ELM832B CMOS Low power operational amplifier

■General description

ELM832B is low power CMOS OP-AMP provided with input common mode voltage range and push-pull output stage. ELM832B makes it easy to design power circuits and is able to operate from single +1.2V power supply. ELM832B is suitable for applications such as portable devices which require low power and single source.

■Features

- Operation from a single power source
- Low voltage operation : 1.2V≤Vdd≤6.0V
- Low current consumption : 25μA (Typ. Vdd=3.0V)
- Common-mode input voltage range
  : Vss to Vdd-0.3V (Vdd=1.5V)
  : Vss to Vdd-0.1V (Vdd=3.0V)
- Output stage : Push-pull
- Unity gain bandwidth : Typ. 200kHz
- Package : SOT-25

■Application

- Battery-operated portable devices
- Micropower signal process
- Low voltage analog circuit

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Power supply voltage	Vdd	10	V
Input voltage	Vin	Vss-0.3 to Vdd+0.3	V
Output voltage	Vout	Vss-0.3 to Vdd+0.3	V
Output short circuit		Continuous	Sec.
Power dissipation	Pd	300	mW
Operating temperature	Top	-20 to +70	°C
Storage temperature	Tstg	-55 to +125	°C

■Selection guide

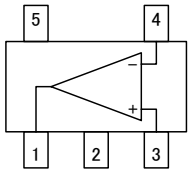
ELM832B-x

Symbol		
a	Product version	B
b	Taping direction	S, N : Refer to PKG file

ELM832 B - x
↑ ↑
a b

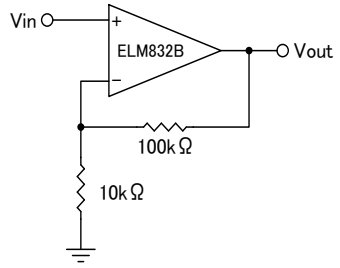
■Pin configuration

SOT-25 (TOP VIEW)



Pin No.	Pin name
1	OUT
2	VDD
3	IN+
4	IN-
5	VSS

■Standard circuit



■Electrical characteristics (Vdd=1.5V)

Vss=0V, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input offset voltage	Vio	Vin+=Vdd/2, Unity gain follower			±6	mV
Input bias current	Iib				1.0	nA
Common-mode input voltage range	Vcmr	For CMRR≥50dB	0.00		1.20	V
Maximum output voltage swing	Vouts	Vid=100mV, RL=10kΩ to Vss	1.40			V
Large-signal voltage gain	Avd	RL=10kΩ to Vss		95		dB
Common-mode rejection ratio	CMRR	RL=10kΩ to Vss		70		dB
Supply voltage rejection ratio	PSRR	RL=10kΩ to Vss Vdd=1.35V to 6.0V		95		dB
Current consumption	Iss	Vin+=Vdd/2, Unity gain follower		22	40	μA
Unity gain bandwidth	GBW			200		kHz
Slew rate	SR	RL=100kΩ, CL=20pF	80	120		mV/μs

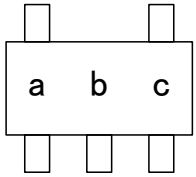
■Electrical characteristics (Vdd=3.0V)

Vss=0V, Top=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input offset voltage	Vio	Vin+=Vdd/2, Unity gain follower			±6	mV
Input bias current	Iib				1.0	nA
Common-mode input voltage range	Vcmr	For CMRR≥50dB	0.00		2.90	V
Maximum output voltage swing	Vouts	Vid=100mV, RL=10kΩ to Vss	2.90			V
Large-signal voltage gain	Avd	RL=10kΩ to Vss		100		dB
Common-mode rejection ratio	CMRR	RL=10kΩ to Vss		70		dB
Supply voltage rejection ratio	PSRR	RL=10kΩ to Vss Vdd=2.7V to 6.0V		100		dB
Current consumption	Iss	Vin+=Vdd/2, Unity gain follower		25	45	μA
Unity gain bandwidth	GBW			150		kHz
Slew rate	SR	RL=100kΩ, CL=20pF	80	100		mV/μs

■Marking

SOT-25



No.	Mark	Content
a	B	ELM832B
b	0 to 9	Lot No.
c	0 to 9	Lot No.

