

## Auto-Zero, High Precision Single Operational Amplifier

### ■GENERAL DESCRIPTION

The NJU7098 is Auto Zero high precision operational amplifiers available in the SOT-23-5 packages. The NJU7098 operates from a single 3V to 10V supply. The NJU7098 of CMOS operational amplifier use Auto Zero techniques to simultaneously provide very low offset voltage, and near-zero drift over temperature (0.05 $\mu$ V/ $^{\circ}$ C Max.).

The NJU7098 includes a shutdown mode. Under logic control, the amplifiers can be switched from normal operation to a standby. When the SHDN pin is connected high, the amplifier is active. Connecting  $\overline{\text{SHDN}}$  low disables the amplifier.

### ■PACKAGE OUTLINE



NJU7098F1

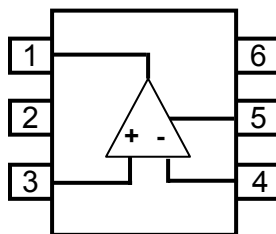
### ■FEATURES

- Low Offset Voltage Drift                   0.05 $\mu$ V/ $^{\circ}$ C max.
- Low Offset Voltage                        15 $\mu$ V max.
- Operating Voltage                         +3V to +10V
- High Voltage Gain                        140dB typ.
- CMR, SVR                                 130dB typ.
- Operating Current                        0.6mA typ. (at  $V_{DD}=+5V$ )
- Output Full-Swing ( $R_L=10k\Omega$ )
- Shutdown
- Ground Sensing
- Package Outline                         SOT-23-6

### ■APPLICATIONS

- Thermocouple / Thermopile Amplifiers
- Strain Gauge / Pressure sensor Amplifiers
- Load Cell and Bridge Transducer Amplifiers
- High Resolution Data Acquisition
- Precision Current Sensing

### ■PIN CONFIGURATION

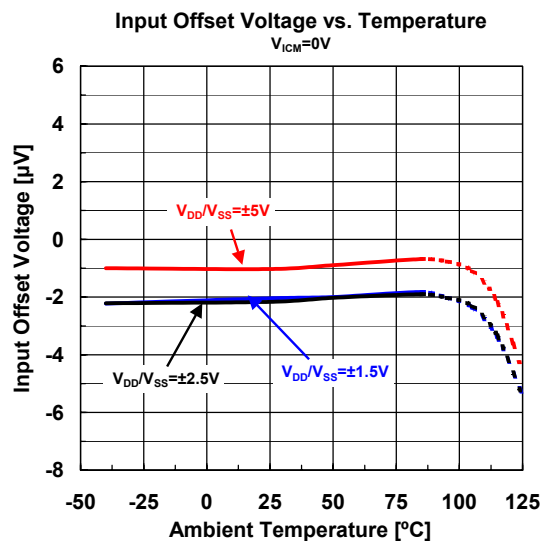


NJU7098F1  
(Top View)

#### PIN FUNCTION

1. OUTPUT
2.  $V_{SS}$
3. +INPUT
4. -INPUT
5.  $\overline{\text{SHDN}}$
6.  $V_{DD}$

### ■TYPICAL CHARACTERISTICS



## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

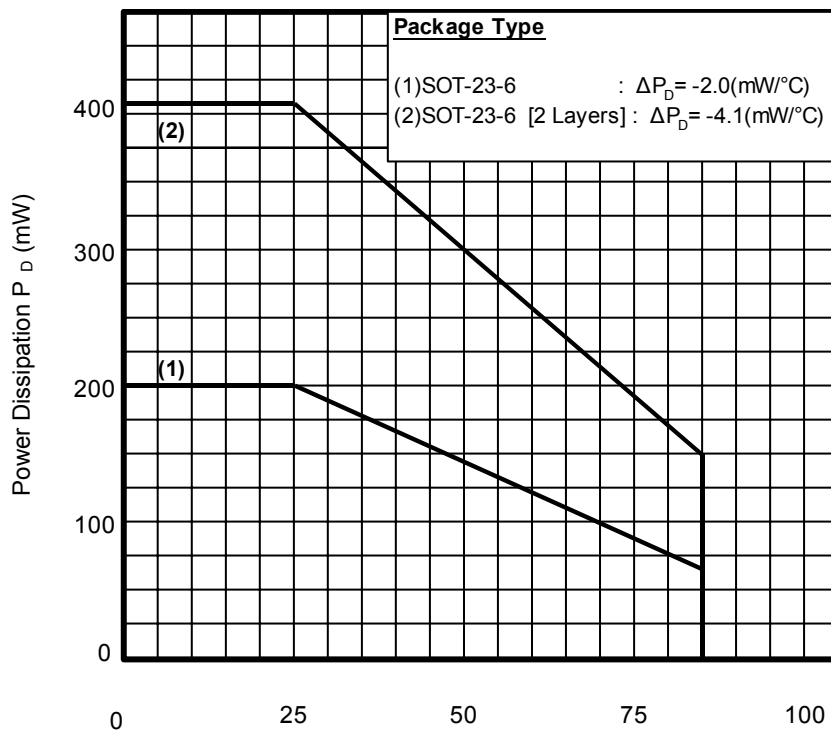
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>DD</sub>	11	V
Common Mode Input Voltage Range	V <sub>ICM</sub>	-0.3 to V <sub>DD</sub> +0.3	V
Differential Input Voltage Range	V <sub>ID</sub>	±11(Note 1)	V
Power Dissipation	P <sub>D</sub>	200 [SOT23-6]	mW
		410 [SOT23-6] (Note 2)	
Operating Temperature Range	T <sub>opr</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

(Note 1) For supply voltage less than 11V, the absolute maximum input voltage is equal to the supply voltage.

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

(Note 3) Do not exceed "Power dissipation: P<sub>D</sub>" 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 .

Figure 1: Power Dissipation – Ambient Temperature



## ■ OPERATING VOLTAGE (Ta=-40 to +85°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>DD</sub>	3 to 10	V

## ■ ELECTORIC CHARACTERISTICS

● DC CHARACTERISTICS ( $V_{DD}=+3V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=-40\sim 85^{\circ}C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Supply Current	$I_{DD}$	$R_L=\infty$ , No Signal	-	0.55	1.1	mA
Input Offset Voltage1	$V_{IO1}$	$T_a=25^{\circ}C$	-	3	15	$\mu V$
Input Offset Voltage2	$V_{IO2}$		-	3	15	$\mu V$
Input Offset Voltage Drift	$V_{IO}/\Delta t$		-	-	0.05	$\mu V/^{\circ}C$
Input Bias Current1	$I_{B1}$	$T_a=25^{\circ}C$	-	15	50	pA
Input Bias Current2	$I_{B2}$		-	-	100	pA
Input Offset Current1	$I_{IO1}$	$T_a=25^{\circ}C$	-	-	100	pA
Input Offset Current2	$I_{IO2}$		-	-	200	pA
Voltage Gain1	$A_{V1}$	$R_L \geq 10k\Omega$ , $V_o=0.35\sim 2.65V$ , $T_a=25^{\circ}C$	120	140	-	dB
Voltage Gain2	$A_{V2}$	$R_L \geq 10k\Omega$ , $V_o=0.35\sim 2.65V$	115	140	-	dB
Input Common Mode Voltage Range	$V_{ICM}$	$CMR \geq 110dB$	0	-	1.7	V
Common Mode Rejection Ratio1	CMR1	$V_{ICM}=0\sim 1.7V$ , $T_a=25^{\circ}C$	110	130	-	dB
Common Mode Rejection Ratio2	CMR2	$V_{ICM}=0\sim 1.7V$	110	130	-	dB
Supply Voltage Rejection Ratio1	SVR1	$V_{DD}=3\sim 10V$ , $T_a=25^{\circ}C$	110	130	-	dB
Supply Voltage Rejection Ratio2	SVR2	$V_{DD}=3\sim 10V$	110	130	-	dB
Maximum Output Voltage1	$V_{OH1}$	$R_L=2k\Omega$ to GND	2.85	2.94	-	V
	$V_{OL1}$	$R_L=2k\Omega$ to GND	-	1	10	mV
Maximum Output Voltage2	$V_{OH2}$	$R_L=10k\Omega$ to GND	2.95	2.98	-	V
	$V_{OL2}$	$R_L=10k\Omega$ to GND	-	1	10	mV
Output Source Current	$I_{SOURCE}$	$V_o=2.5V$	5	20	-	mA
Output Sink Current	$I_{SINK}$	$V_o=0.5V$	3	25	-	mA

