ELM832BW CMOS Low power dual operational amplifier

■General description

ELM832BW is low power CMOS dual operational amplifier which consists of doubly-packed ELM832B.
ELM832BW makes it easy to design power circuits and is able to operate from single +1.2V source.

■Features

- Operation from a single power source
- Low voltage operation : 1.2V≤Vdd≤6.0V
- Low current consumption
  : Typ.50μA(Vdd=3.0V, 2Amp. units total)
- 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 : TSSOP-8

■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

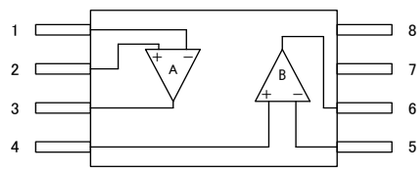
ELM832BW-x

Symbol		
a	Product version	B
b	Dual mark	W: dual
c	Taping direction	S, N: Refer to PKG file

ELM832 B W - x
↑ ↑ ↑
a b c

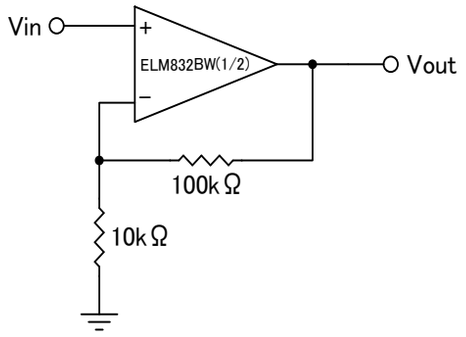
■Pin configuration

TSSOP-8(TOP VIEW)



Pin No.	Pin name
1	IN-A
2	IN+A
3	OUTA
4	IN+B
5	IN-B
6	OUTB
7	VDD
8	VSS

■Standard circuit



■Electrical characteristics

Vdd=1.5V Vss=0V, Top=25°C

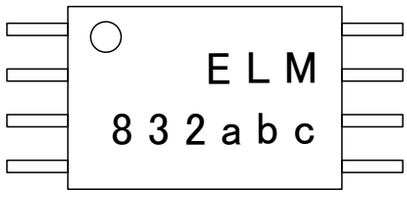
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input offset voltage	Vio	Vin+=Vdd/2, Unity gain follower			±6	mV
Input bias current	Iib				1.0	nA
Common-mode input voltage range	Vcmr	For CMRR≥50dB	0.00		1.20	V
Maximum output voltage swing	Vouts	Vid=100mV, RL=10kΩ to Vss	1.40			V
Large-signal voltage gain	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 (2Amp.unit total)	Iss	Vin+=Vdd/2, Unity gain follower		44	80	μA
Unity gain bandwidth	GBW			200		kHz
Slew rate	SR	RL=100kΩ, CL=20pF	80	120		mV/μs

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=2.70V to 6.0V		100		dB
Current consumption (2Amp.unit total)	Iss	Vin+=Vdd/2, Unity gain follower		50	90	μA
Unity gain bandwidth	GBW			150		kHz
Slew rate	SR	RL=100kΩ, CL=20pF	80	100		mV/μs

■Marking

TSSOP-8



Symbol	Mark	Content
a	0 to 9	Last numeral of A.D.
b	A to M (excepted I)	Assembly month
c	0 to 9	Lot No.

■Note

1) Common mode input voltage range

ELM832BW common mode input voltage range is fixed under the condition of CMRR≥50dB; ELM832BW 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

ELM832BW is designed to be most suitable for single power source; therefore, ELM832BW is able to share power supply with logic circuit one. Meanwhile, ELM832BW can also operate from double power sources. To protect power supplies of ELM832BW 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

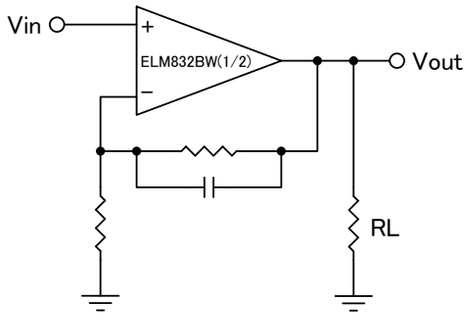
When OP-AMP circuit is used with feedback resistor, oscillation may happen in the circuit with loop-gain like unity gain follower.

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.