■Note

1) Common mode input voltage range

ELM832B common mode input voltage range is fixed under the condition of CMRR≥50dB; ELM832B is able to accept the input above its specification if the degradation of CMRR is not considered. Even if the input voltage exceeds either positive or negative power voltage, troubles such as reverse of output will not occur.

As maximum absolute rating, the input voltage is possible within (Vss-0.3)V to (Vdd+0.3)V.

2) Operation from single power source

ELM832B is designed to be most suitable for single power source; therefore, ELM832B is able to share power supply with logic circuit one. Meanwhile, ELM832B can also operate from double power sources.To protect power supplies of ELM832B and logic circuit from noise, please separate wire from power supply and use decoupling (bypass) capacitor. Using the capacitor can improve PSRR characteristics, especially on 10kHz to 100kHz or more.

3) Feedback

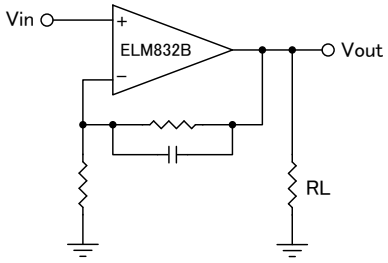
When OP-AMP circuit is used with feedback resistor, oscillation may happen in the circuit with loop-gain like unity gain follower.

a) When large feedback resistance is used, the phase margin is decreased by its combination with the parasitic capacitance of the input part of OP-AMP. In this situation, please connect small capacitor parallelly with feedback resistor as shown in fig-1.

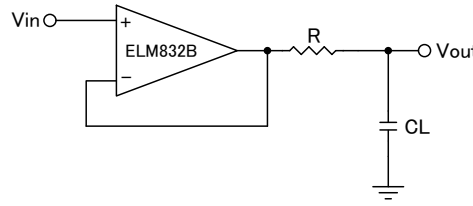
b) For capacitive load, external resistor in series connection will be effective as shown in fig-2. (R=300 to 500Ω)

c) Being used as an unity gain follow, ELM832B is able to drive capacitive load of 100pF directly without oscillation.