● AC CHARACTERISTICS ( $V_{DD}=+3V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=+25^{\circ}C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Gain Bandwidth Product	GB	$R_L=10k\Omega$	-	2	-	MHz
Phase Margin	$\Phi_M$	$R_L=10k\Omega$ , $C_L=50pF$	-	30	-	deg
Equivalent Input Noise Voltage	$V_{NI}$	$f=10Hz$	-	120	-	$nV/\sqrt{Hz}$
Internal Sampling Frequency	$F_S$		-	7.5	-	kHz

● TRANSIENT CHARACTERISTICS ( $V_{DD}=+3V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=+25^{\circ}C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Positive Slew Rate	+SR	$A_V=1$ , $V_{IN}=1V_{P-P}$ , $R_L=10k\Omega$	-	3	-	$V/\mu s$
Negative Slew Rate	-SR	$A_V=1$ , $V_{IN}=1V_{P-P}$ , $R_L=10k\Omega$	-	8	-	$V/\mu s$

● SHUTDOWN CHARACTERISTICS

( $V_{DD}=+3V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=-40\sim 85^{\circ}C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Shutdown Supply Current	$I_{DDSHDN}$	$R_L=\infty$ , $V_{SHDN}=GND$ , No Signal	-	-	10	$\mu A$
Turn On Voltage to Enable Part	$V_{SHDNON}$	$I_{DD} \geq 300\mu A$	2.5	-	3	V
Turn off Voltage to Disable Part	$V_{SHDNOFF}$	$I_{DD} \leq 10\mu A$	GND	-	0.5	V
Shutdown Bias Current	$I_{SHDN}$	$V_{SHDN}=GND$	-	0.5	3.0	$\mu A$

## ■ ELECTRIC CHARACTERISTICS

● DC CHARACTERISTICS ( $V_{DD}=+5V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=-40\sim 85^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Supply Current	$I_{DD}$	$R_L=\infty$ , No signal	-	0.6	1.2	mA
Input Offset Voltage1	$V_{IO1}$	$T_a=25^\circ C$	-	3	15	$\mu V$
Input Offset Voltage2	$V_{IO2}$		-	3	15	$\mu V$
Input Offset Voltage Drift	$V_{IO}/\Delta t$		-	-	0.05	$\mu V/^\circ C$
Input Bias Current1	$I_{B1}$	$T_a=25^\circ C$	-	20	50	pA
Input Bias Current2	$I_{B2}$		-	-	100	pA
Input Offset Current1	$I_{IO1}$	$T_a=25^\circ C$	-	-	100	pA
Input Offset Current2	$I_{IO2}$		-	-	200	pA
Voltage Gain1	$A_{V1}$	$R_L \geq 10k\Omega$ , $V_o=1\sim 4V$ , $T_a=25^\circ C$	125	140	-	dB
Voltage Gain2	$A_{V2}$	$R_L \geq 10k\Omega$ , $V_o=1\sim 4V$	120	140	-	dB
Input Common Mode Voltage Range	$V_{ICM}$	$CMR \geq 115dB$	0	-	3.5	V
Common Mode Rejection Ratio1	CMR1	$V_{ICM}=0\sim 3.5V$ , $T_a=25^\circ C$	120	130	-	dB
Common Mode Rejection Ratio2	CMR2	$V_{ICM}=0\sim 3.5V$	115	130	-	dB
Supply Voltage Rejection Ratio1	SVR1	$V_{DD}=4\sim 10V$ , $T_a=25^\circ C$	115	130	-	dB
Supply Voltage Rejection Ratio2	SVR2	$V_{DD}=4\sim 10V$	115	130	-	dB
Maximum Output Voltage1	$V_{OH1}$	$R_L=2k\Omega$ to GND	4.85	4.94	-	V
	$V_{OL1}$	$R_L=2k\Omega$ to GND	-	1	10	mV
Maximum Output Voltage2	$V_{OH2}$	$R_L=10k\Omega$ to GND	4.95	4.98	-	V
	$V_{OL2}$	$R_L=10k\Omega$ to GND	-	1	10	mV
Output Source Current	$I_{SOURCE}$	$V_o=4.5V$	10	30	-	mA
Output Sink Current	$I_{SINK}$	$V_o=0.5V$	4	40	-	mA

AC CHARACTERISTICS ( $V_{DD}=+5V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=+25^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Gain Bandwidth Product	GB	$R_L=10k\Omega$	-	3	-	MHz
Phase Margin	$\Phi_M$	$R_L=10k\Omega$ , $C_L=50pF$	-	30	-	deg
Equivalent Input Noise Voltage	$V_{NI}$	$f=10Hz$	-	120	-	$nV/\sqrt{Hz}$
Internal Sampling Frequency	$F_S$		-	7.5	-	kHz

● TRANSIENT CHARACTERISTICS ( $V_{DD}=+5V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=+25^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Positive Slew Rate	+SR	$A_V=1$ , $V_{IN}=2V_{P-P}$ , $R_L=10k\Omega$	-	3	-	$V/\mu s$
Negative Slew Rate	-SR	$A_V=1$ , $V_{IN}=2V_{P-P}$ , $R_L=10k\Omega$	-	12	-	$V/\mu s$

● SHUTDOWN CHARACTERISTICS

( $V_{DD}=+5V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=-40\sim 85^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Shutdown Supply Current	$I_{DDSHDN}$	$R_L=\infty$ , $V_{SHDN}=GND$ , No Signal	-	-	15	$\mu A$
Turn On Voltage to Enable Part	$V_{SHDNON}$	$I_{DD} \geq 300\mu A$	4.5	-	5	V
Turn off Voltage to Disable Part	$V_{SHDNOFF}$	$I_{DD} \leq 15\mu A$	GND	-	0.5	V
Shutdown Bias Current	$I_{SHDN}$	$V_{SHDN}=GND$	-	2.0	7.0	$\mu A$

## ■ ELECTORIC CHARACTERISTICS

● DC CHARACTERISTICS ( $V_{DD}=+10V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=-40\sim 85^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Supply Current	$I_{DD}$	$R_L=\infty$ , No Signal	-	0.7	1.5	mA
Input Offset Voltage1	$V_{IO1}$	$T_a=25^\circ C$	-	3	15	$\mu V$
Input Offset Voltage2	$V_{IO2}$		-	3	15	$\mu V$
Input Offset Voltage Drift	$V_{IO}/\Delta t$		-	-	0.05	$\mu V/^\circ C$
Input Bias Current1	$I_{B1}$	$T_a=25^\circ C$	-	40	200	pA
Input Bias Current2	$I_{B2}$		-	-	200	pA
Input Offset Current1	$I_{IO1}$	$T_a=25^\circ C$	-	-	400	pA
Input Offset Current2	$I_{IO2}$		-	-	400	pA
Voltage Gain1	$A_{V1}$	$R_L \geq 10k\Omega$ , $V_o=1\sim 9V$ , $T_a=25^\circ C$	125	140	-	dB
Voltage Gain2	$A_{V2}$	$R_L \geq 10k\Omega$ , $V_o=1\sim 9V$	120	140	-	dB
Input Common Mode Voltage Range	$V_{ICM}$	$CMR \geq 115dB$	0	-	8.5	V
Common Mode Rejection Ratio1	$CMR1$	$V_{ICM}=0\sim 8.5V$ , $T_a=25^\circ C$	120	130	-	dB
Common Mode Rejection Ratio2	$CMR2$	$V_{ICM}=0\sim 8.5V$	115	130	-	dB
Supply Voltage Rejection Ratio1	$SVR1$	$V_{DD}=4\sim 10V$ , $T_a=25^\circ C$	115	130	-	dB
Supply Voltage Rejection Ratio2	$SVR2$	$V_{DD}=4\sim 10V$	115	130	-	dB
Maximum Output Voltage1	$V_{OH1}$	$R_L=2k\Omega$ to GND	9.5	9.94	-	V
	$V_{OL1}$	$R_L=2k\Omega$ to GND	-	1	10	mV
Maximum Output Voltage2	$V_{OH2}$	$R_L=10k\Omega$ to GND	9.6	9.98	-	V
	$V_{OL2}$	$R_L=10k\Omega$ to GND	-	1	10	mV
Output Source Current	$I_{SOURCE}$	$V_o=9.5V$	14	40	-	mA
Output Sink Current	$I_{SINK}$	$V_o=0.5V$	5	60	-	mA

● AC CHARACTERISTICS ( $V_{DD}=+10V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=+25^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Gain Bandwidth Product	GB	$R_L=10k\Omega$	-	2	-	MHz
Phase Margin	$\Phi_M$	$R_L=10k\Omega$ , $C_L=50pF$	-	30	-	deg
Equivalent Input Noise Voltage	$V_{NI}$	$f=10Hz$	-	120	-	$nV/\sqrt{Hz}$
Internal Sampling Frequency	$F_S$		-	7.5	-	kHz