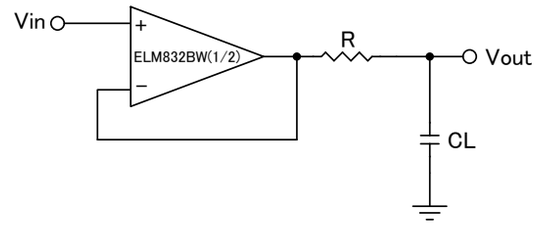
b) For capacitive load, external resistor in series connection will be effective as shown in fig-2. (R=300 to 500Ω)

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

a) fig-1

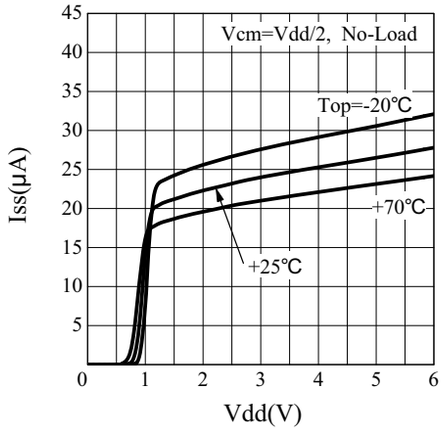


b) fig-2

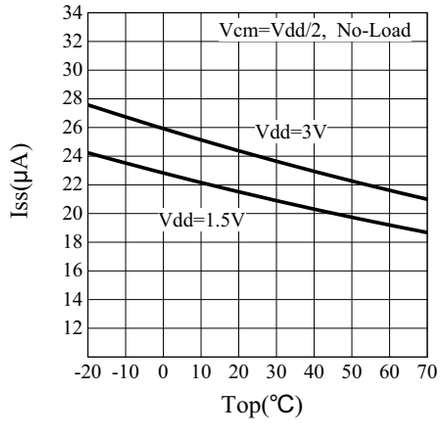


■Typical characteristics

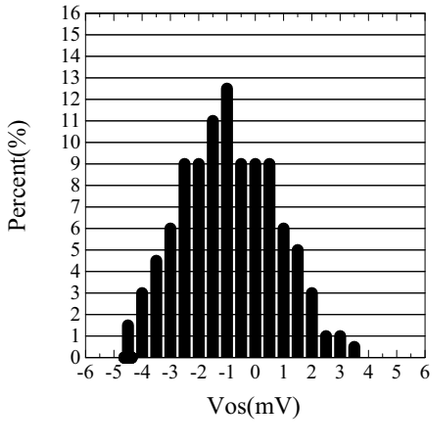
Iss - Vdd



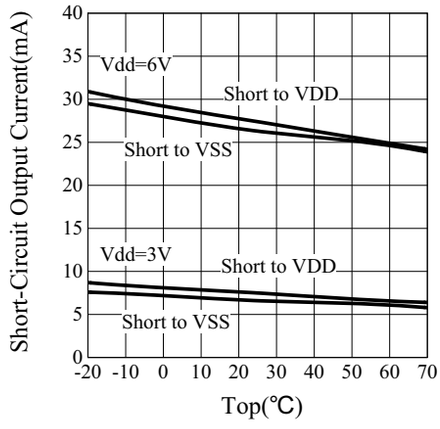
Iss - Top



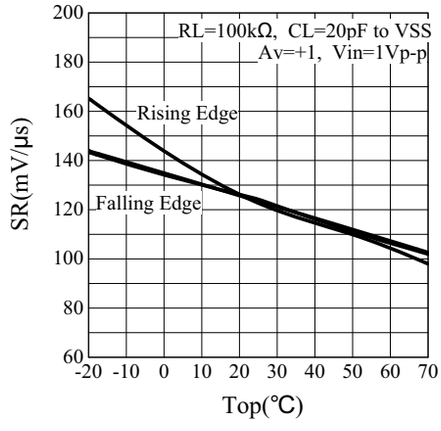
