



LA6210M

Dual Operational Amplifier

Preliminary

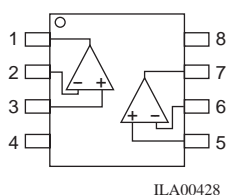
Overview

LA6210M is a low supply voltage and low saturation output voltage ($\pm 2.0V_{P-P}$ at supply voltage $\pm 2.5V$) operational amplifier. It is applicable to handy type CD, radio cassette CD, and portable DAT, that are digital audio apparatus which require the 5V single supply operation and high output voltage.

Features

- Single supply operation.
- Operating voltage. ($\pm 1.0V$ to $\pm 3.5V$)
- Low saturation output voltage.
- High slew rate. ($4.5V / \mu s$ typ.)
- Package outline. MFP8
- Bipolar technology.

Pin Configuration



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Pin function

1. A OUTPUT
2. A -INPUT
3. A +INPUT
4. V-
5. B +INPUT
6. B -INPUT
7. B OUTPUT
8. V+

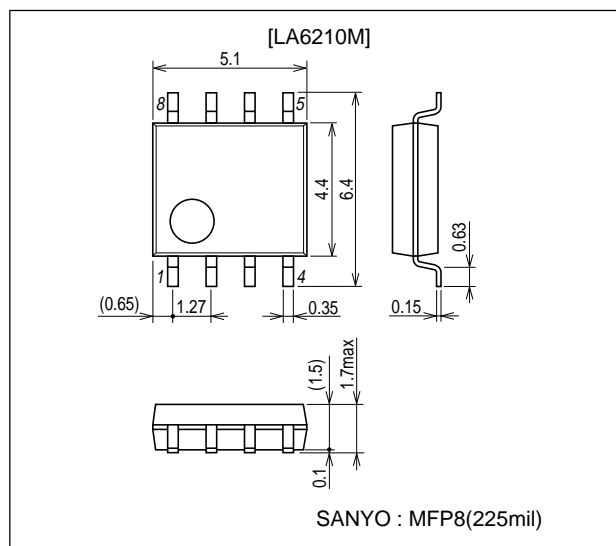
Specifications

Absolute Maximum Ratings at $T_a = 25^\circ C$

Parameter	Symbol	Ratings	Unit
Supply voltage	V^+/V^-	± 3.5	V
Differential input voltage	V_{ID}	± 7	V
Power dissipation	P_D	300	mW
Operating temperature range	T_{opr}	-40 to +85	$^\circ C$
Storage temperature range	T_{stg}	-40 to +150	$^\circ C$

Package Dimensions

unit : mm
3202C



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Electrical Characteristics at $T_a = 25\text{ }^\circ\text{C}$, $V^+/V^- = \pm 2.5\text{V}$

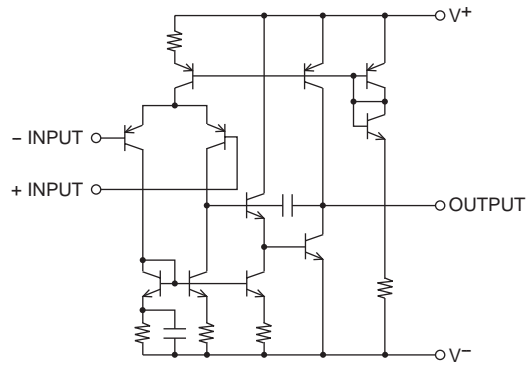
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input offset voltage	V_{IO}	$R_S \leq 10\text{k}\Omega$	-	0.3	6	mV
Input offset current	I_{IO}		-	1.5	200	nA
Input bias current	I_B		-	75	300	nA
Large signal voltage gain	A_V	$R_L \geq 10\text{k}\Omega$	60	90	-	dB
Maximum output voltage swing	V_{OM}	$R_L \geq 2.5\text{k}\Omega$	± 2	± 2.2	-	V
Input common mode voltage range	V_{ICM}		± 1.5	-	-	V
Common mode rejection ratio	CMR		60	80	-	dB
	SVR(+)		60	92	-	dB
Supply voltage rejection ratio	SVR(-)		60	72	-	dB
Operating current	I_{CC}	$V_{IN} = 0, R_L = \infty$	-	3.4	5	mA
Slew rate	SR	$A_V = 1, V_{IN} = \pm 1\text{V}$	-	4.5	-	V/ μS
Gain-bandwidth product	GB		-	12	-	MHz

(Note 1) Applied circuit voltage gain is desired to be operated within the range of 3 dB to 30 dB.

