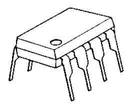
Full-Swing Input and Output type Dual Operational Amplifier

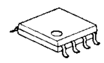
■ GENERAL DESCRIPTION

NJM2732 is dual operational amplifier with full swing input and output, operate from 1.8V.
Input and Output Full Swing provides wide dynamic range, is from ground to power supply level. In addition to ground sensing applications, NJM2732 enable to be applied to Hi-side sensing applications.
The features are low noise and low operating voltage for battery management, portable audio applications, and others.

■ PACKAGE OUTLINE



NJM2732D



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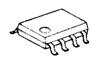

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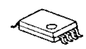

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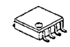


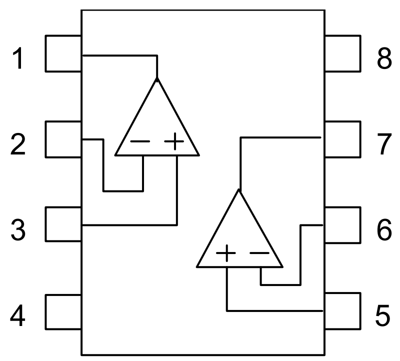
NJM2732RB1

■ FEATURES

- ●Operating Voltage :1.8 to 6.0V
- ●Input Full-Swing :V_{ICM}= 0 to 5.0V, at V^+=5V
- ●Output Full-Swing :V_{OH}≥4.9V/ V_{OL}≤0.1V, at V^+=5V, R_L=20kΩ
- ●Load Drivability :V_{OH}≥4.75V/ V_{OL}≤0.25V, at V^+=5V, R_L=2kΩ
- ●Offset Voltage :5mV max.
- ●Slew Rate :0.4V/µs typ.
- ●Low Input Voltage Noise :10nV/√Hz typ.
- ●Adequate phase margin :Φ_M=75deg. typ., at R_L=2kΩ, voltage follower
- ●Bipolar Technology
- ●Package Outline :DIP8, DMP8, EMP8, SSOP8, TVSP8

■ PIN CONFIGURATION

(Top View)



PIN FUNCTION
1. A OUTPUT
2. A -INPUT
3. A +INPUT
4. GND
5. B +INPUT
6. B –INPUT
7. B OUTPUT
8. V^+

NJM2732D
NJM2732M
NJM2732E
NJM2732V
NJM2732RB1

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25˚C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	7.0	V
Differential Input Voltage Range	V_{ID}	±1.0	V
Common Mode Input Voltage Range	V_{IC}	0 ~ 7.0 (Note1)	V
Power Dissipation	P_D	(DIP8) 500 (DMP8) 300 (EMP8) 320 (SSOP8) 250 (TVSP8) 320	mW
Operating Temperature Range	T_{opr}	-40~+85	˚C
Storage Temperature Range	T_{stg}	-40~+125	˚C

(Note1) For supply voltage less than 7V, the absolute maximum input voltage is equal to the supply voltage.

■ RECOMMENDED OPERATING CONDITION

(Ta=25˚C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	1.8 to 6.0	V

■ ELECTRICAL CHARACTERISTICS (V^+=5V, Ta=25˚C)

●DC CHARACTERISTICS (V^+=5V, Ta=25˚C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal applied	-	580	900	μA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Large Signal Voltage Gain	A_V	R_L=2kΩ	60	85	-	dB
Common Mode Rejection Ratio	CMR	CMR+: 2.5V≤V_{CM}≤5V CMR-: 0V≤V_{CM}≤2.5V (Note2)	55	70		dB
Supply Voltage Rejection Ratio	SVR	V^+/V^-=±2.0V ~ ±3.0V	70	85	-	dB
Maximum Output Voltage 1	V_{OH1}	R_L=20kΩ	4.9	4.95	-	V
	V_{OL1}	R_L=20kΩ	-	0.05	0.1	V
Maximum Output Voltage 2	V_{OH2}	R_L=2kΩ	4.75	4.85	-	V
	V_{OL2}	R_L=2kΩ	-	0.15	0.25	V
Input Common Mode Voltage Range	V_{ICM}	CMR≥55dB	0	-	5	V

(Note2) CMR is represented by either CMR+ or CMR- has lower value.
CMR+ is measured with 2.5V≤V_{CM}≤5.0 and CMR- is measured with 0V≤V_{CM}≤2.5V.