Vos - Distribution



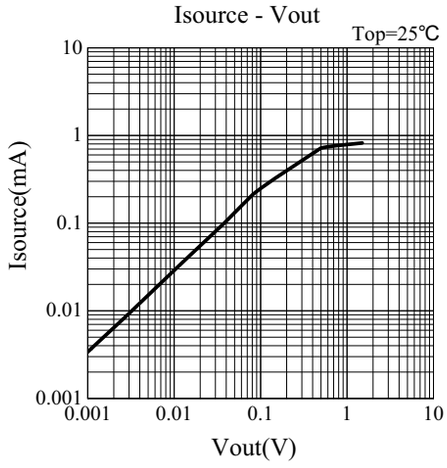
Short-Circuit Output Current - Top

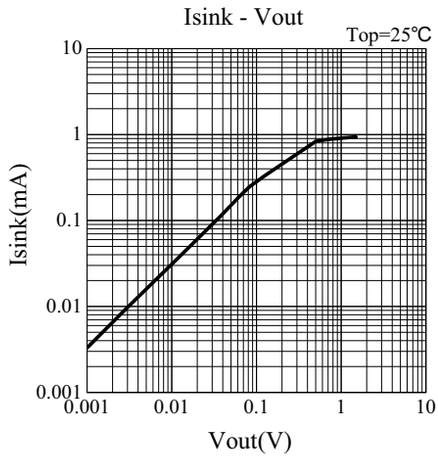


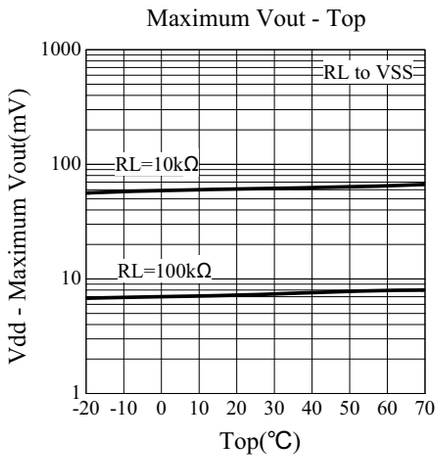
SR - Top

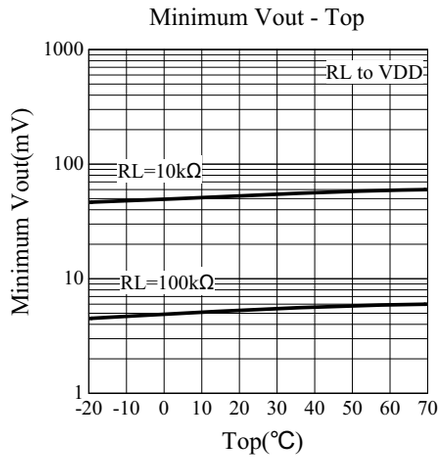


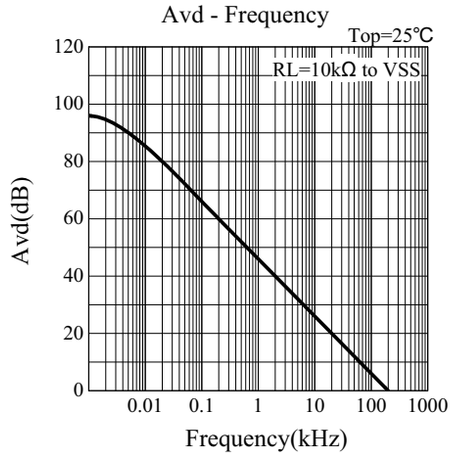
■1.5V Performance



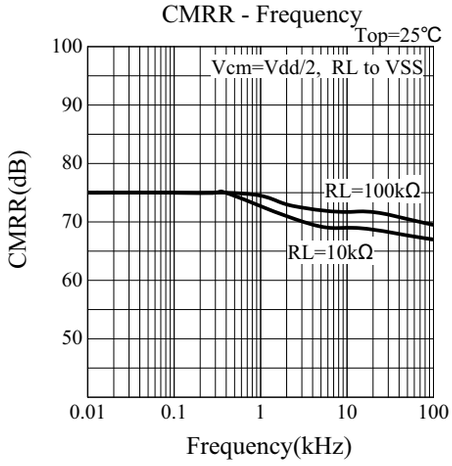




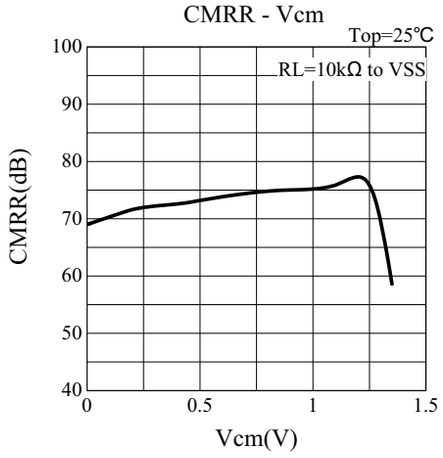




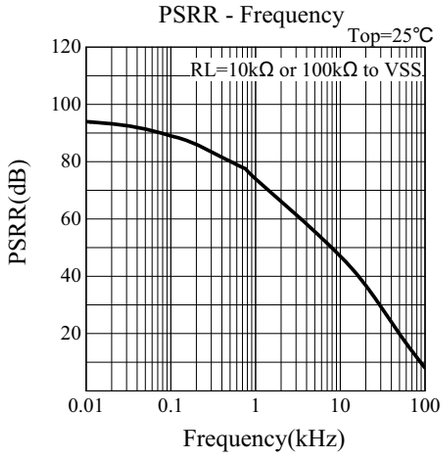
CMRR - Frequency