a) fig-1

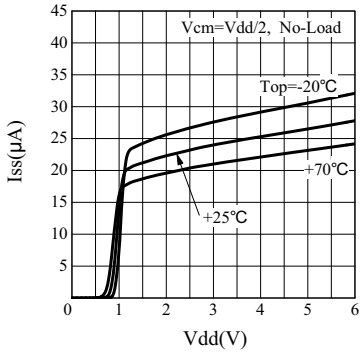


b) fig-2

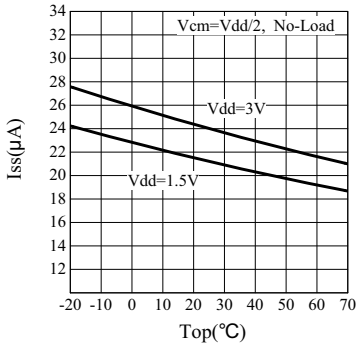


■Typical characteristics

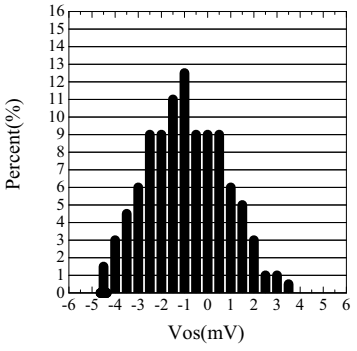
Iss - Vdd



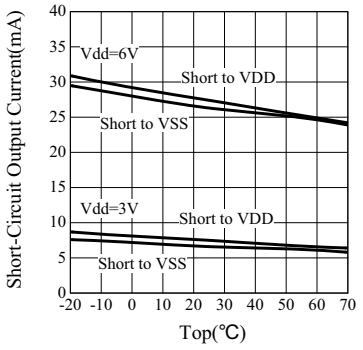
Iss - Top



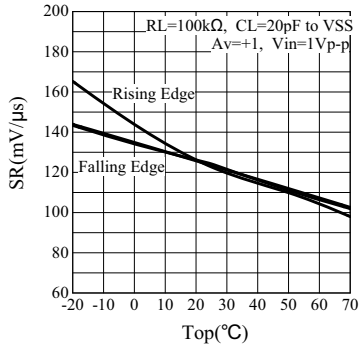
Vos - Distribution



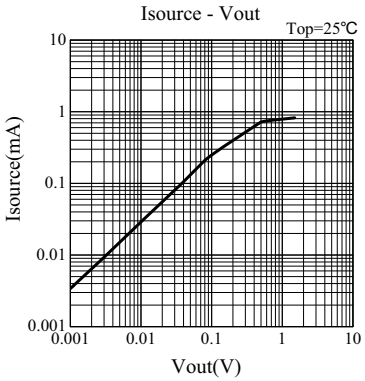
Short-Circuit Output Current - Top

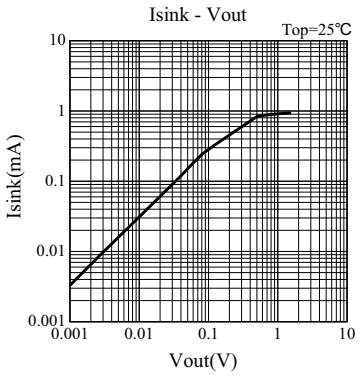


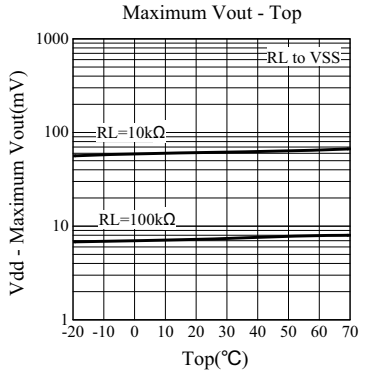
SR - Top

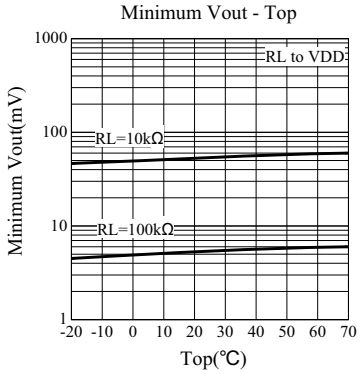


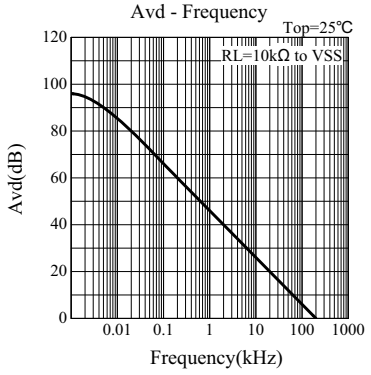
■1.5V Performance

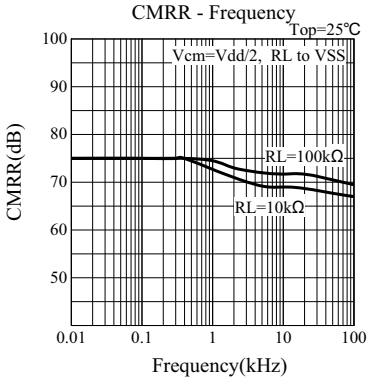


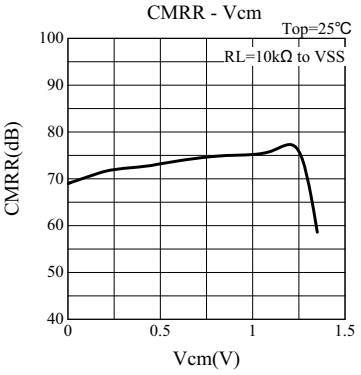


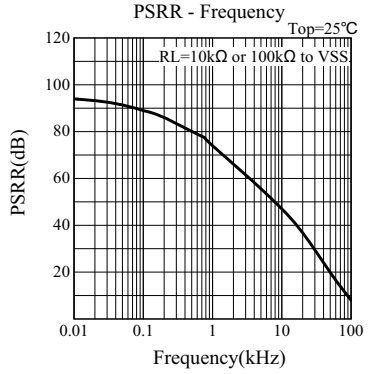


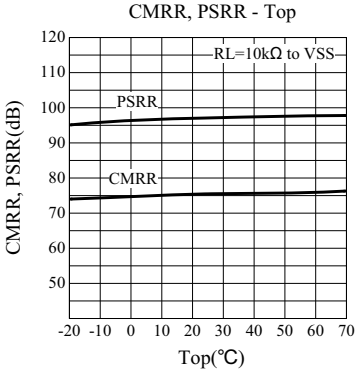


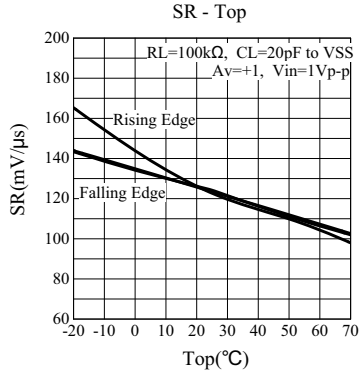



CMRR - Frequency
Top=25℃
Vcm=Vdd/2, RL to VSS
RL=100kΩ
RL=10kΩ