● TRANSIENT CHARACTERISTICS ( $V_{DD}=+10V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=+25^\circ C$  unless otherwise specified)

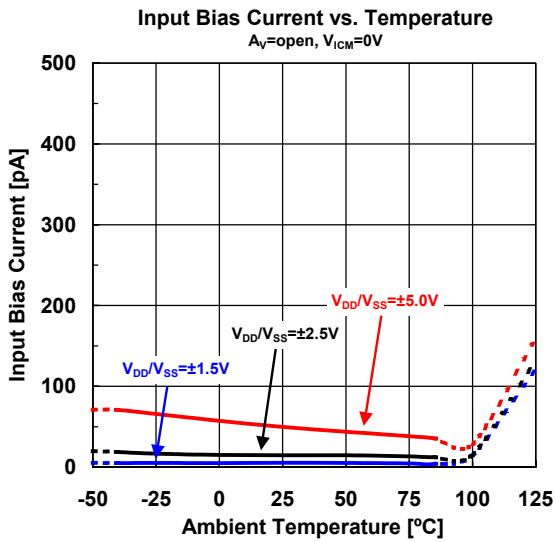
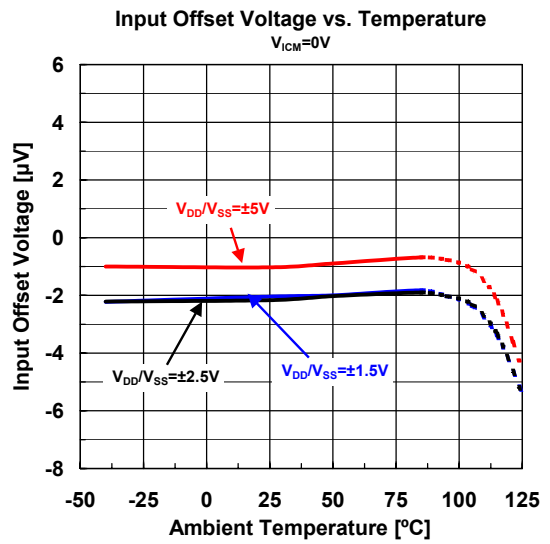
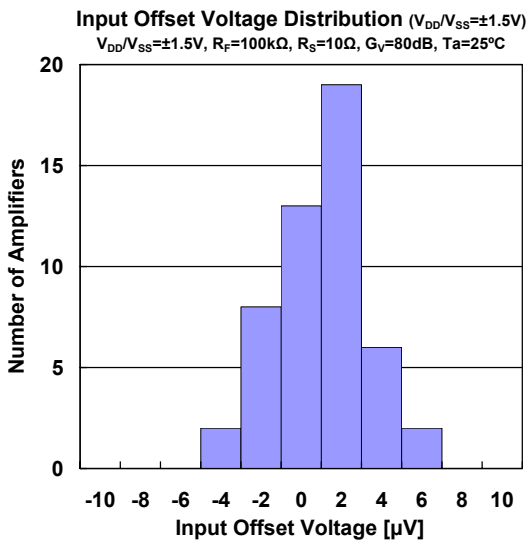
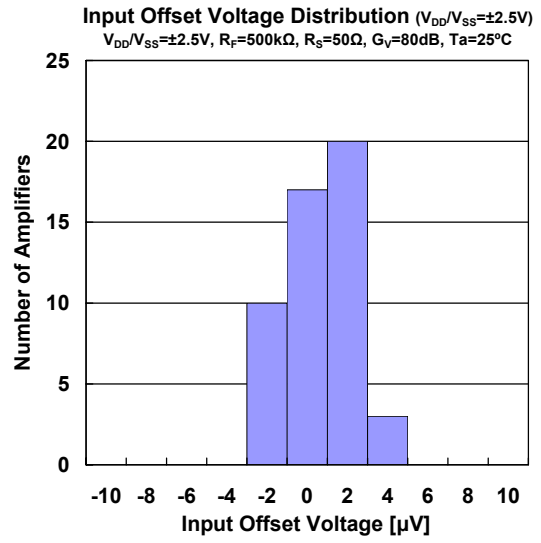
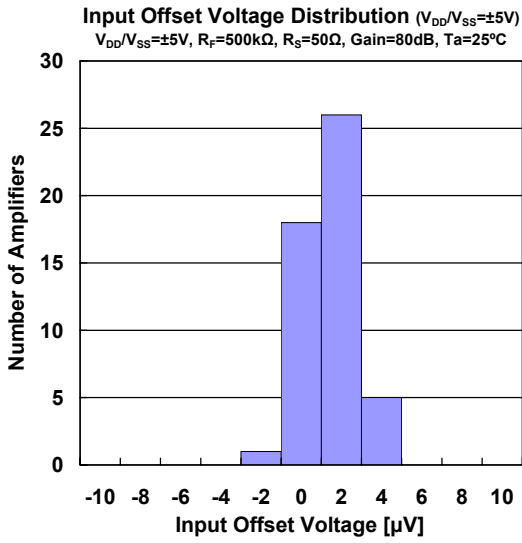
PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Positive Slew Rate	+SR	$A_V=1$ , $V_{IN}=2V_{P-P}$ , $R_L=10k\Omega$	-	4	-	$V/\mu s$
Negative Slew Rate	-SR	$A_V=1$ , $V_{IN}=2V_{P-P}$ , $R_L=10k\Omega$	-	14	-	$V/\mu s$

## ● SHUTDOWN CHARACTERISTICS

( $V_{DD}=+10V$ ,  $V_{SS}=GND$ ,  $V_{COM}=V_{DD}/2$ ,  $V_{SHDN}=V_{DD}$ ,  $T_a=-40\sim 85^\circ C$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Shutdown Supply Current	$I_{DDSHDN}$	$R_L=\infty$ , $V_{SHDN}=GND$ , No Signal	-	-	25	$\mu A$
Turn On Voltage to Enable Part	$V_{SHDNON}$	$I_{DD} \geq 400\mu A$	9.5	-	10	V
Turn off Voltage to Disable Part	$V_{SHDNOFF}$	$I_{DD} \leq 25\mu A$	GND	-	0.5	V
Shutdown Bias Current	$I_{SHDN}$	$V_{SHDN}=GND$	-	7.5	20	$\mu A$

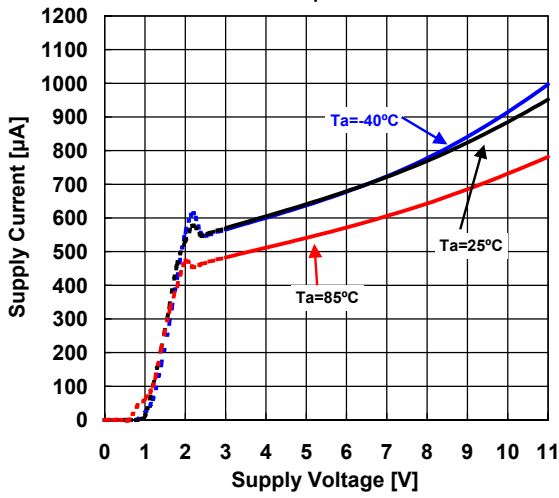
## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS