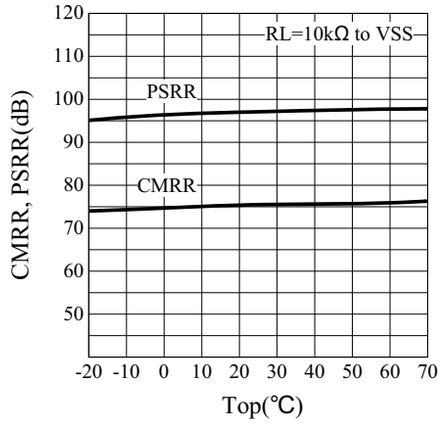
CMRR - Vcm



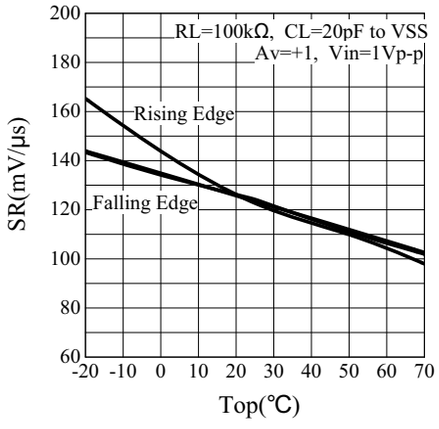
PSRR - Frequency



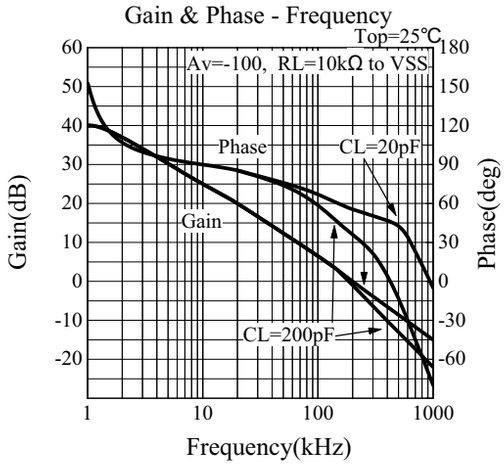
CMRR, PSRR - Top



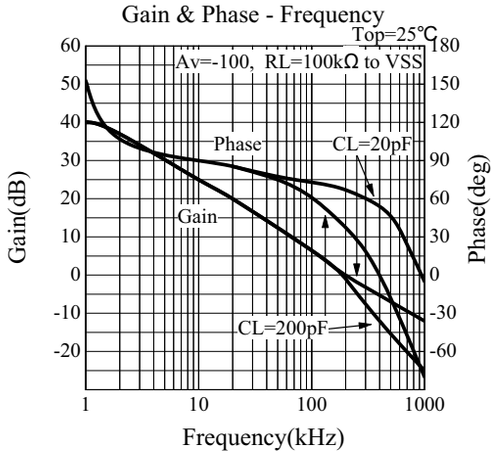
SR - Top



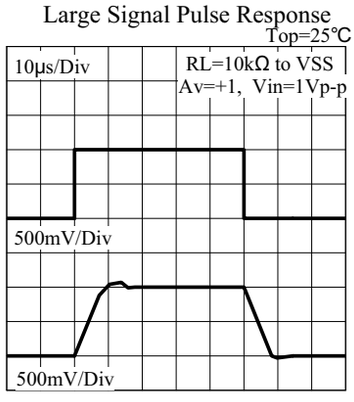
Gain & Phase - Frequency



Gain & Phase - Frequency

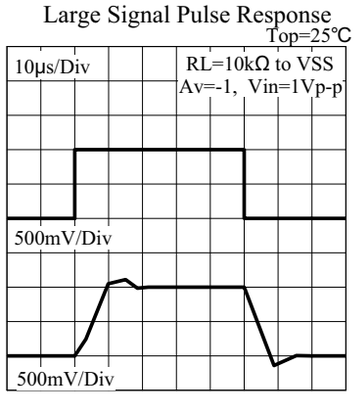


Large Signal Pulse Response



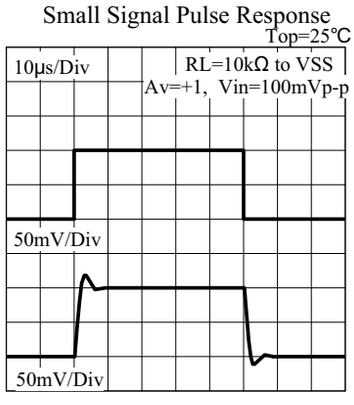
(Non-Inverting)

Large Signal Pulse Response