●AC CHARACTERISTICS (V^+=5V, Ta=25˚C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	R_L=2kΩ	-	1	-	MHz
Phase Margin	Φ_M	R_L=2kΩ	-	75	-	Deg
Equivalent Input Noise Voltage	V_{NI}	f=1kHz	-	10	-	nV/√Hz

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	R_L=2kΩ	-	0.4	-	V/μs

■ ELECTRICAL CHARACTERISTICS (V^+=3V, Ta=25°C)

●DC CHARACTERISTICS (V^+=3V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal applied	-	510	880	µA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Large Signal Voltage Gain	A_V	R_L=2kΩ	60	84	-	dB
Common Mode Rejection Ratio	CMR	CMR+: 1.5V≤V_{CM}≤3V CMR-: 0V≤V_{CM}≤1.5V (Note3)	48	63		dB
Supply Voltage Rejection Ratio	SVR	V^+/V^-=±1.2V ~ ±2.0V	68	83	-	dB
Maximum Output Voltage 1	V_{OH1}	R_L=20kΩ	2.9	2.95	-	V
	V_{OL1}	R_L=20kΩ	-	0.05	0.1	V
Maximum Output Voltage 2	V_{OH2}	R_L=2kΩ	2.75	2.85	-	V
	V_{OL2}	R_L=2kΩ	-	0.15	0.25	V
Input Common Mode Voltage Range	V_{ICM}	CMR≥48dB	0	-	3	V

(Note3) CMR is represented by either CMR+ or CMR-has lower value.
CMR+ is measured with 1.5V≤V_{CM}≤3.0 and CMR- is measured with 0V≤V_{CM}≤1.5V.

●AC CHARACTERISTICS (V^+=3V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	R_L=2kΩ	-	1	-	MHz
Phase Margin	Φ_M	R_L=2kΩ	-	75	-	Deg
Equivalent Input Noise Voltage	V_{NI}	f=1kHz	-	10	-	nV/√Hz

●TRANSIENT CHARACTERISTICS (V^+=3V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	R_L=2kΩ	-	0.35	-	V/µs

■ ELECTRICAL CHARACTERISTICS (V^+=1.8V, Ta=25°C)

●DC CHARACTERISTICS (V^+=1.8V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal applied	-	460	800	µA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Large Signal Voltage Gain	A_V	R_L=2kΩ	60	83	-	dB
Common Mode Rejection Ratio	CMR	CMR+: 0. 9V≤V_{CM}≤1.8V CMR-: 0V≤V_{CM}≤0.9V (Note4)	48	55		dB
Supply Voltage Rejection Ratio	SVR	V^+/V^-=±1.2V ~ ±2.0V	65	80	-	dB
Maximum Output Voltage 1	V_{OH1}	R_L=20kΩ	1.7	1.75	-	V
	V_{OL1}	R_L=20kΩ	-	0.05	0.1	V
Maximum Output Voltage 2	V_{OH2}	R_L=2kΩ	1.55	1.65	-	V
	V_{OL2}	R_L=2kΩ	-	0.15	0.25	V
Input Common Mode Voltage Range	V_{ICM}	CMR≥40dB	0	-	1.8	V

(Note4) CMR is represented by either CMR+ or CMR-has lower value.
CMR+ is measured with 0.9V≤V_{CM}≤1.8 and CMR- is measured with 0V≤V_{CM}≤0.9V.

●AC CHARACTERISTICS (V^+=1.8V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	R_L=2kΩ	-	1	-	MHz
Phase Margin	Φ_M	R_L=2kΩ	-	75	-	Deg
Equivalent Input Noise Voltage	V_{NI}	f=1kHz	-	10	-	nV/√Hz

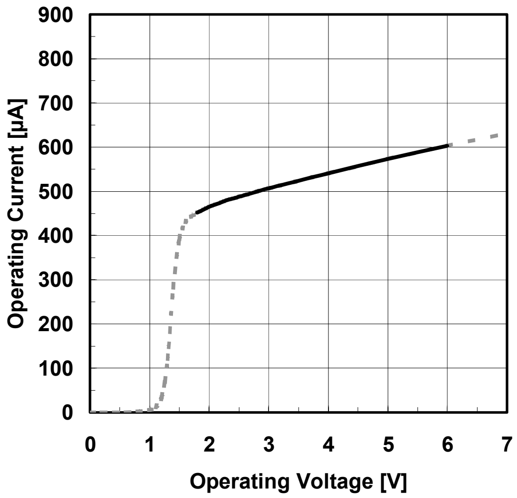
●TRANSIENT CHARACTERISTICS (V^+=1.8V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	R_L=2kΩ	-	0.3	-	V/µs

