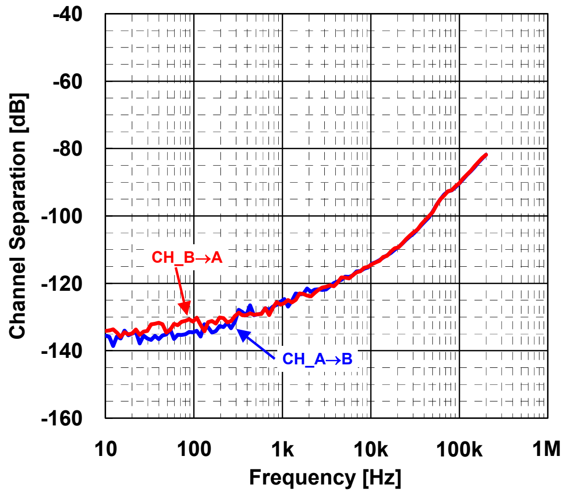
THD vs. Output Voltage (Frequency)
V^+/V^-=±2.5V, Z_{IN}=40Ω, A_V=20dB, V_O=3Vpp,
R1=1kΩ, R2=9kΩ, R_G=10kΩ, R_L=2kΩ,
BW=10~500kHz, Ta=25ºC



Channel Separation vs. Frequency
V^+/V^-=±15V, V_{IN}=200mVpp, Z_{IN}=20Ω, A_V=40dB, V_O=20Vpp,
R1=1kΩ, R2=100kΩ, R_G=10k, R_L=2kΩ, BW=10~500kHz

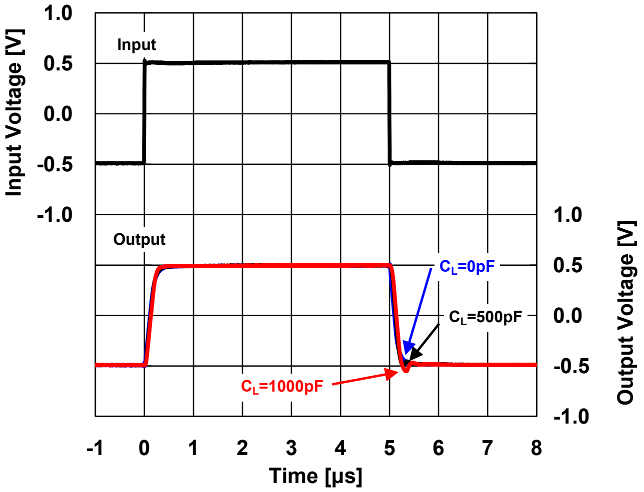


Channel Separation vs. Frequency
V^+/V^-=±2.5V, V_{IN}=20mVpp, Z_{IN}=20Ω, A_V=40dB, V_O=2Vpp,
R1=1kΩ, R2=100kΩ, R_G=10k, R_L=2kΩ, BW=10~500kHz

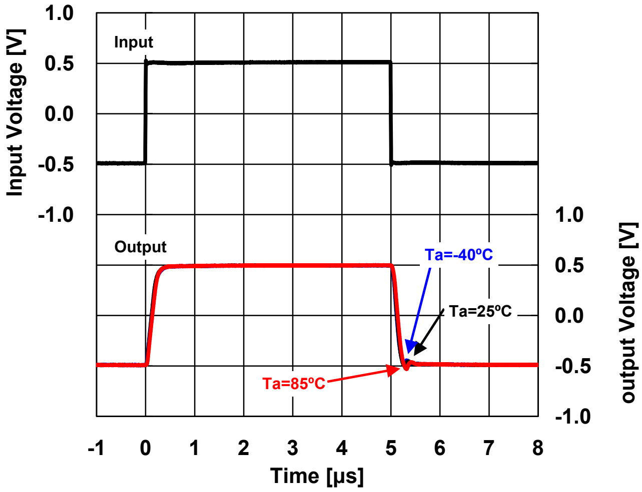


■ TYPICAL CHARACTERISTICS

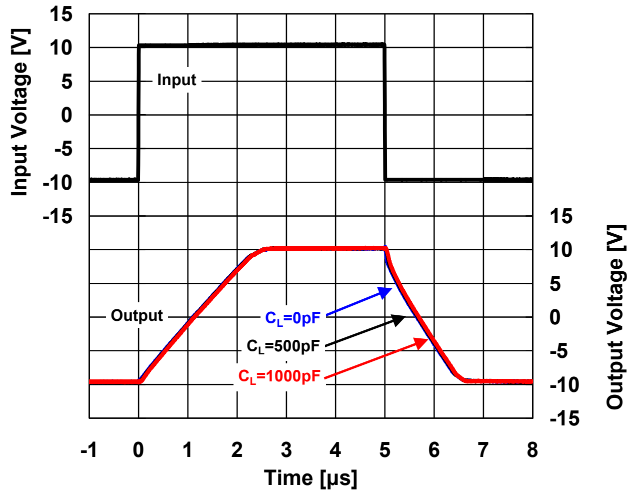
Frequency Response (V_{IN}=1Vpp, Load Capacitance)
V^+/V^-=±15V, V_{IN}=1Vpp,
f=100kHz, A_V=+1, R_L=2kΩ to 0V, Ta=25ºC