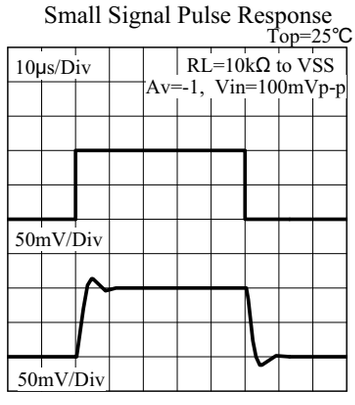
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Small Signal Pulse Response



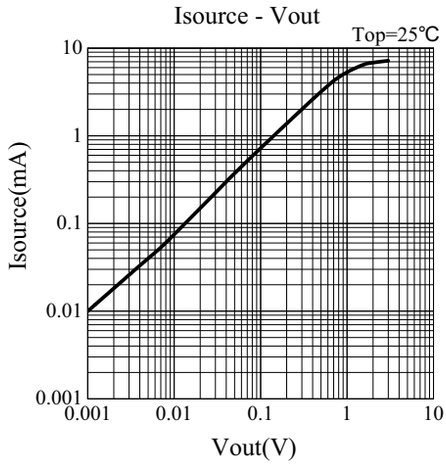
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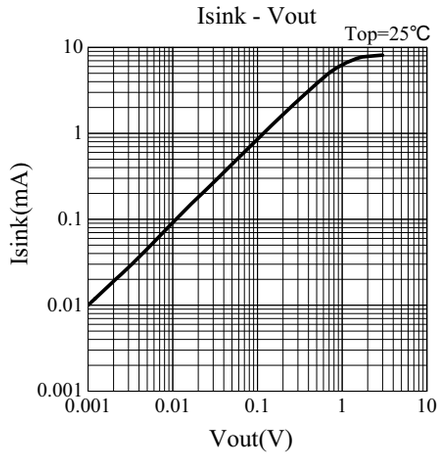
Small Signal Pulse Response

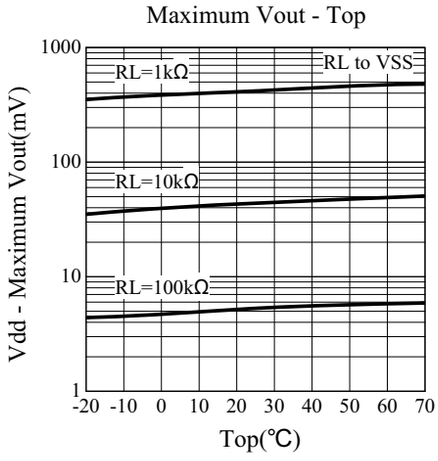


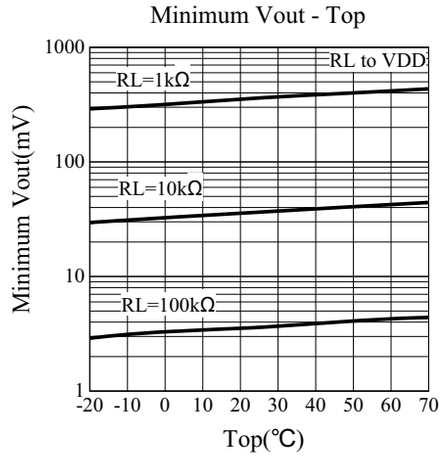
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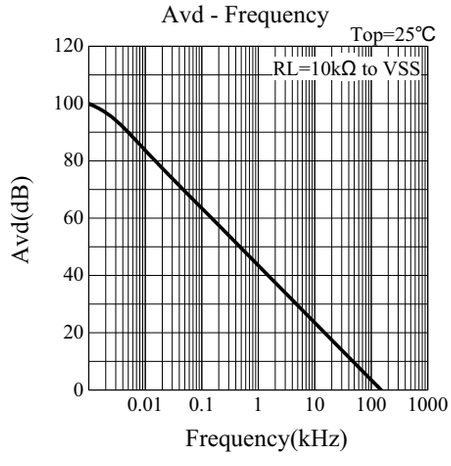
■3.0V Performance