■ TYPICAL CHARACTERISTICS

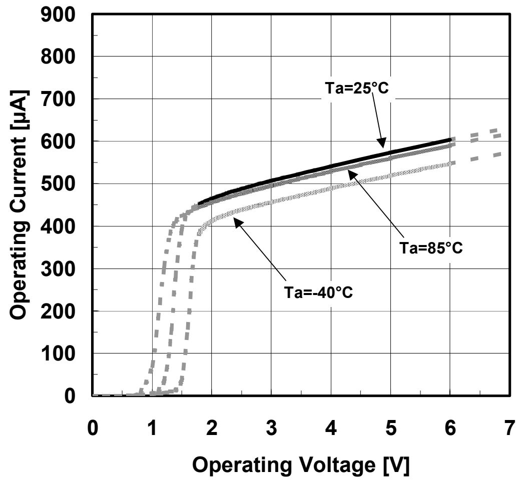
Operating Current vs Operating Voltage

G_V=0dB, Ta=25°C



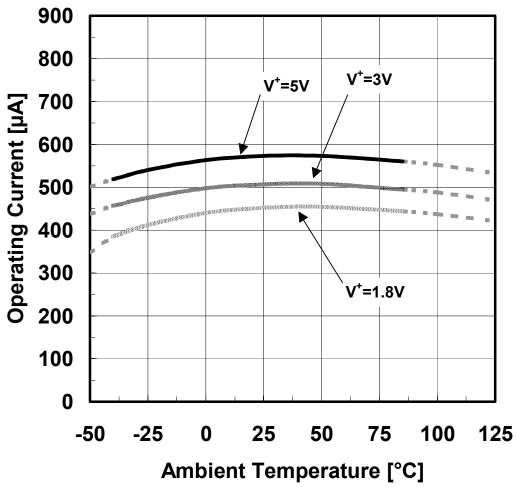
Operating Current vs. Operating Voltage (correlation with Ta)

G_V=0dB, Ta=25°C



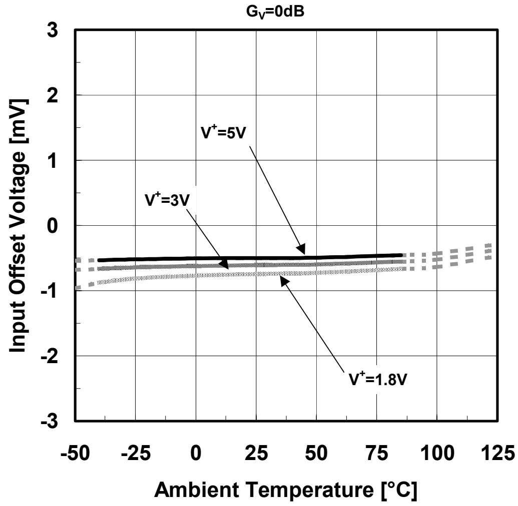
Operating Current vs. Ambient Temperature

G_V=0dB



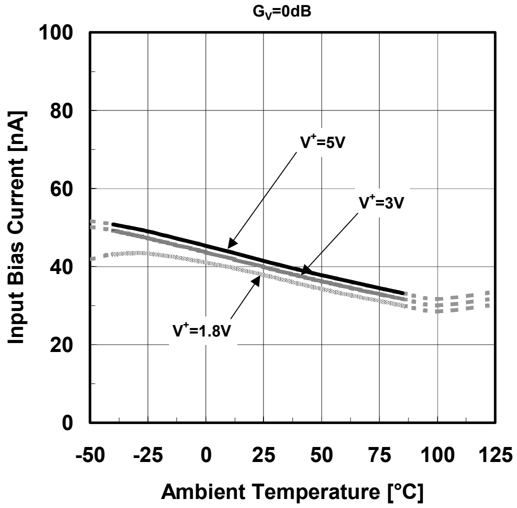
Input Offset Voltage vs. Ambient Temperature

G_V=0dB



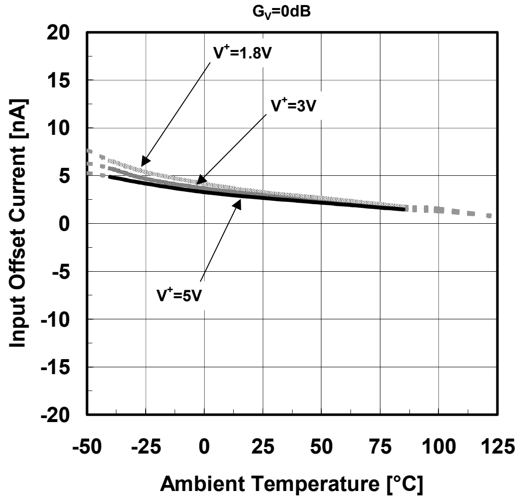
Input Bias Current vs. Ambient Temperature