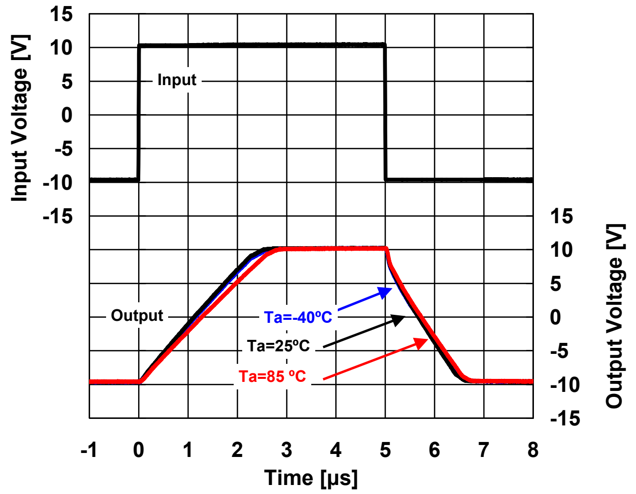
Frequency Response (V_{IN}=1Vpp, Temperature)
V^+/V^-=±15V, V_{IN}=1Vp-p,
f=100kHz, A_V=+1, R_L=2kΩ to 0V, C_L=500pF



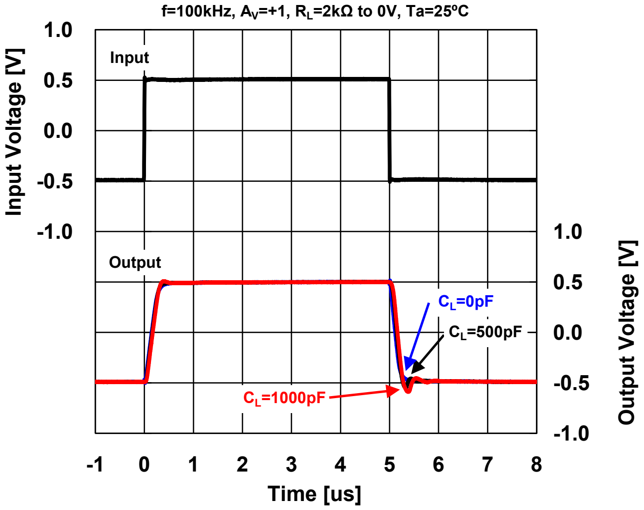
Frequency Response (V_{IN}=20Vpp, Load Capacitance)
V^+/V^-=±15V, V_{IN}=20Vpp,
f=100kHz, A_V=+1, R_L=2kΩ to 0V, Ta=25ºC,



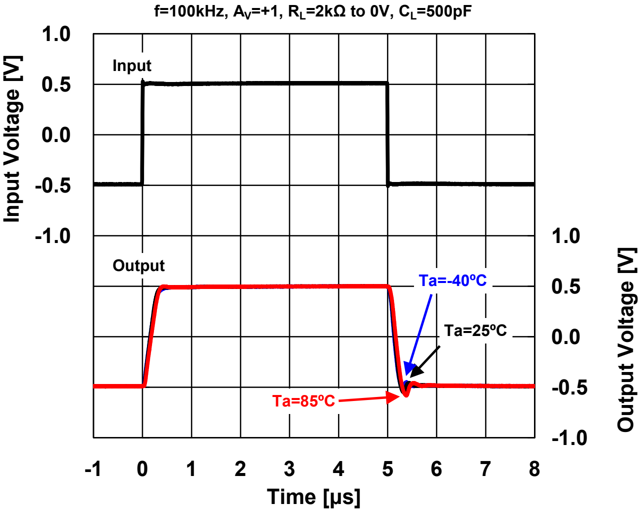
Frequency Response (V_{IN}=20Vpp, Temperature)
V^+/V^-=±15V, V_{IN}=20Vpp,
f=100kHz, A_V=+1, R_L=2kΩ to 0V, C_L=500pF