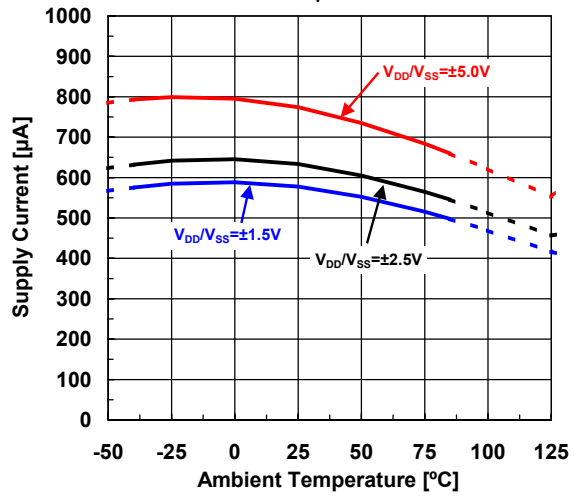
Supply Current vs. Supply Voltage

$A_v=0dB$



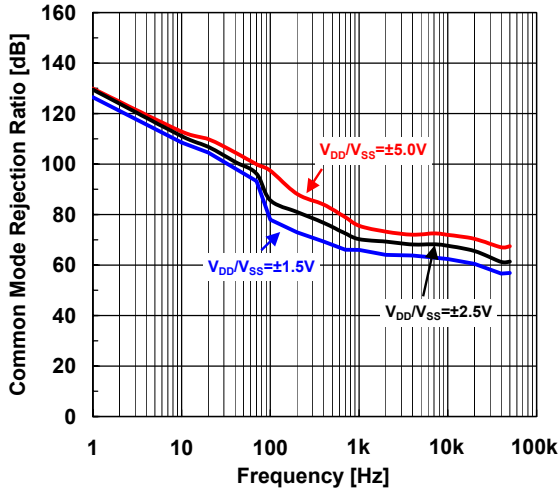
Supply Current vs. Temperature

$A_v=0dB$



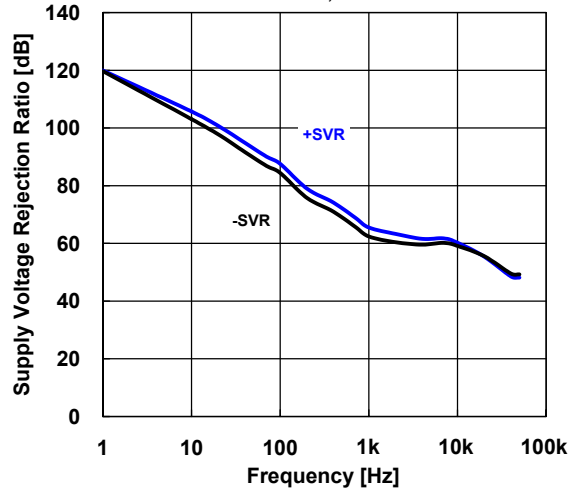
CMR vs. Frequency (Supply Voltage)

$R_f=100k, R_s=10, G_v=80dB, Ta=25°C$



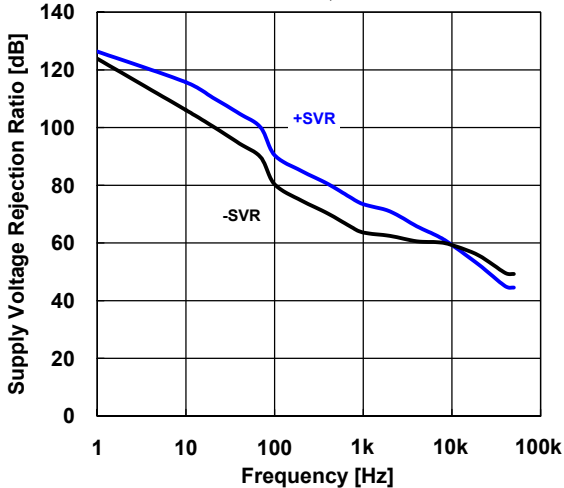
SVR vs. Frequency

$V^*/V=±5V, Ta=25°C$



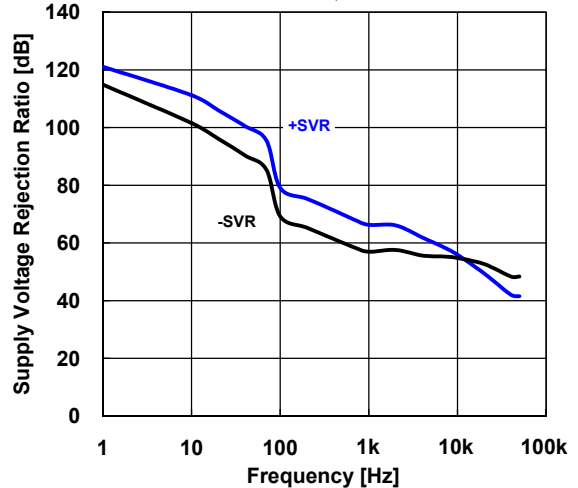
SVR vs. Frequency

$V^*/V=±2.5V, Ta=25°C$

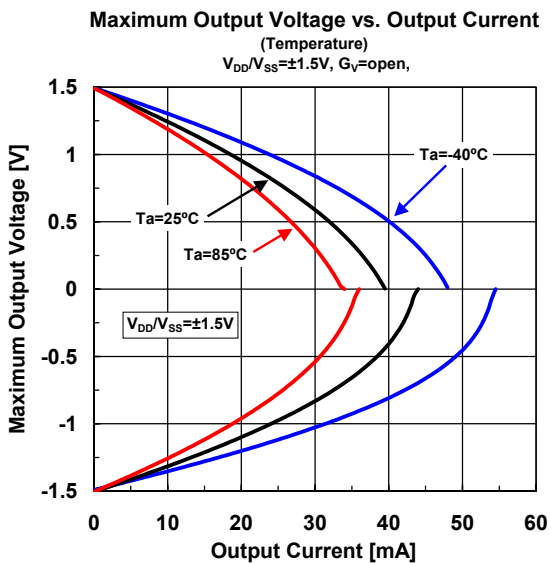
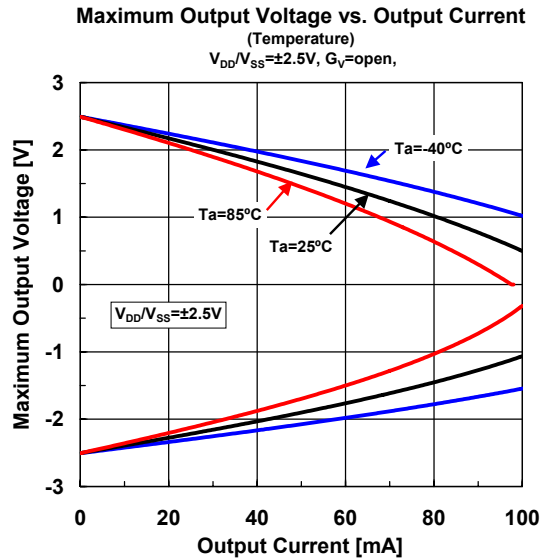
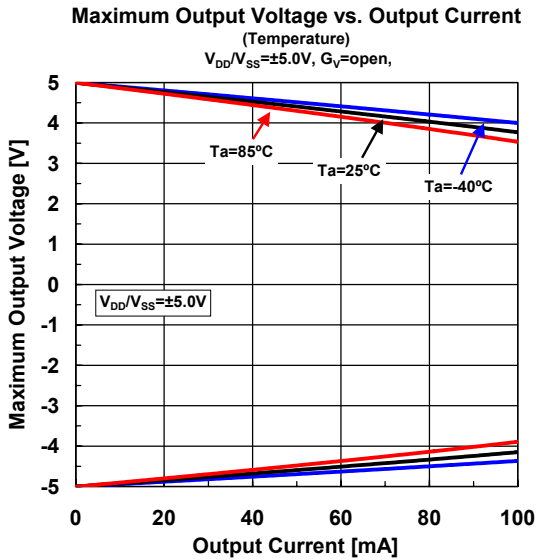
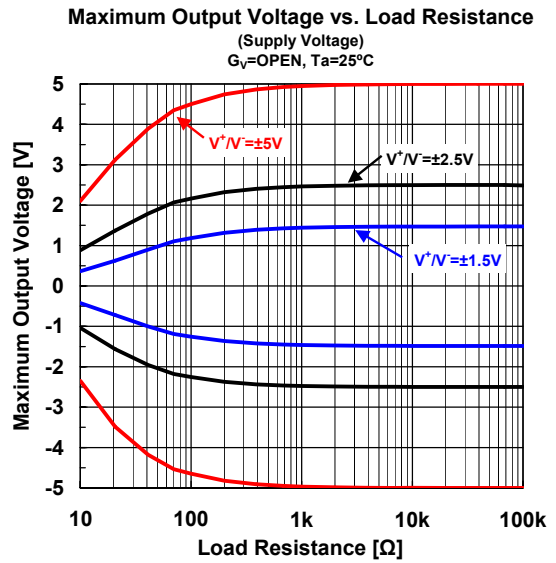
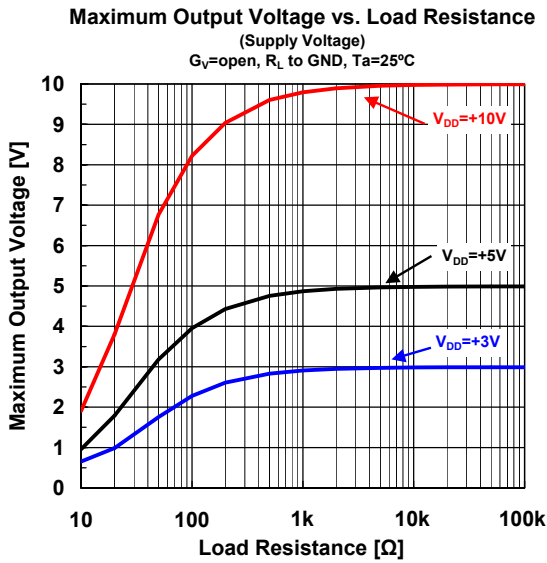