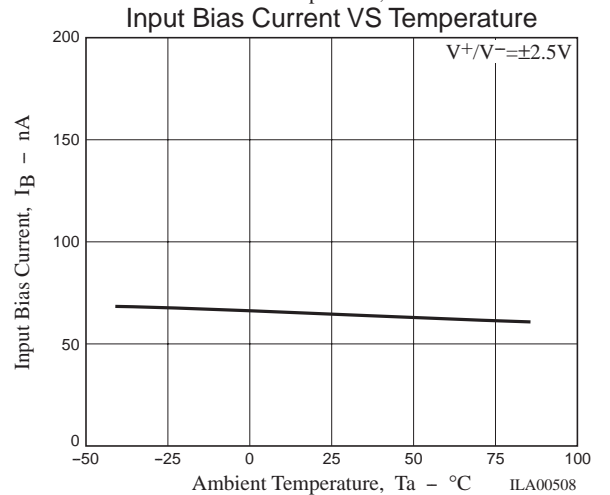
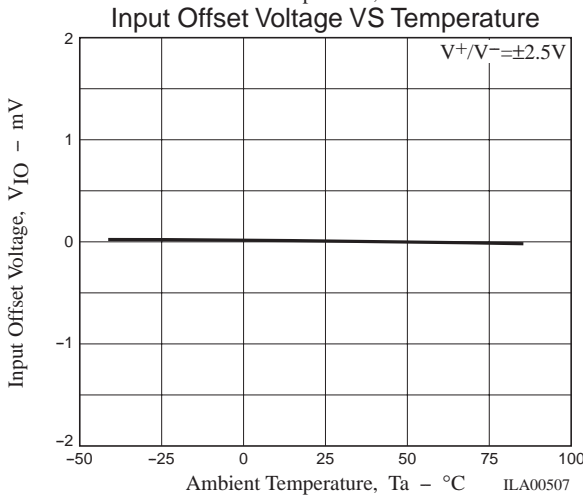
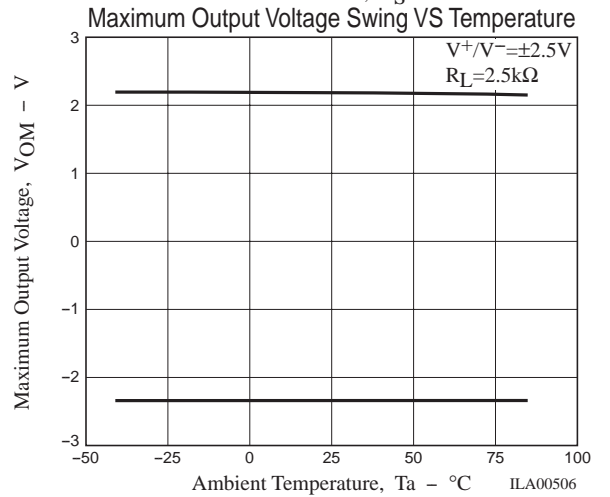
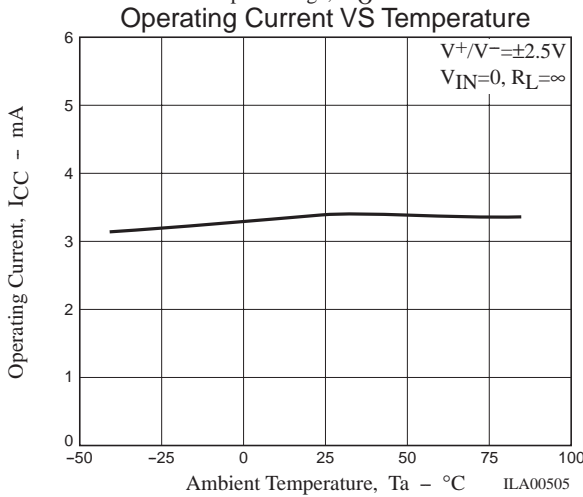
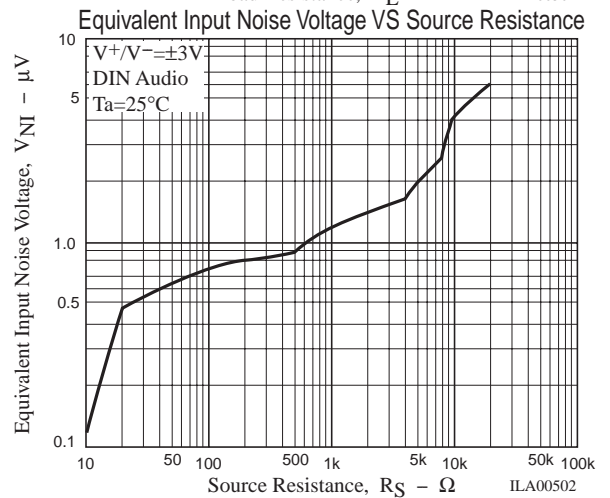
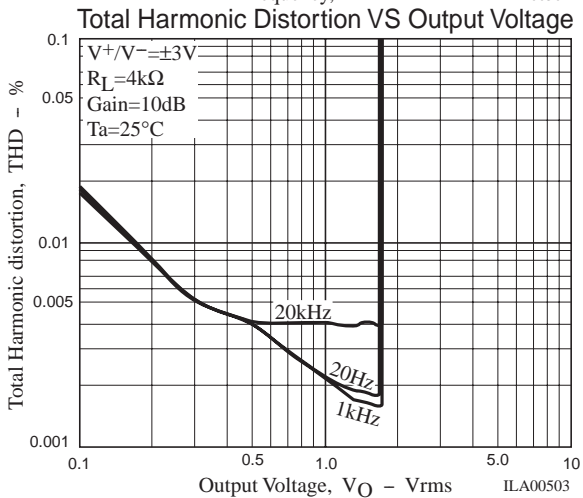