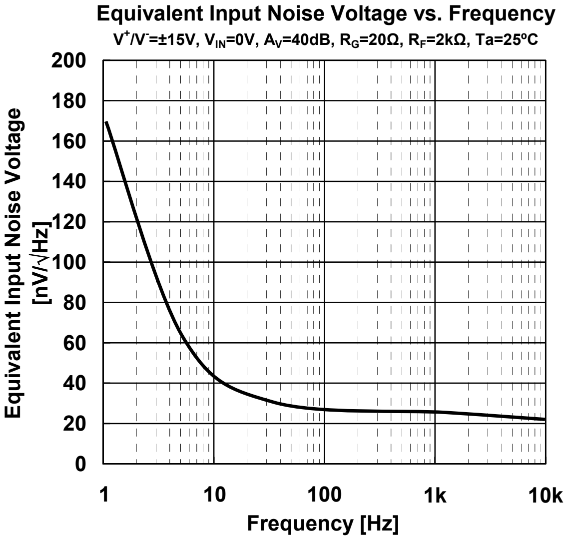
Frequency Response (V_{IN}=1Vpp, Load Capacitance)
V^+/V^-=±2.5V, V_{IN}=1Vpp,
f=100kHz, A_V=+1, R_L=2kΩ to 0V, Ta=25ºC

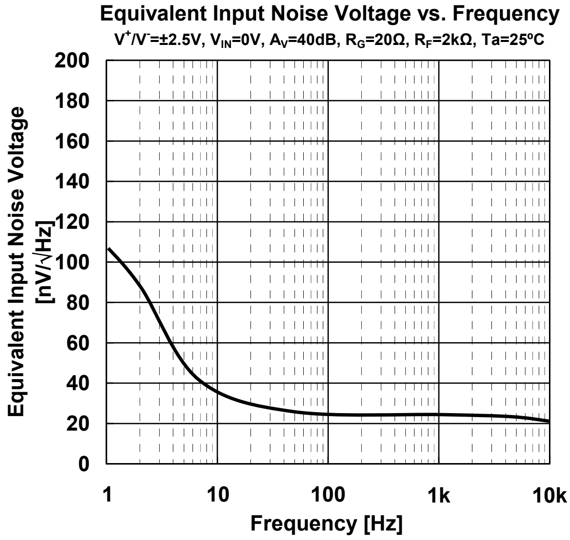


Frequency Response (V_{IN}=1Vpp, Temperature)
V^+/V^-=±2.5V, V_{IN}=1Vpp,
f=100kHz, A_V=+1, R_L=2kΩ to 0V, C_L=500pF



■ TYPICAL CHARACTERISTICS





■ TEST CIRCUIT

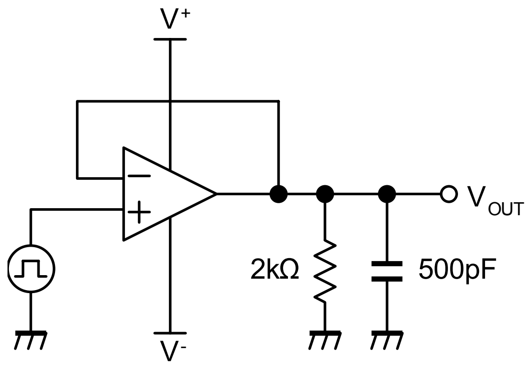


Fig.2.1 Slew Rate (Non Inverting)

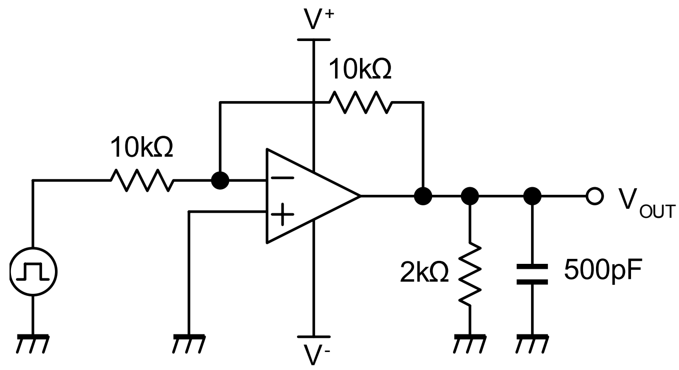


Fig.2.2 Slew Rate (Inverting)

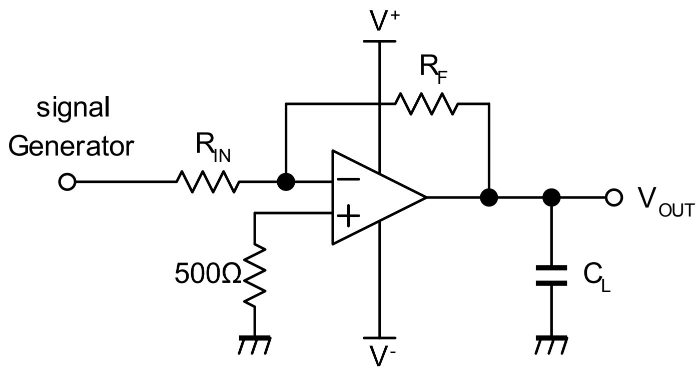


Fig.2.3 Settling Time

Стандарт
Электрон
Связь

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