CMRR(dB)
100
90
80
70
60
50
0.01
0.1
1
10
100
Frequency(kHz)

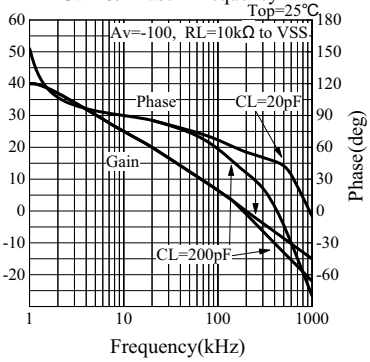

CMRR - Vcm
Top=25℃
RL=10kΩ to VSS
CMRR(dB)
100
90
80
70
60
50
40
0
0.5
1
1.5
Vcm(V)


PSRR - Frequency
Top=25℃
RL=10kΩ or 100kΩ to VSS
PSRR(dB)
120
100
80
60
40
20
0.01
0.1
1
10
100
Frequency(kHz)

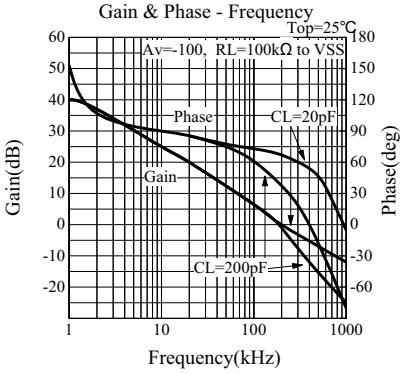

CMRR, PSRR - Top
RL=10kΩ to VSS
PSRR
CMRR
CMRR, PSRR(dB)
120
110
100
90
80
70
60
50
-20 -10 0 10 20 30 40 50 60 70
Top(℃)


SR - Top
RL=100kΩ, CL=20pF to VSS
Av=+1, Vin=1Vp-p
Rising Edge
Falling Edge
SR(mV/μs)
200
180
160
140
120
100
80
60
-20 -10 0 10 20 30 40 50 60 70
Top(℃)

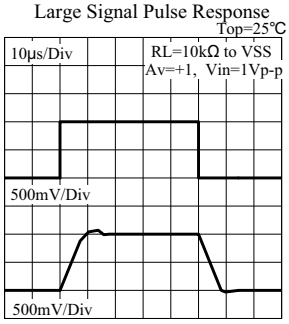
Gain & Phase - Frequency



Gain & Phase - Frequency

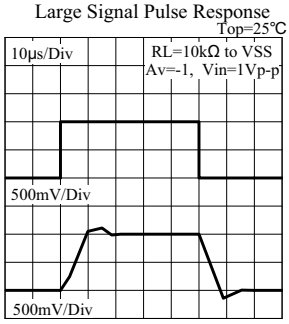


Large Signal Pulse Response



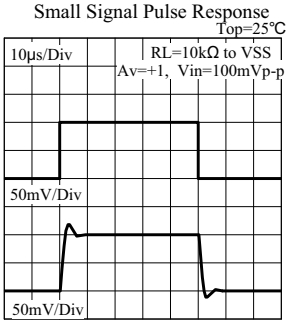
(Non-Inverting)