SVR vs. Frequency

$V^*/V=±1.5V, Ta=25°C$



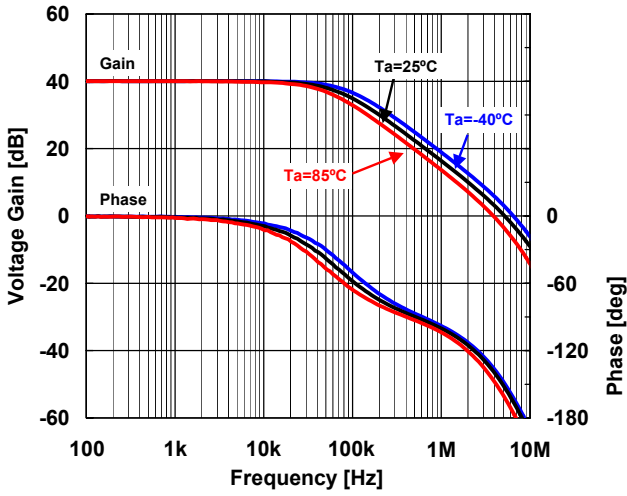
## ■ TYPICAL CHARACTERISTICS



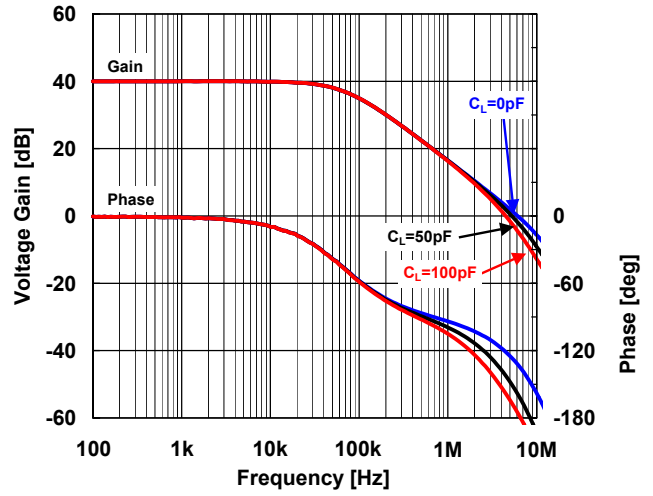


■ TYPICAL CHARACTERISTICS

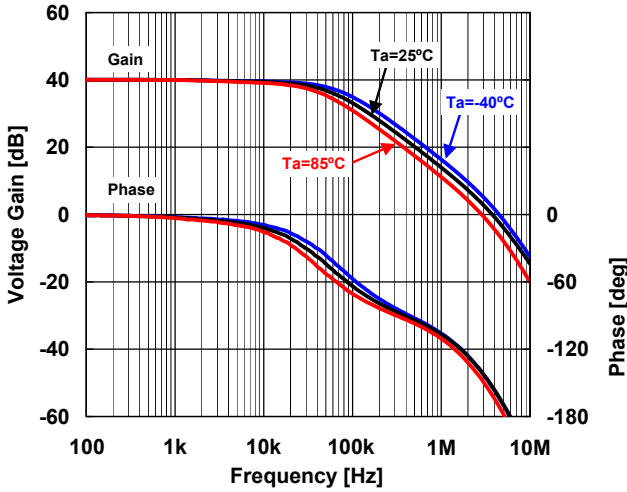
40dB Gain/Phase vs. Frequency  
 ( $V_{DD}/V_{SS}=\pm 5V$ , Temperature)  
 $V_{DD}/V_{SS}=\pm 5V$ ,  $G_v=40dB$ ,  $R_L=10k\Omega$ ,  $C_L=50pF$



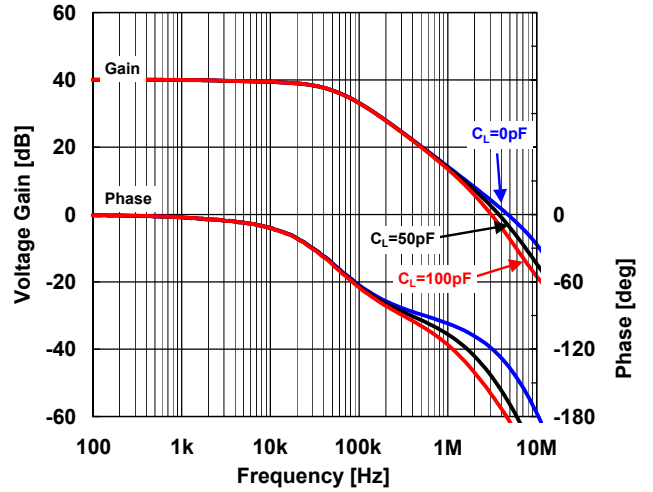
40dB Gain/Phase vs. Frequency  
 ( $V_{DD}/V_{SS}=\pm 5V$ , Load Capacitance)  
 $V_{DD}/V_{SS}=\pm 5V$ ,  $G_v=40dB$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$



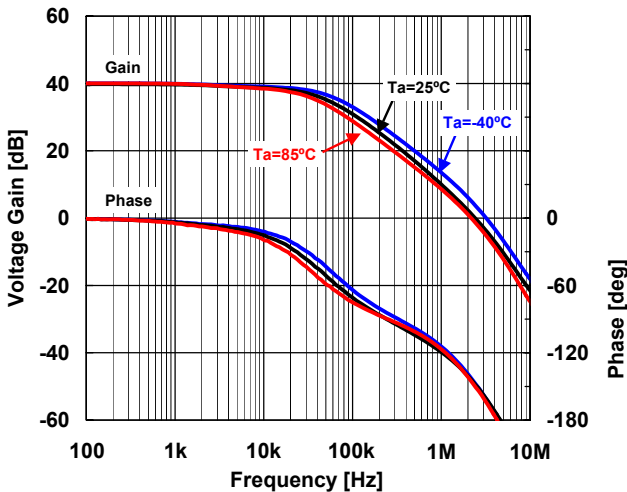
40dB Gain/Phase vs. Frequency  
 ( $V_{DD}/V_{SS}=\pm 2.5V$ , Temperature)  
 $V_{DD}/V_{SS}=\pm 2.5V$ ,  $G_v=40dB$ ,  $R_L=10k\Omega$ ,  $C_L=50pF$



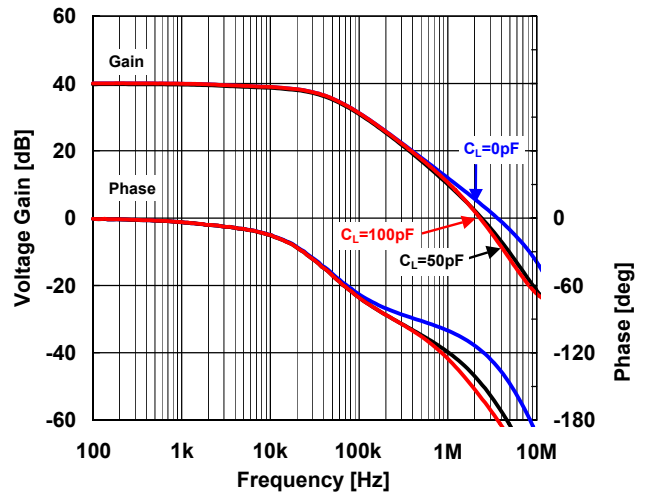
40dB Gain/Phase vs. Frequency  
 ( $V_{DD}/V_{SS}=\pm 2.5V$ , Load Capacitance)  
 $V_{DD}/V_{SS}=\pm 2.5V$ ,  $G_v=40dB$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$



40dB Gain/Phase vs. Frequency  
 ( $V_{DD}/V_{SS}=\pm 1.5V$ , Temperature)  
 $V_{DD}/V_{SS}=\pm 1.5V$ ,  $G_v=40dB$ ,  $R_L=10k\Omega$ ,  $C_L=50pF$

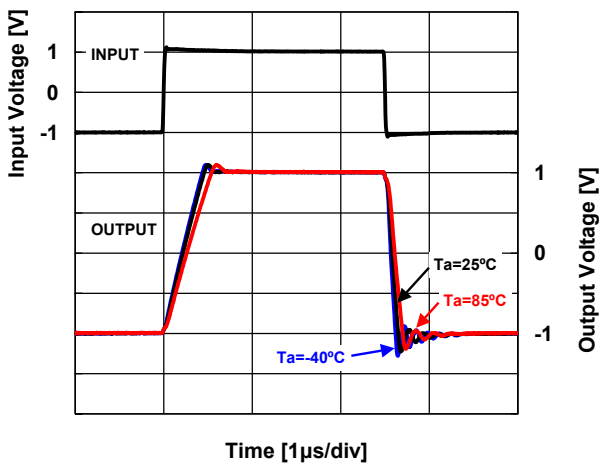


40dB Gain/Phase vs. Frequency  
 ( $V_{DD}/V_{SS}=\pm 1.5V$ , Load Capacitance)  
 $V_{DD}/V_{SS}=\pm 1.5V$ ,  $G_v=40dB$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$