G_V=0dB

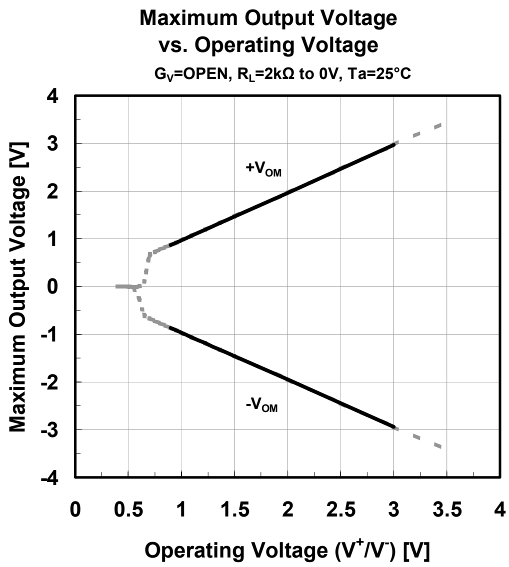


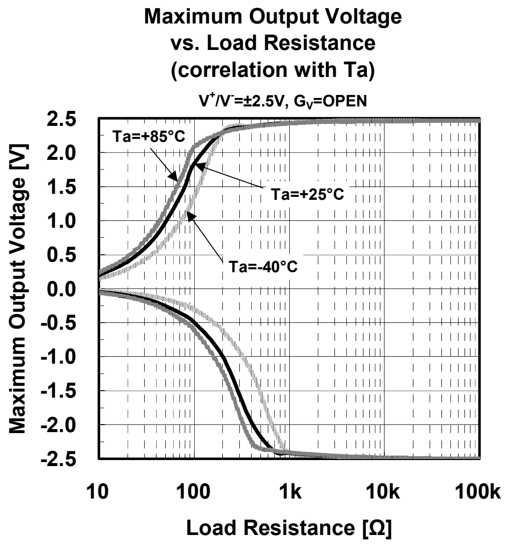
Input Offset Current vs. Ambient Temperature