Large Signal Pulse Response



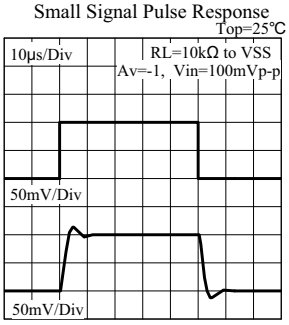
(Inverting)

Small Signal Pulse Response



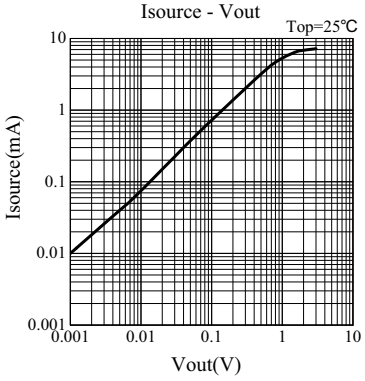
(Non-Inverting)

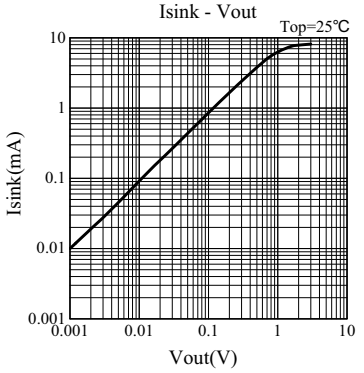
Small Signal Pulse Response

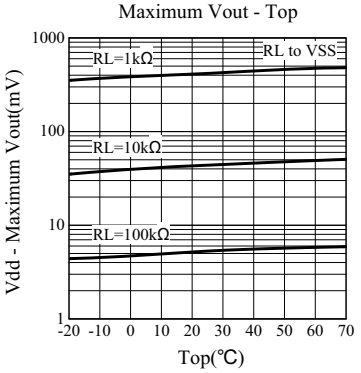


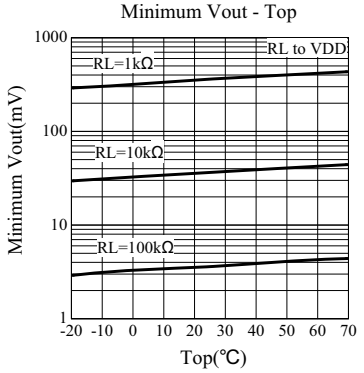
(Inverting)