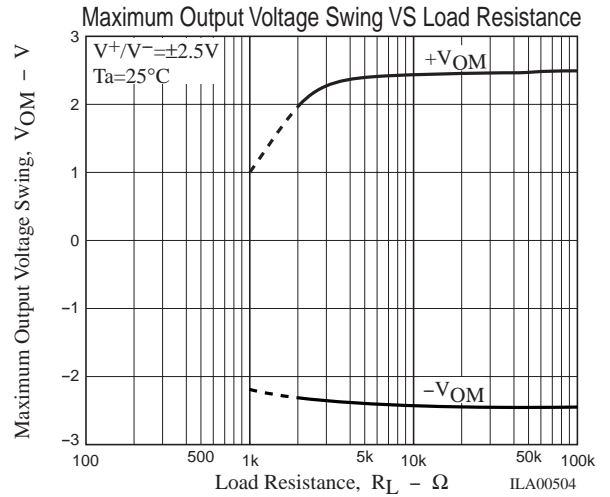
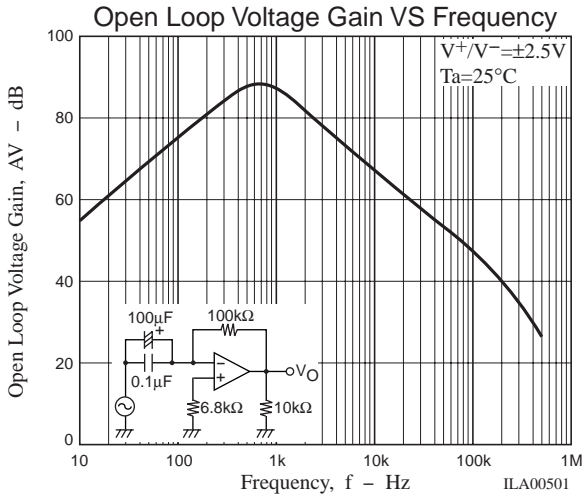
(Note 2) Special care being required for input common mode voltage range and the oscillation due to the capacitive load when operating on voltage follower.