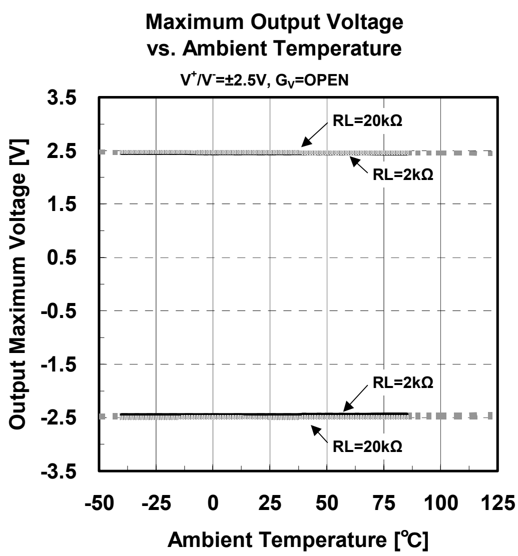
G_V=0dB

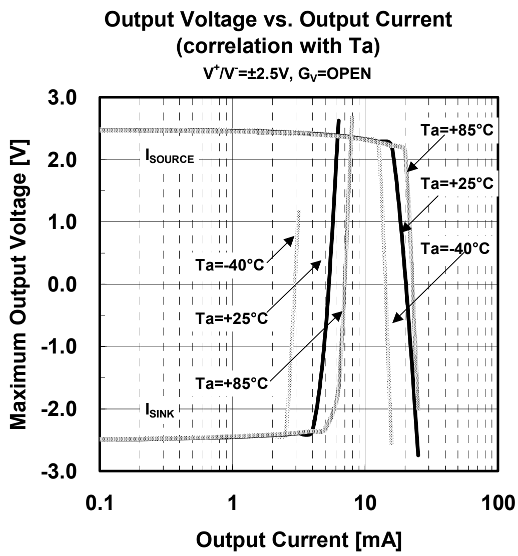


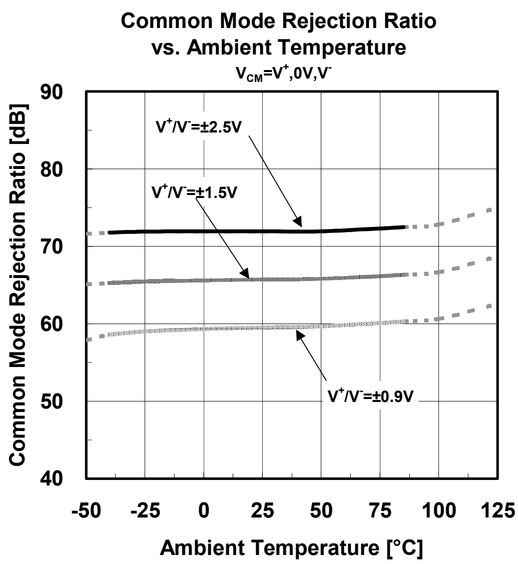
■ TYPICAL CHARACTERISTICS

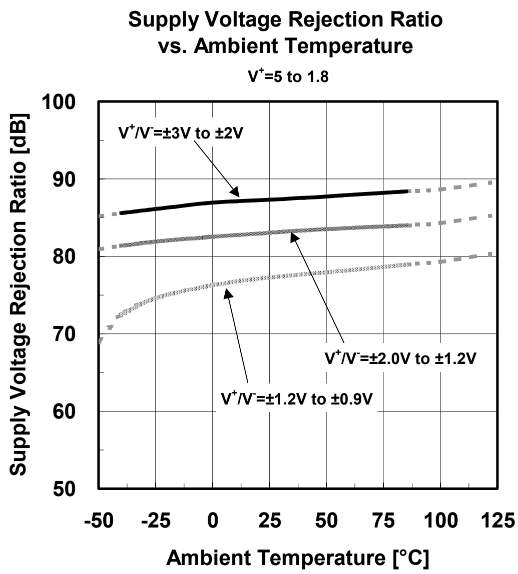






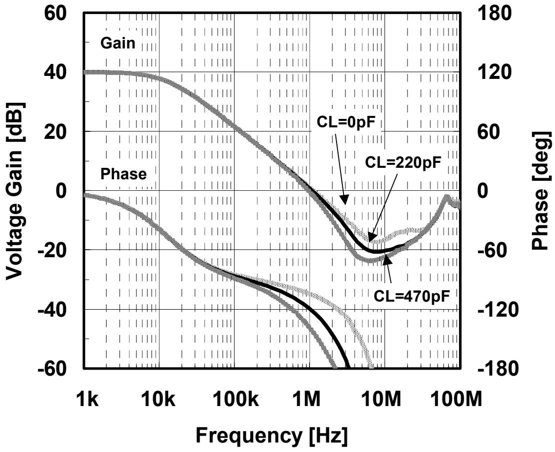




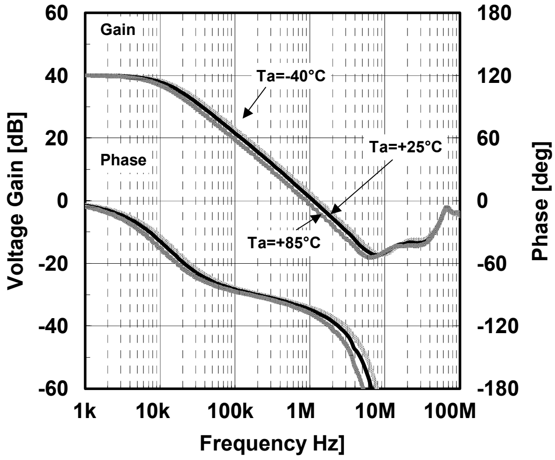


■ TYPICAL CHARACTERISTICS

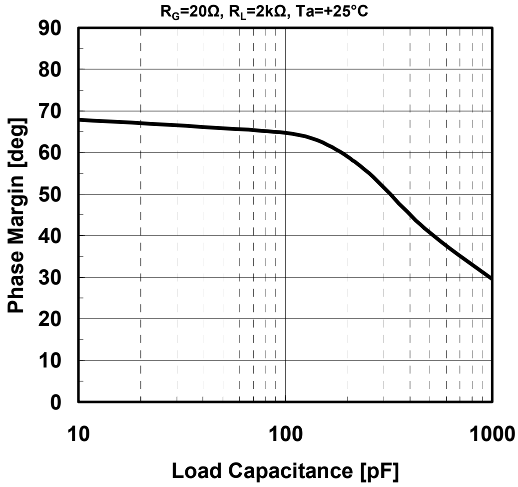
Voltage Gain/Phase vs. Frequency (with Capacitive load)
V^+/V^-=±2.5V, G_V=40dB, R_F=2kΩ, R_G=20Ω, R_L=2kΩ, Ta=+25°C