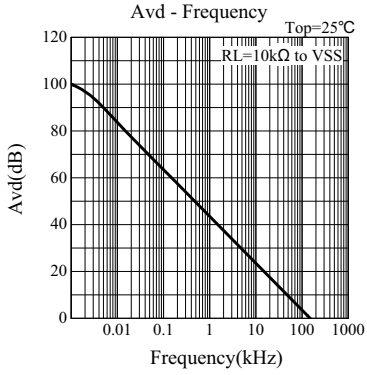
■3.0V Performance



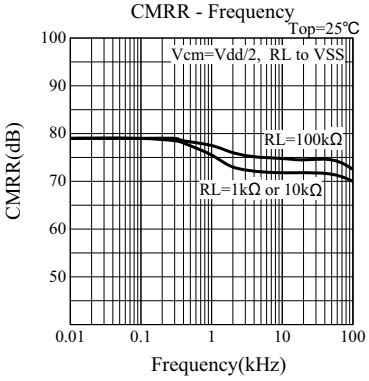




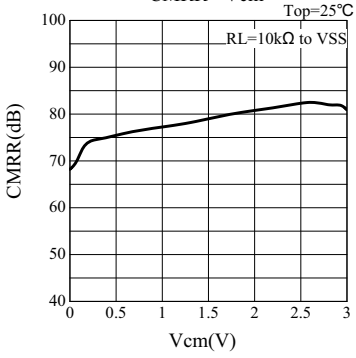




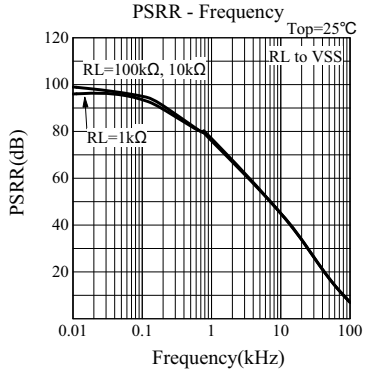
CMRR - Frequency



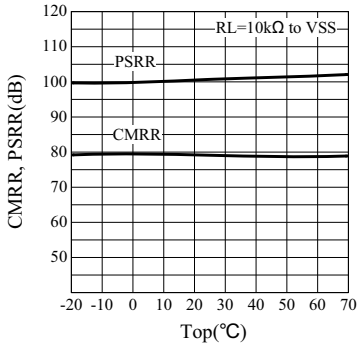
CMRR - Vcm



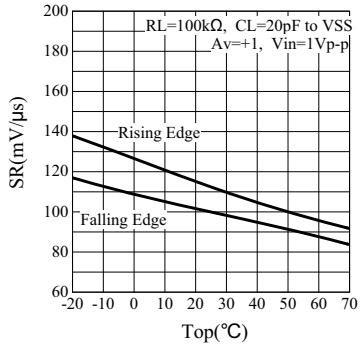
PSRR - Frequency



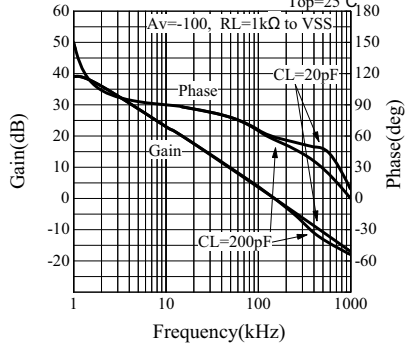
CMRR, PSRR - Top



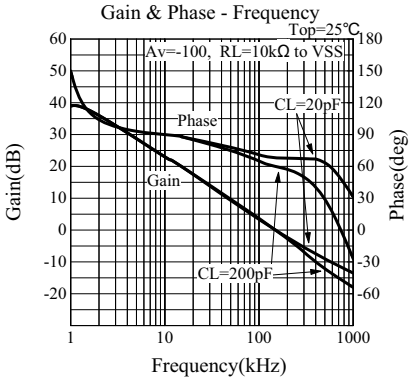
SR - Top



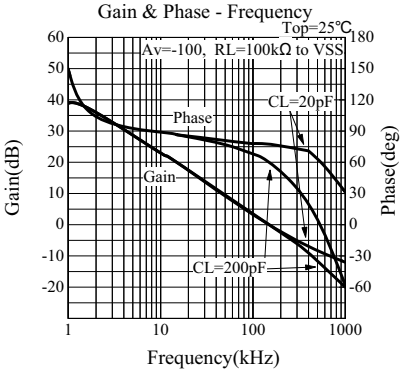
Gain & Phase - Frequency



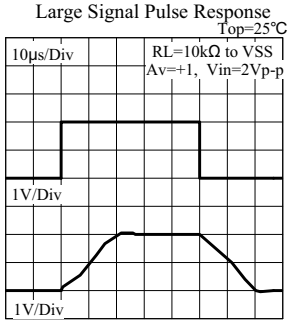
Gain & Phase - Frequency



Gain & Phase - Frequency

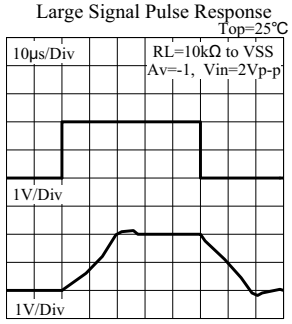


Large Signal Pulse Response



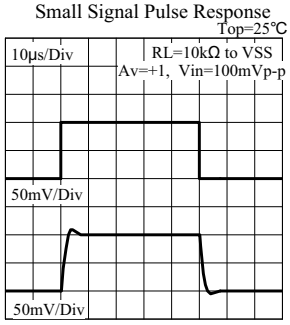
(Non-Inverting)

Large Signal Pulse Response



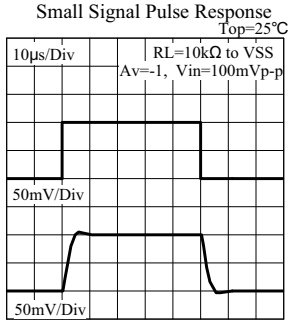
(Inverting)

Small Signal Pulse Response



(Non-Inverting)

Small Signal Pulse Response



(Inverting)