(Note 3) Special care being required for the oscillation, yet having the gain when the supply voltage is applied at more than $\pm 2.5\text{V}$ (single supply voltage 5V).

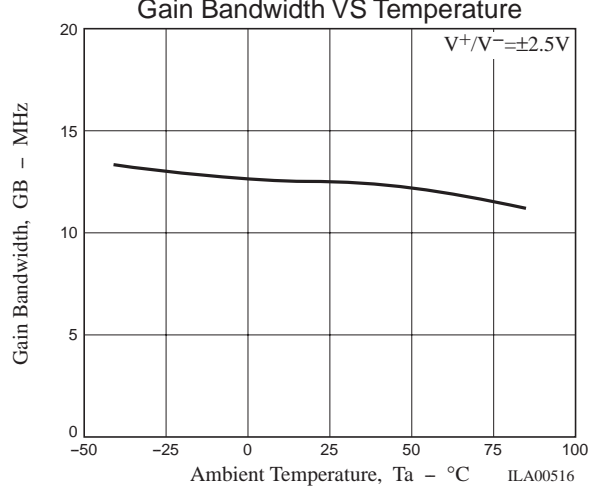
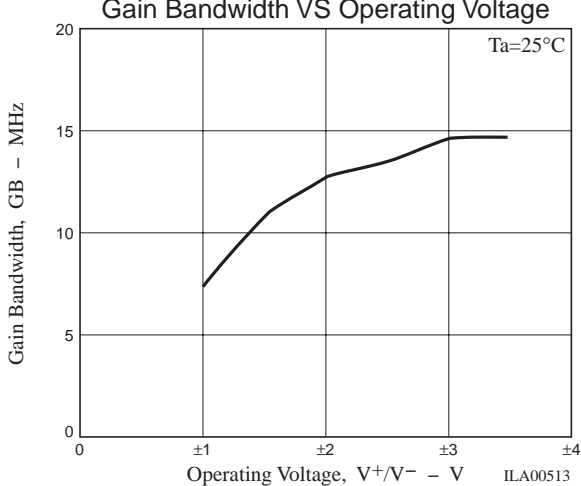