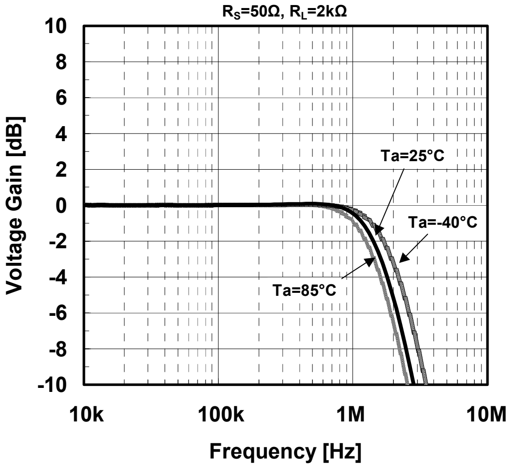
Voltage Gain/Phase vs. Frequency (correlation with Ta)
V^+/V^-=±2.5V, G_V=40dB
R_F=2kΩ, R_G=20Ω, R_L=2kΩ, C_L=0pF



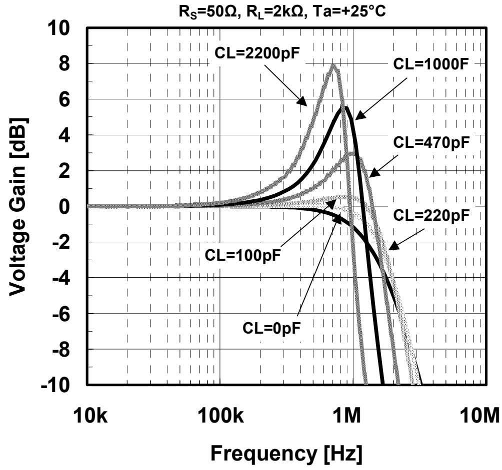
Phase Margin vs. Load Capacitance (with Capacitance Load)
V^+/V^-=±1.5V, G_V=40dB, R_F=2kΩ
R_G=20Ω, R_L=2kΩ, Ta=+25°C



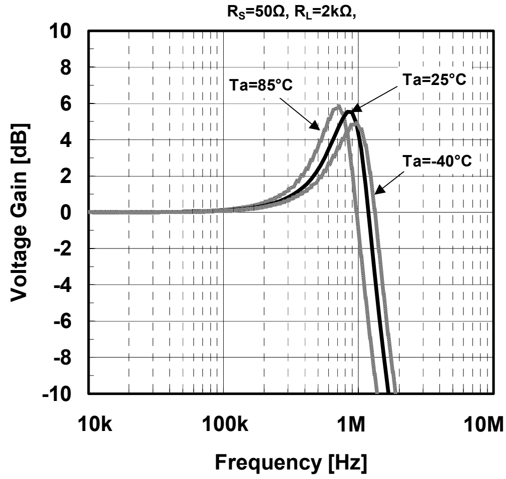
Voltage Gain vs. Frequency (correlation with Ta)
V^+/V^-=±2.5V, G_V=0dB, C_L=100pF
R_S=50Ω, R_L=2kΩ



Voltage Gain vs. Frequency (with Capacitance Load)
V^+/V^-=±2.5V, G_V=0dB
R_S=50Ω, R_L=2kΩ, Ta=+25°C



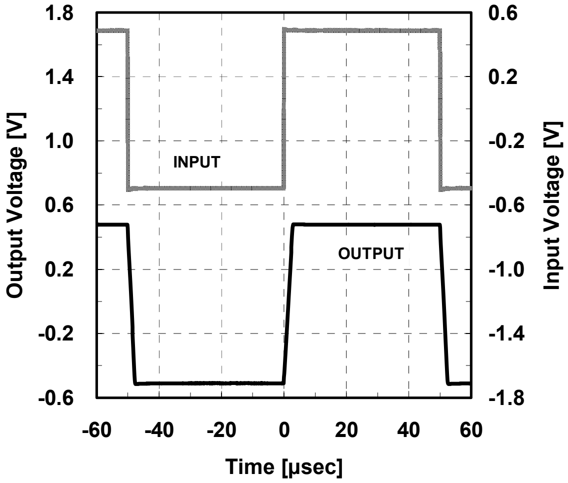
Voltage Gain vs. Frequency (correlation with Ta)
V^+/V^-=±2.5V, G_V=0dB, C_L=1000pF
R_S=50Ω, R_L=2kΩ,