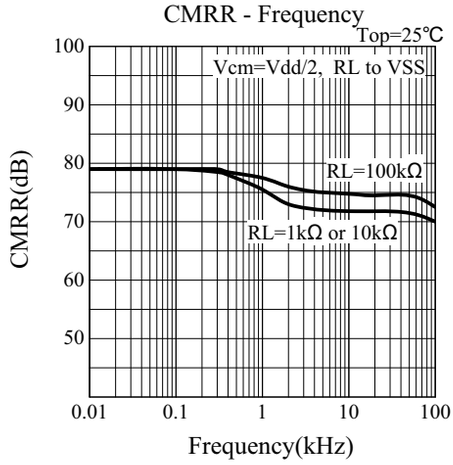




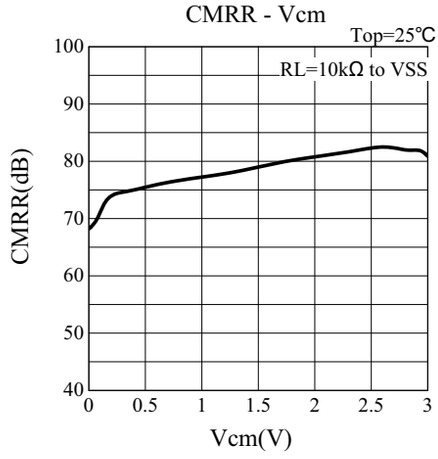




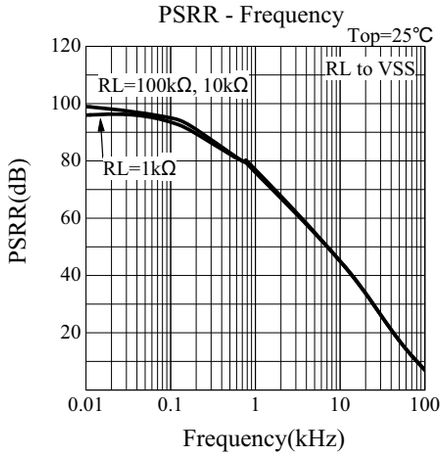
CMRR - Frequency



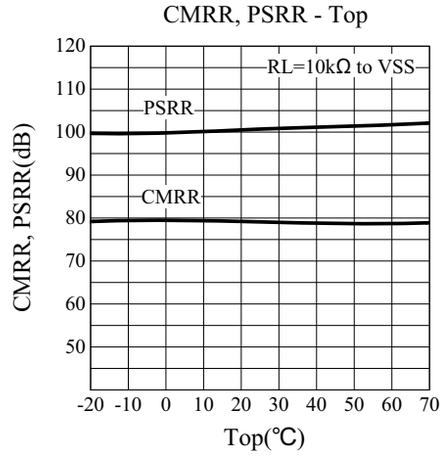
CMRR - Vcm



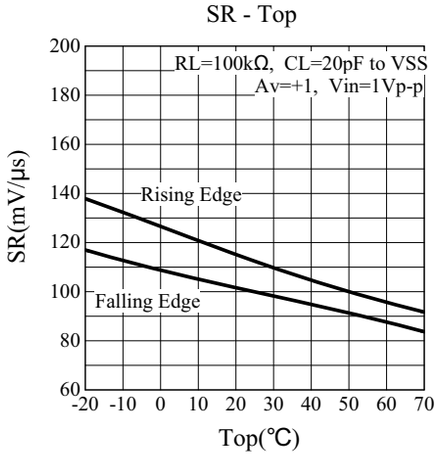
PSRR - Frequency



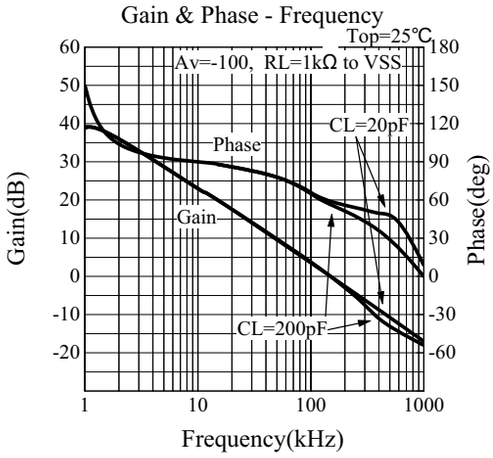
CMRR, PSRR - Top



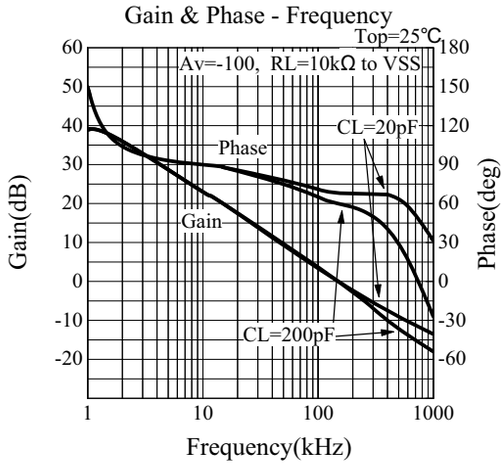
SR - Top



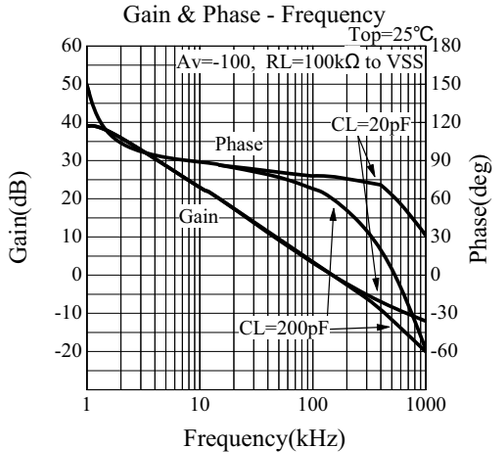
Gain & Phase - Frequency