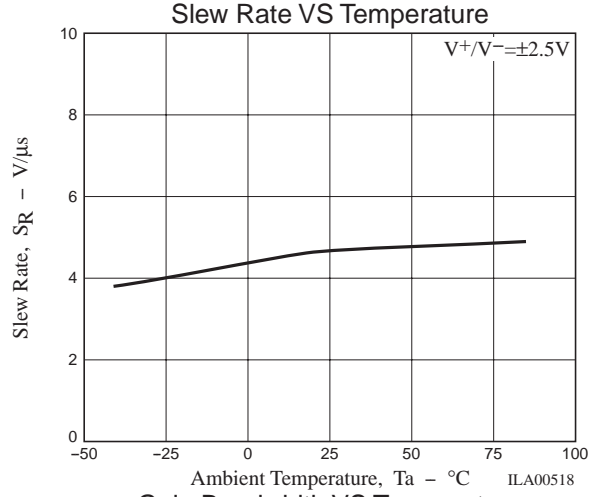
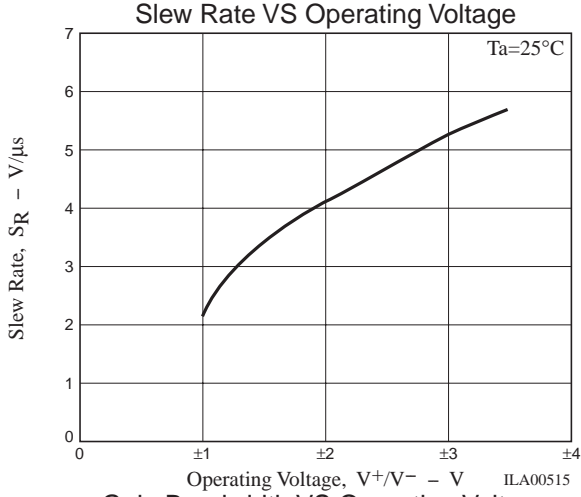
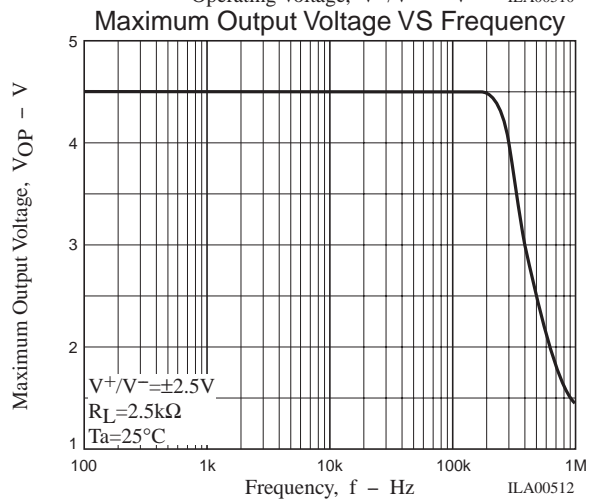
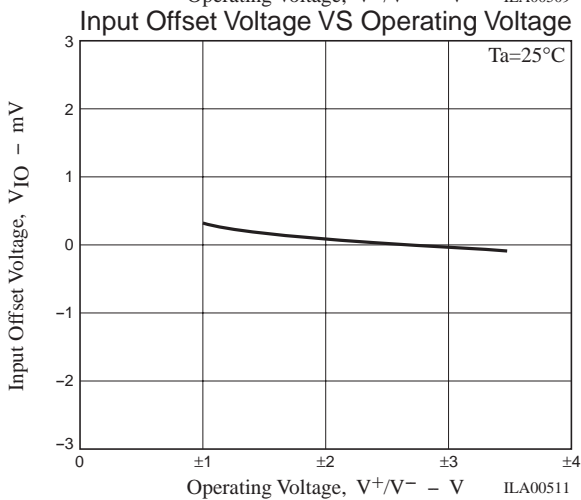
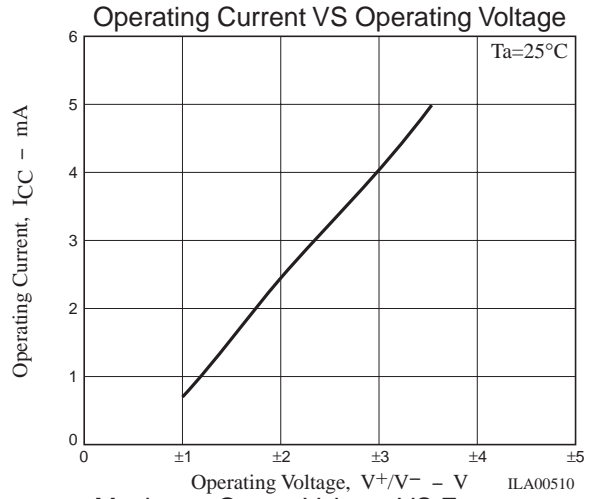
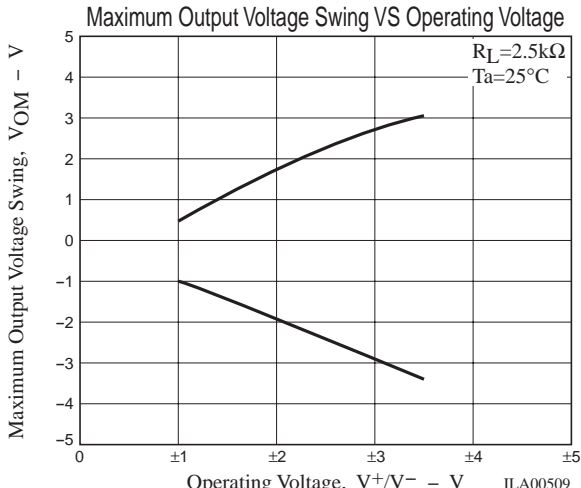
Equivalent Circuit