■ TYPICAL CHARACTERISTICS

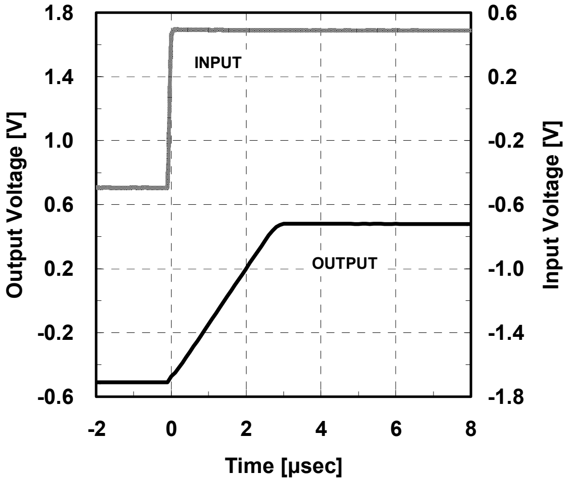
Pulse Response

$V^+/V^-=\pm2.5V$, $G_V=0dB$, f=10kHz, $V_{IN}=1V_{PP}$
$R_S=50\Omega$, $R_L=2k\Omega$, $C_L=0pF$, Ta=+25°C



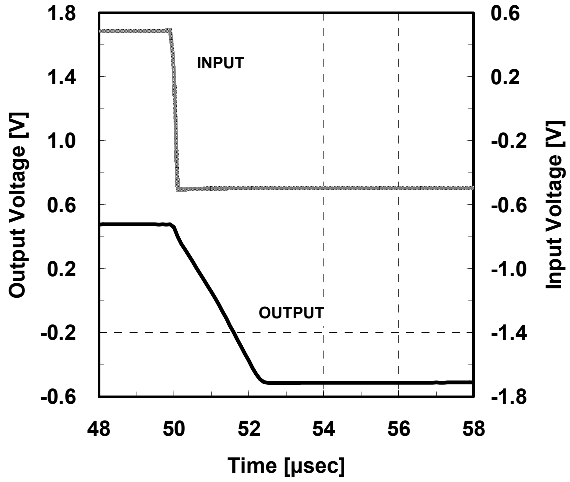
Pulse Response (Rise)

$V^+/V^-=\pm2.5V$, $G_V=0dB$, f=10kHz, $V_{IN}=1V_{PP}$
$R_S=50\Omega$, $R_L=2k\Omega$, $C_L=0pF$, Ta=+25°C



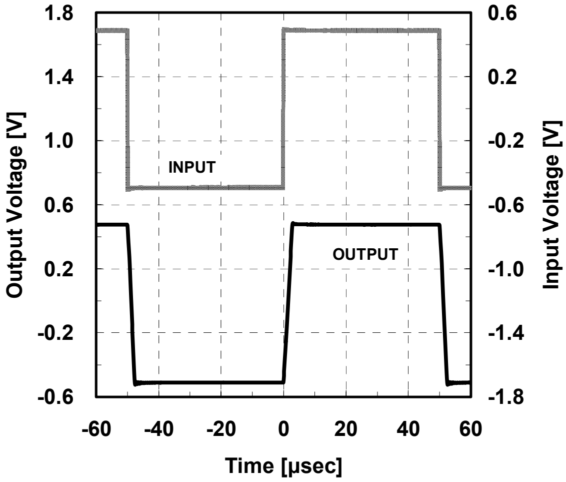
Pulse Response (Fall)

$V^+/V^-=\pm2.5V$, $G_V=0dB$, f=10kHz, $V_{IN}=1V_{PP}$
$R_S=50\Omega$, $R_L=2k\Omega$, $C_L=0pF$, Ta=+25°C



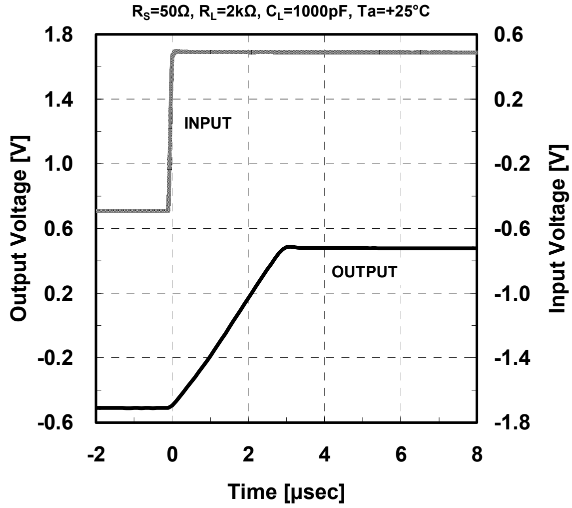
Pulse Response

$V^+/V^-=\pm2.5V$, $G_V=0dB$, f=10kHz, $V_{IN}=1V_{PP}$
$R_S=50\Omega$, $R_L=2k\Omega$, $C_L=1000pF$, Ta=+25°C