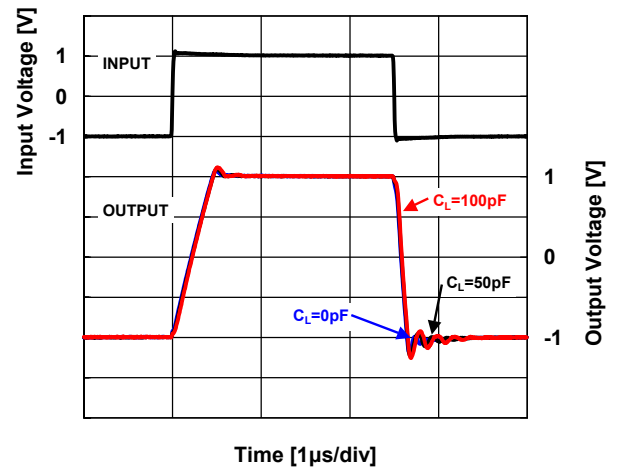


## ■ TYPICAL CHARACTERISTICS

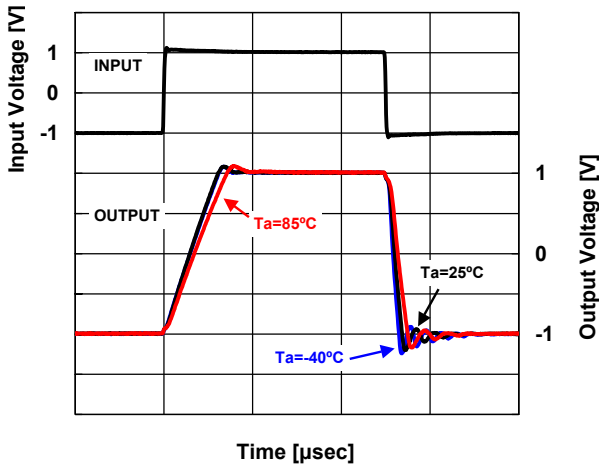
**Pulse Response ( $V_{DD}/V_{SS}=\pm 5V$ , Temperature)**  
 $V_{DD}/V_{SS}=\pm 5.0V$ ,  $G_v=0dB$ ,  $f=100kHz$ ,  
 $V_{IN}=\pm 1V$ ,  $R_L=10k\Omega$ ,  $C_L=50pF$



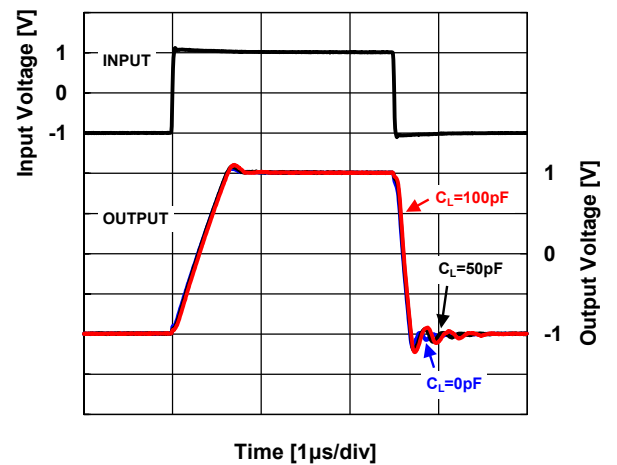
**Pulse Response ( $V_{DD}/V_{SS}=\pm 5V$ , Load Capacitance)**  
 $V_{DD}/V_{SS}=\pm 5.0V$ ,  $G_v=0dB$ ,  $f=100kHz$ ,  
 $V_{IN}=\pm 1V$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$



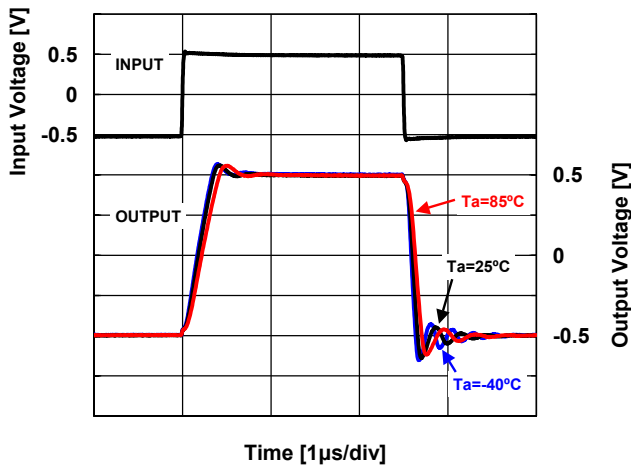
**Pulse Response ( $V_{DD}/V_{SS}=\pm 2.5V$ , Temperature)**  
 $V_{DD}/V_{SS}=\pm 2.5V$ ,  $G_v=0dB$ ,  $f=100kHz$ ,  
 $V_{IN}=\pm 1V$ ,  $R_L=10k\Omega$ ,  $C_L=50pF$



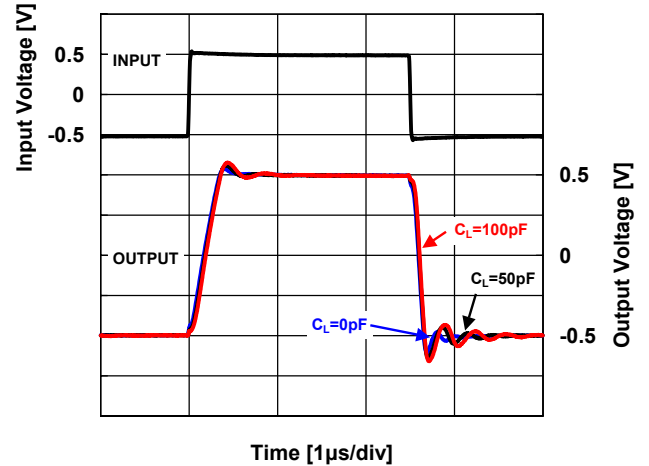
**Pulse Response ( $V_{DD}/V_{SS}=\pm 2.5V$ , Load Capacitance)**  
 $V_{DD}/V_{SS}=\pm 2.5V$ ,  $G_v=0dB$ ,  $f=100kHz$ ,  
 $V_{IN}=\pm 1V$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$