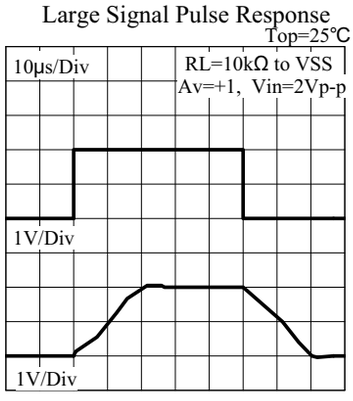
Gain & Phase - Frequency



Gain & Phase - Frequency

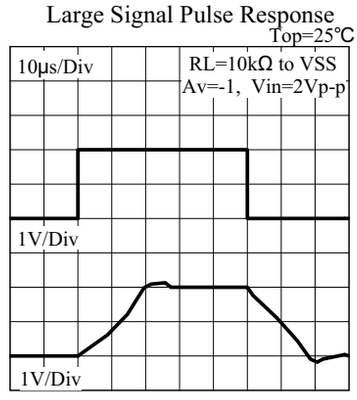


Large Signal Pulse Response



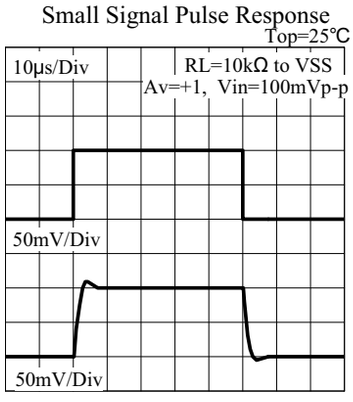
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Large Signal Pulse Response



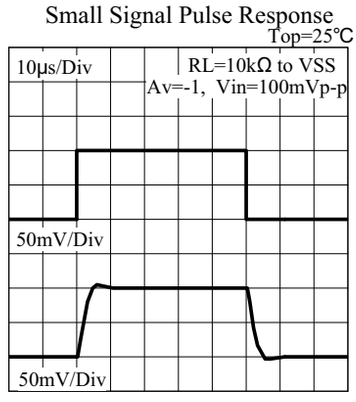
(Inverting)

Small Signal Pulse Response



(Non-Inverting)

Small Signal Pulse Response



(Inverting)