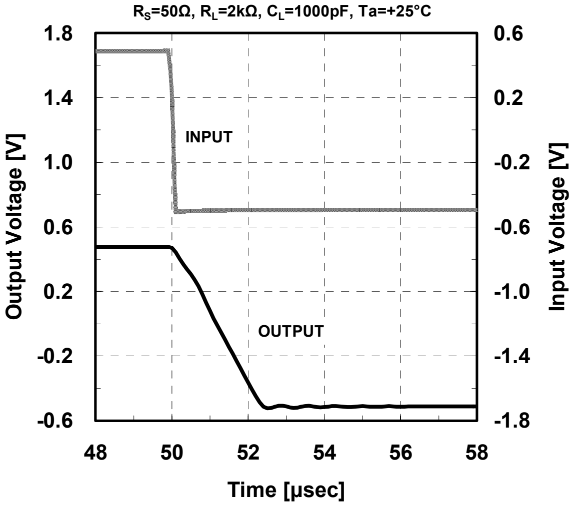
Pulse Response (Rise)

$V^+/V^-=\pm2.5V$, $G_V=0dB$, f=10kHz, $V_{IN}=1V_{PP}$
$R_S=50\Omega$, $R_L=2k\Omega$, $C_L=1000pF$, Ta=+25°C

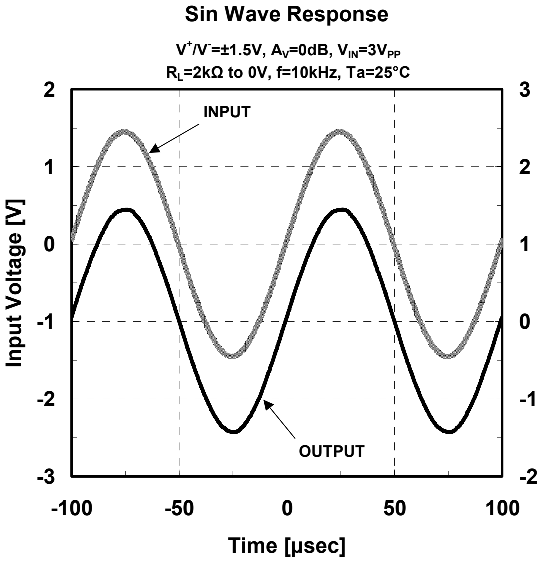


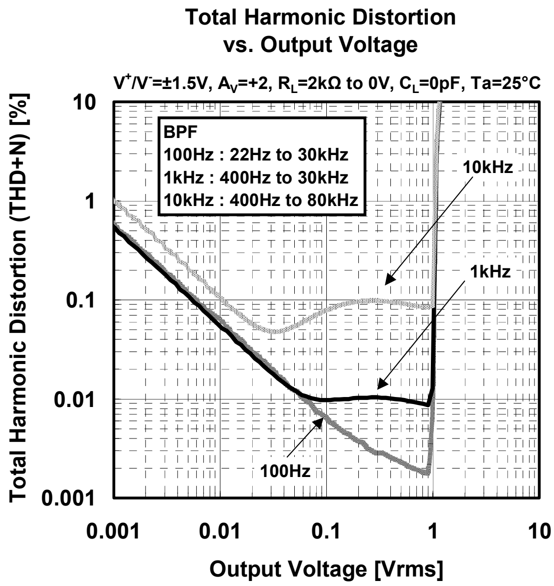
Pulse Response (Fall)

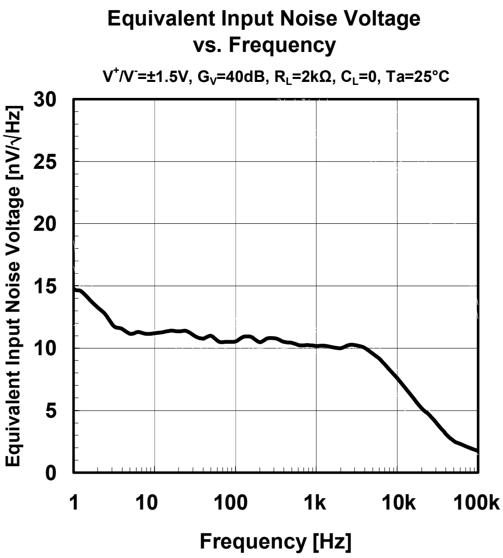
$V^+/V^-=\pm2.5V$, $G_V=0dB$, f=10kHz, $V_{IN}=1V_{PP}$
$R_S=50\Omega$, $R_L=2k\Omega$, $C_L=1000pF$, Ta=+25°C



■ TYPICAL CHARACTERISTICS







Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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