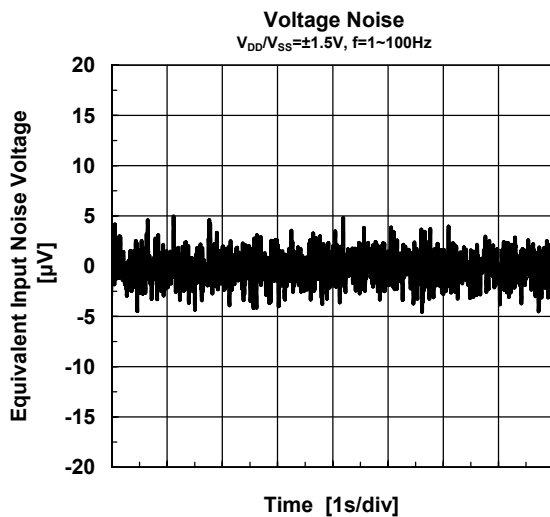
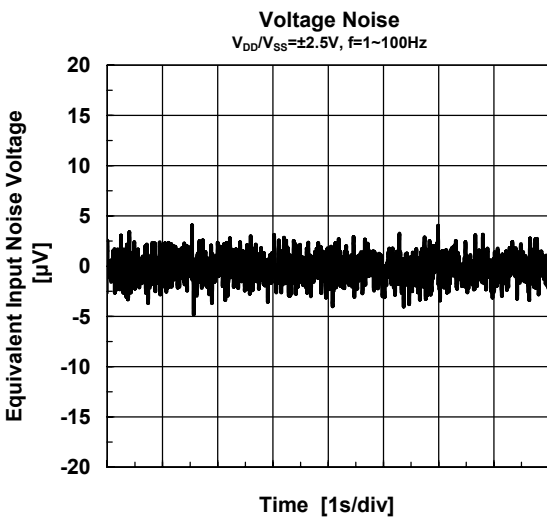
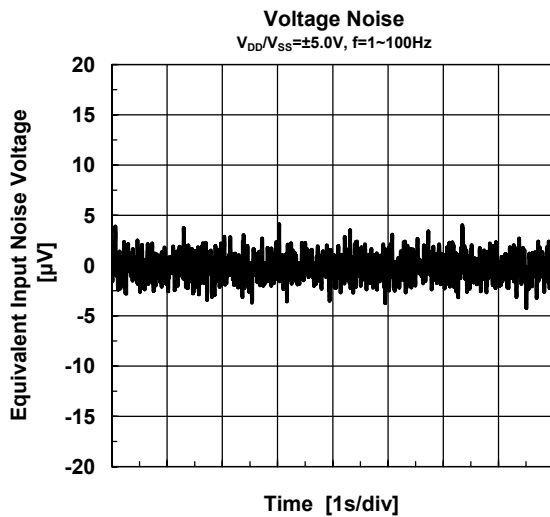
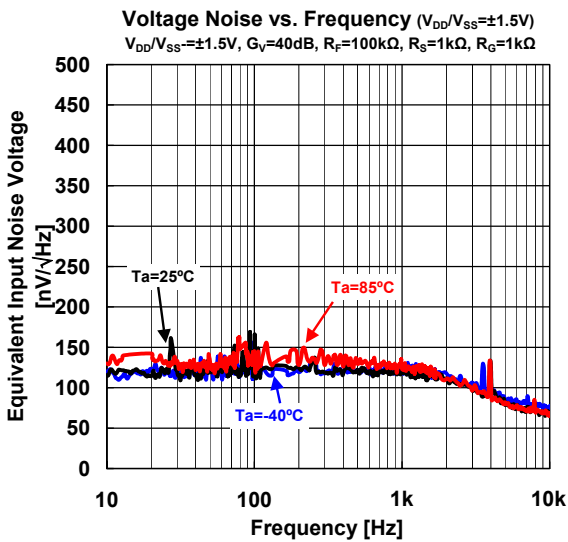
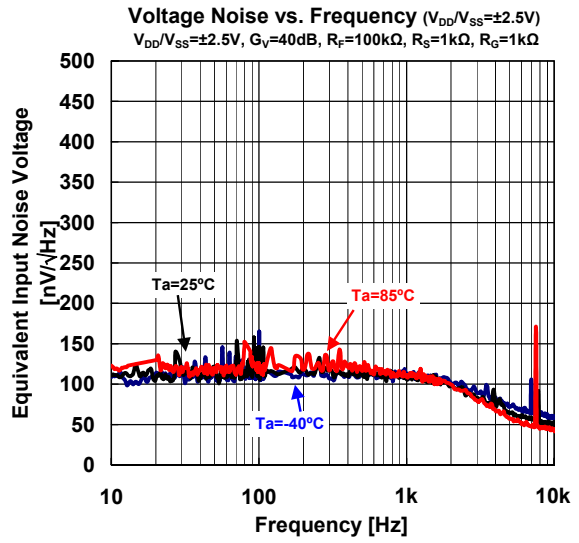
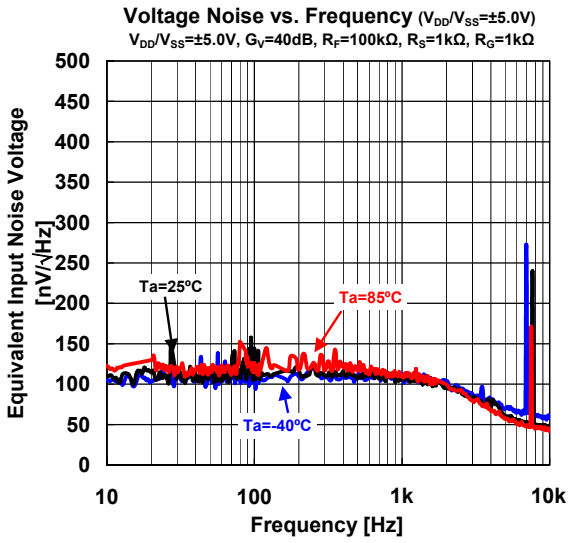
**Pulse Response ( $V_{DD}/V_{SS}=\pm 1.5V$ , Temperature)**  
 $V_{DD}/V_{SS}=\pm 1.5V$ ,  $G_v=0dB$ ,  $f=100kHz$ ,  
 $V_{IN}=\pm 0.5V$ ,  $R_L=10k\Omega$ ,  $C_L=50pF$



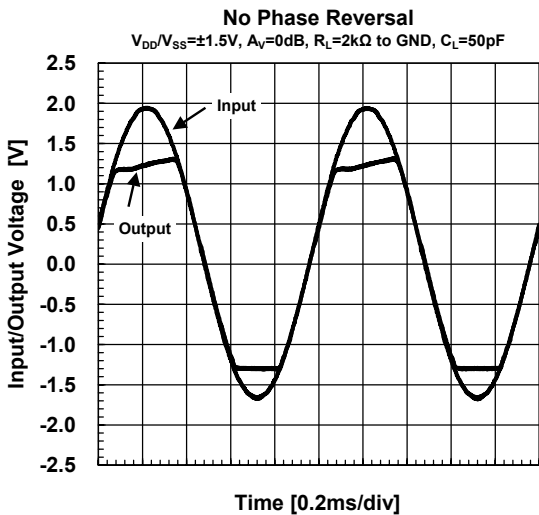
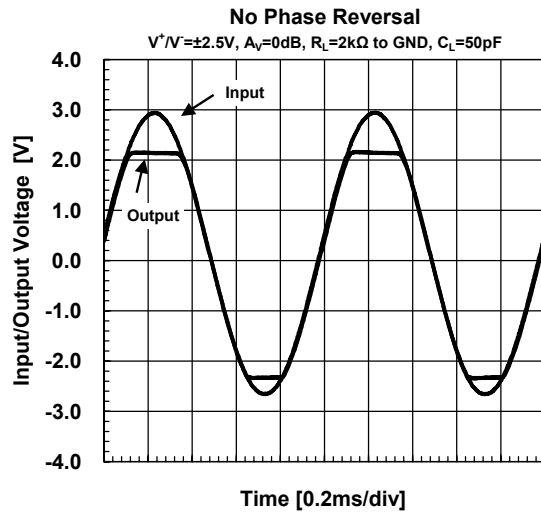
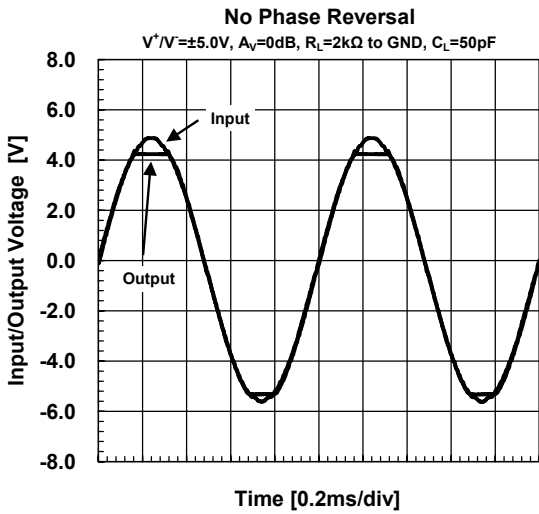
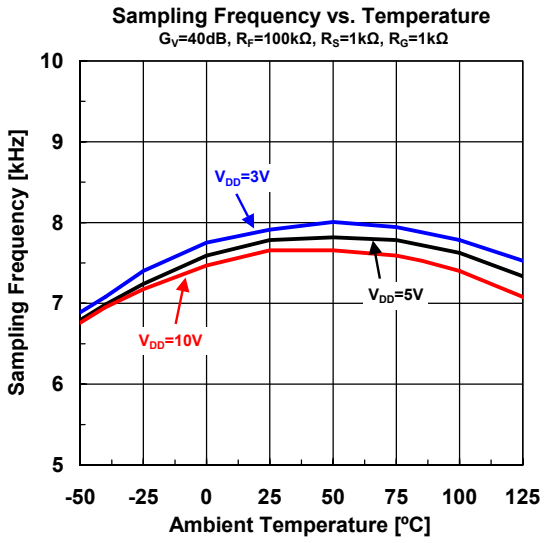
**Pulse Response ( $V_{DD}/V_{SS}=\pm 1.5V$ , Load Capacitance)**  
 $V_{DD}/V_{SS}=\pm 1.5V$ ,  $G_v=0dB$ ,  $f=100kHz$ ,  
 $V_{IN}=\pm 0.5V$ ,  $R_L=10k\Omega$ ,  $T_a=25^\circ C$