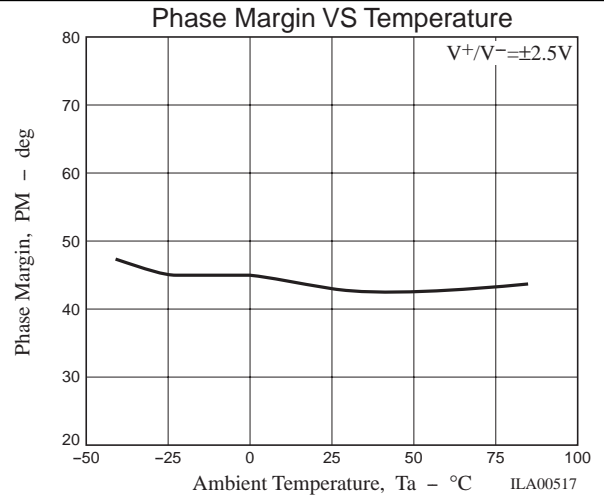
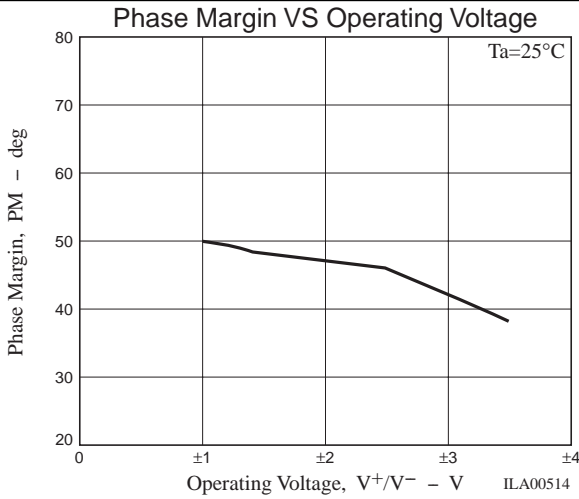
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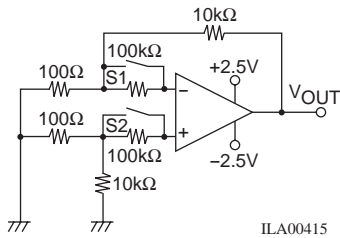