## ■ TYPICAL CHARACTERISTICS



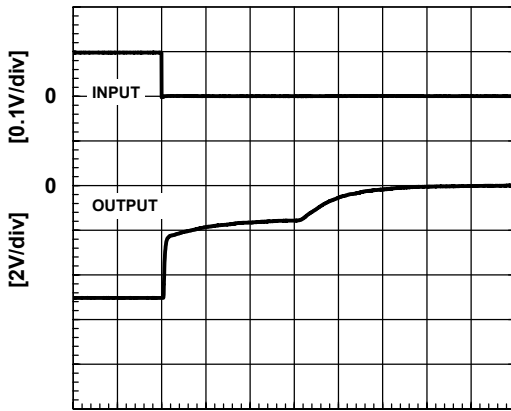
## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS

Positive Overload Recovery Response

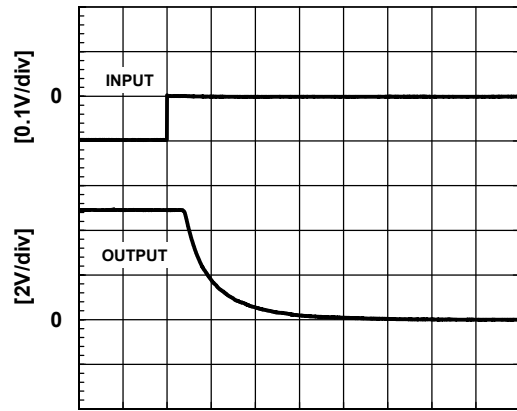
$V^+/V^-\approx\pm 5.0V$ ,  
 $A_v=100$ ,  $R_1=1k\Omega$ ,  $R_2=100k\Omega$



Time [0.1ms/div]

Negative Overload Recovery Response

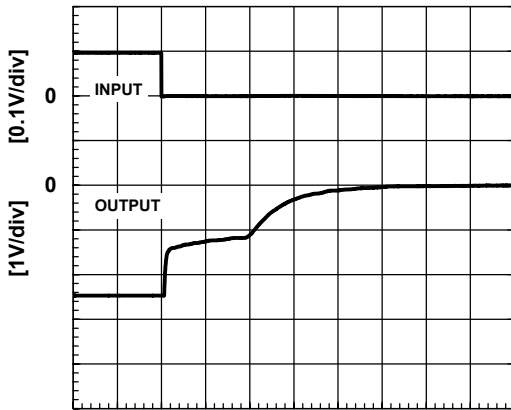
$V^+/V^-\approx\pm 5.0V$ ,  $A_v=100$ ,  $R_1=1k\Omega$ ,  $R_2=100k\Omega$



Time [0.1ms/div]

Positive Overload Recovery Response

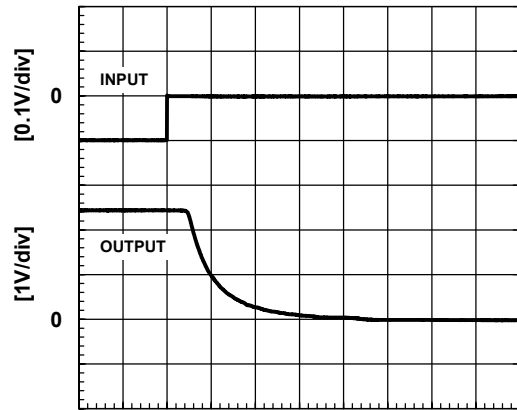
$V^+/V^-\approx\pm 2.5V$ ,  $A_v=100$ ,  $R_1=1k\Omega$ ,  $R_2=100k\Omega$



Time [0.1ms/div]

Negative Overload Recovery Response

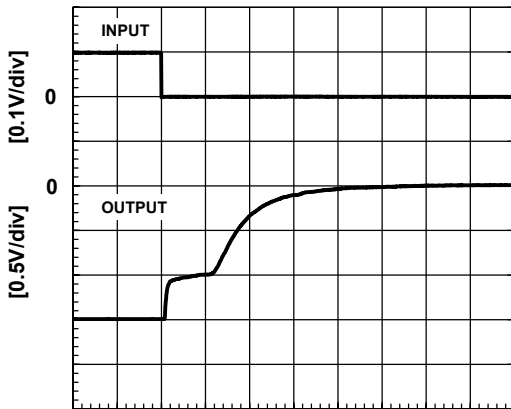
$V^+/V^-\approx\pm 2.5V$ ,  $A_v=100$ ,  $R_1=1k\Omega$ ,  $R_2=100k\Omega$



Time [0.1ms/div]

Positive Overload Recovery Response

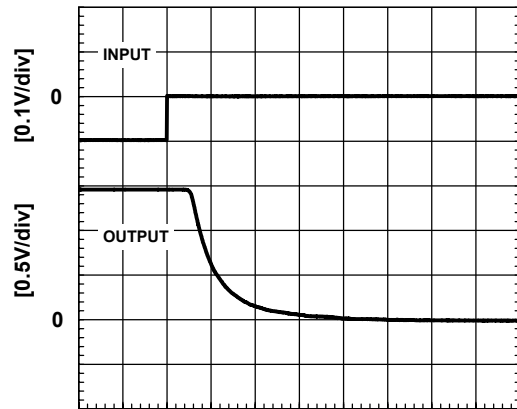
$V^+/V^-\approx\pm 1.5V$ ,  $A_v=100$ ,  $R_1=1k\Omega$ ,  $R_2=100k\Omega$



Time [0.1ms/div]

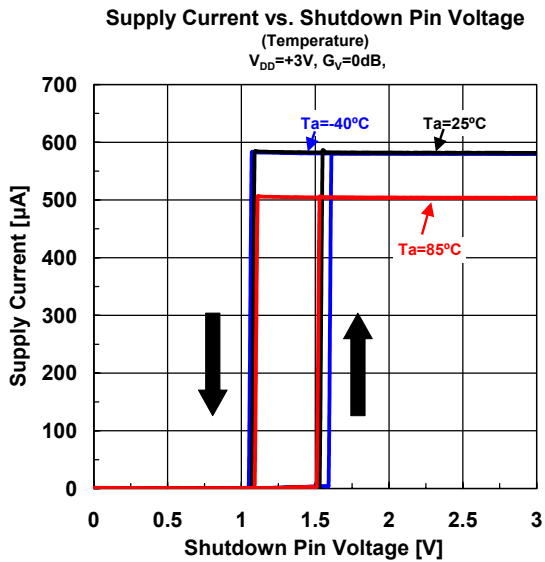
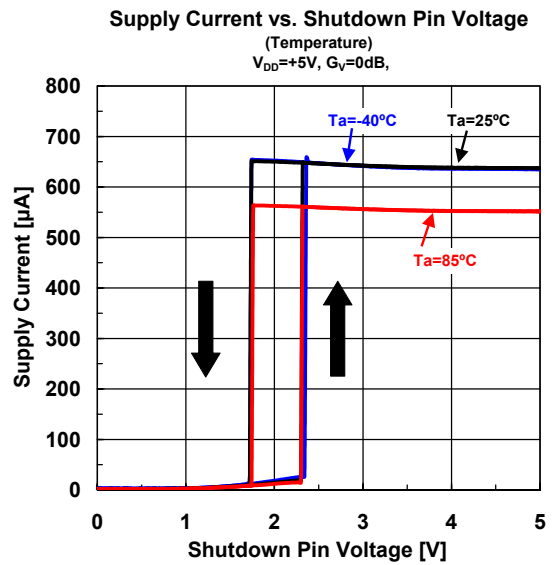
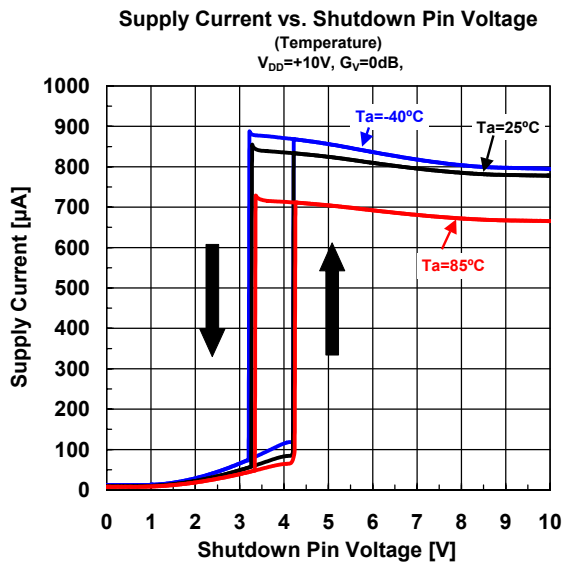
Negative Overload Recovery Response

$V^+/V^-\approx\pm 1.5V$ ,  $A_v=100$ ,  $R_1=1k\Omega$ ,  $R_2=100k\Omega$



Time [0.1ms/div]

## ■ TYPICAL CHARACTERISTICS



[CAUTION]  
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