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Test Circuits(V[±]=2.5V, Ta=25°C, TYP) :

Input Offset Voltage / Input Offset Current / Input Bias Current



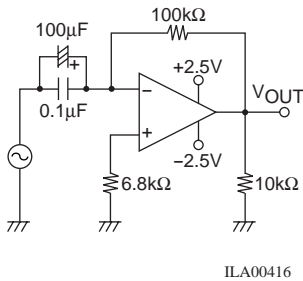
S1	S2	V _{OUT}
on	on	V _{O1}
off	off	V _{O2}
on	off	V _{O3}
off	on	V _{O4}

$$V_{IO} = \frac{V_{O1}}{\text{Gain}}$$

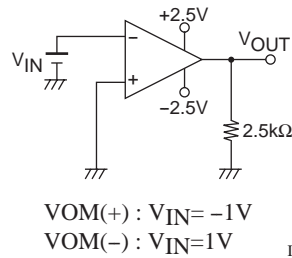
$$I_{IO} = \frac{|V_{O2} - V_{O1}|}{100k\Omega \times \text{Gain}}$$

$$I_B = \frac{|V_{O3} - V_{O4}|}{2 \times 100k\Omega \times \text{Gain}}$$

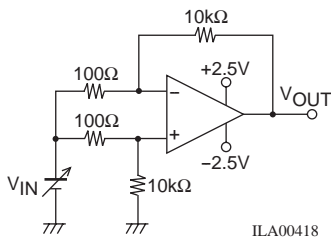
Large Signal Voltage Gain



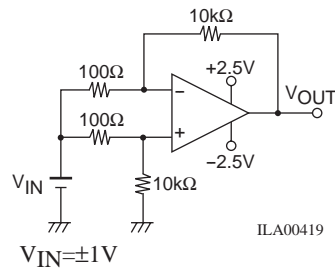
Maximum Output Voltage Swing



Input Common Mode Voltage Range

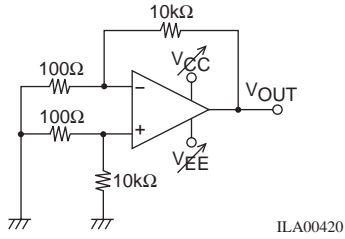


Common Mode Rejection Ratio



$$CMR = 20 \log \left| \frac{\Delta V_{IN} \times \text{Gain}}{\Delta V_{OUT}} \right|$$

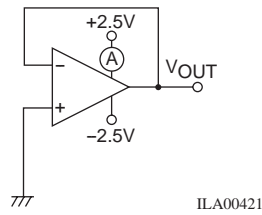
Supply Voltage Rejection Ratio



SVR(+): $V_{CC}=1.25V, V_{EE}=-2.5V$
 SVR(-): $V_{CC}=2.5V, V_{EE}=-1.25V$

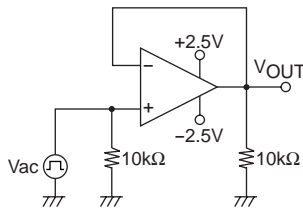
$$SVR=20 \log \left| \frac{\text{Gain} \times \Delta V_{SUP}}{\Delta V_{OUT}} \right|$$

Operating Current

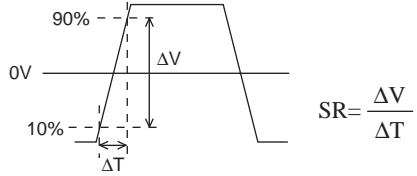


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Slew Rate

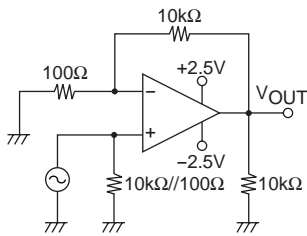


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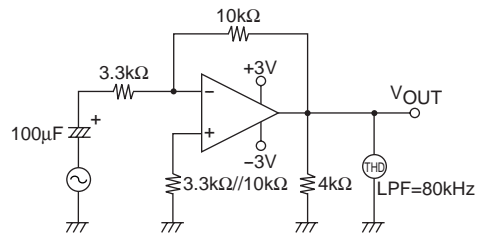
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Gain Bandwidth Product



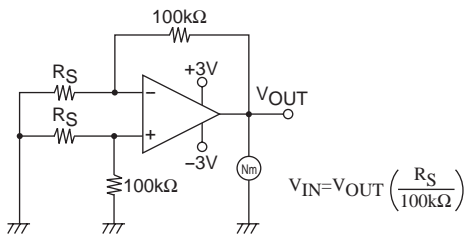
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Total Harmonic Distortion



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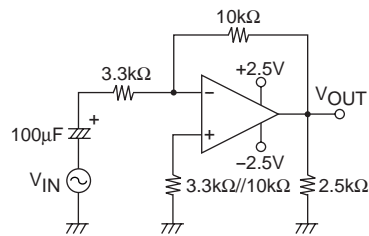
Equivalent Input Noise Voltage



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$$V_{IN}=V_{OUT} \left(\frac{R_S}{100k\Omega} \right)$$

Maximum Output Voltage vs. Frequency



Set V_{IN} level when output is 10% THD at 1kHz.

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